

Anxiety, Depression, And Their Associations With Resilience Among Chinese Adolescents: A Cross-Sectional Study

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Abstract

The mental health problems of adolescents appear to have increased worldwide in recent years. The aim of this study was to assess anxiety, depression, and their associations with resilience among Chinese adolescents. 2452 students were recruited from 3 middle schools through cluster randomization in Chengdu, Sichuan province, China. Resilience, family function, depression and anxiety were measured by resilience subscale of Chinese Positive Youth Development Scale (CPYDS), Chinese Family Assessment Instrument (C-FAI), the Center for Epidemiological Studies Depression Scale for Children (CES-DC), and the Screen for Child Anxiety Related Emotional Disorders (SCARED), respectively. Ordinal logistic regression and binary logistic regression were used to explore the independent effect of different variables on anxiety and depression. The prevalence of anxiety and depressive symptoms among adolescents was 30.3% and 40.5% respectively in our study. Senior and male students experienced lower levels of anxiety ($OR=0.900, p<0.001$; $OR=0.479, p<0.001$). Resilience was negatively associated with both anxiety and depression ($OR=0.700, p<0.001$; $OR=0.796, p<0.001$). Poor interaction with caregivers was a risk factor for both anxiety ($OR=0.943, p=0.037$) and depression ($OR=0.899, p<0.001$). Family dysfunction and internet use were protective factors for both anxiety ($OR=1.418, p<0.001$; $OR = 1.001, p<0.001$) and depression ($OR=1.418, p<0.001$; $OR = 1.001, p<0.001$). The existence of anxiety was found to be positively correlated with depressive symptoms in our sample. More attention should be paid to the mental health of adolescents. Measures that improve resilience and family function might be considered by stakeholders. A healthy lifestyle should also be stressed among adolescents.

1. Introduction

The mental health problems of adolescents appear to have increased worldwide in recent years(1). As shown by UK prevalence data, approximately 9% of young people aged 11–16 and 15% of young people aged 17–19 have a diagnosable emotional disorder(2), among which, depression and anxiety are the most common disorders(3). It was reported that more than 20% of Chinese adolescents aged 10–15 years were suffering from depressive symptoms in 2018(4). Untreated depression and anxiety disorders of teenagers often persist into adulthood(5), and are usually associated with increased risk of a wide range of long-term negative outcomes including educational underachievement, unemployment, substance abuse, teenage pregnancy and poor physical health(6, 7). Moreover, they are the main contributors to self-harm and suicide(8), which is the third leading cause of death in adolescents(9) and the most common cause of death in female adolescents aged 15–19 years globally(10).

In recent decades, researches focusing on promotion of protective factors of mental health are increasing (11). Previous studies have shown that higher levels of protective factors, including strong attachment to family, high social skills/competence, high levels of religiosity, positive personal disposition, positive social support, and strong family cohesion were associated with lower levels of anxiety and depressive symptoms in adolescents(12–14). Positive development has long been considered to be critical for adolescents, with resilience as an important part(15). Resilience describes the phenomenon in which an individual gets a positive adaptation to adversity (16), experiences little or no psychiatric health

problems(17). Findings of studies have demonstrated that resilience was an important protective factor of mental health problems in children and adolescents. For example, studies have reported higher resilience were associated with less distress and somatic symptoms(18, 19). A retrospective cohort study reported that children with higher resilience were more likely to get higher income and experience less unemployment when they grew up compared with children with lower resilience(20). However, there is a paucity of evidence focusing on the correlations between anxiety, depression, and resilience, which limits our understanding of the whole picture of the mental health issues of adolescents. Therefore, our study aims to assess the prevalence of anxiety and depressive symptoms and their associations with resilience among Chinese adolescents, with the hypothesis that resilience would be an independent protective factor of both depression and anxiety.

2. Methods

2.1. Study population and sampling

We conducted a cross-sectional study in Chengdu, Sichuan Province, China, assessing anxiety and depression, as well as their associations with resilience in adolescents. Two thousand four hundred and fifty-two out of 3080 students were recruited through cluster randomization from 3 middle schools in Chengdu according to voluntariness.

2.2. Measurement tools

Demographic information

A self-compiled demographic data form was used to collect the basic characteristics of participants, including gender, nationality, grade, age, time spent on sleep, sports, and electronic products, frequency of soft-drinks consumption and relationship with caregivers.

CES-DC

The Center for Epidemiological Studies Depression Scale for Children (CES-DC) was used for depression screening. CES-DC has great reliability and validity in Mainland China (internal consistency $\alpha= 0.74-0.89$; effect size = 0.72; sensitivity = 0.80) (21, 22), There are 20 items in total, with each item rated on a 4-point scale in terms of its frequency of occurrence during the last week, from “not at all” = 0 to “a lot” = 3 (23). The total score of CES-DC ranges from 0 to 60, and the recommended cutoff point was a score of ≥ 15 (24), a higher score represents a higher level of depression.

SCARED

The Screen for Child Anxiety Related Emotional Disorders (SCARED), a self-report instrument, was used to screen for anxiety disorders (25). SCARED is consisted of 41 items (each item included 3-point responses, 0: not at all, 1: sometimes, 2: frequently) and 5 factors (panic/somatic, generalized anxiety, separation anxiety, social phobia, and school phobia), each factor shows good internal consistency, with a

coefficient value ranging between 0.78 and 0.87 in Mainland China(26). The whole SCARED has demonstrated good internal consistency, test–retest reliability and discriminant validity as well(26, 27), with a cutoff point of ≥ 25 .

Resilience subscale of CPYDS

Resilience subscale of Chinese Positive Youth Development Scale (CPYDS) was used to assess resilience. CPYDS has 15 subscales: bonding, resilience, social competence, emotional competence, cognitive competence, behavioral competence, moral competence, self-determination competence, self-efficacy, spirituality, beliefs in the future, clear and positive identity, prosocial involvement, prosocial norms and recognition for positive behavior(28). Resilience subscale has 6 items, each item includes 6-point responses (1: disagree very much, 2: disagree moderately, 3: disagree slightly, 4: agree slightly, 5: agree moderately, and 6: agree very much). Scores of all the 6 items are summarized to serve as the final score of the resilience subscale. A higher score indicates better resilience. Good reliability (internal consistency coefficient is 0.82) and criterion-related validity of the Resilience subscale has been demonstrated(29).

C-FAI

The Chinese Family Assessment Instrument (C-FAI) was used to measure family function. C-FAI has 33 items (scores range from 1 to 5) and five subscales, including mutuality, communication, conflict and harmony, parental concern, and parental control. The total score of C-FAI ranges from 33 to 165, a higher score indicates a higher level of family dysfunction (30). The C-FAI has been validated in mainland China, with a concordance correlation coefficient ranging between 0.93 and 0.98 (31).

2.3 Data collection

Data was collected by trained researchers in an onsite manner between September 2020 to December 2020, using self-assessment questionnaires. All participants filled the questionnaire independently and returned to researchers immediately, uniform explanation was offered by researchers if needed. It took about 30 minutes for each participant to complete the entire study.

2.4 Ethical consideration

Our study was approved by the Medical Ethical Committee of XX University, with the registration number of KXXXXXXX. Informed written consent was obtained before recruitment. Participants' names were replaced by numbers for confidentiality. All the participants were aware of the purposes and procedures of the study, and they had the right to withdraw at any time without any negative consequences.

2.5 Statistical analysis

SPSS 25.0 software was used to analyze data. All variables were examined for outliers and normality. Qualitative data were reported as numbers and percentages [N (%)]. Quantitative variables were recorded as median and quartile [M (Q)] or mean and standard deviation [mean (SD)] according to the data

distribution. Univariate analyses (Chi-square test, Wilcoxon Mann-Whitney test and Kruskal-Wallis test) were used to explore the correlations between resilience and demographic characteristics, anxiety, and depression. To explore the independent effect of different variables on anxiety and depression, ordinal logistic regression and binary logistic regression were used. Dummy variables were set for categorical variables before entering the model. All statistical tests used were two-sided, and a P-value of less than 0.05 was considered significant.

3. Results

3.1. Basic information

A total of 2452 participants completed the entire study. The majority of them (99.1%) were Han nationality, and 1218(49.7%) of them were boys, the other 1234(50.3%) were girls. Forty-three point six percent of the participants were at grade 7, 42.3% were at grade 8, and 14.1% were at grade 9. The average age of the participants was 14.19(SD 0.88) years old (ranging from 12–19). Demographic characteristics of participants are shown in Table 1.

Table 1
Results of univariate analysis.

		N (%)	CES-DC		SCARED	
			χ^2 value	<i>p</i> value	χ^2 value	<i>p</i> value
Gender	Male	1218(49.7)	12.048	0.002	51.447	0.000
	Female	1234(50.3)				
Nationality	Han nationality	2431(99.1)	0.714	0.700	0.418	0.518
	Minority nationality	21(0.9)				
Grade	7	1070(43.6)	10.508	0.033	24.097	0.000
	8	1038(42.3)				
	9	344(14.1)				
SCARED	No	1710(69.7)	566.037	0.000		
	Yes	742(30.3)				
CES-DC	No depression	1458(59.5)				
	Potential depression	252(10.2)				
	Definite depression	742(30.3)				
		M (Q ₁ , Q ₃)/Mean (SD)	CES-DC		SCARED	
			H/F value	<i>p</i> value	Z/t value	<i>p</i> value
Age		14.08(0.876)	4.291	0.015	-3.315	0.001
Resilience		5.33(4.67, 5.83)	167.622	0.000	-11.771	0.000
C-FAI		1.86(1.37, 2.57)	209.926	0.000	-10.143	0.000
Daily time spending on electronic products (minute)		120(61, 190)	65.225	0.000	-7.459	0.000
Daily time spending on sleeping (minute)		480(480, 540)	19.879	0.000	-2.743	0.006

N = Number, M = Median, Q₁ = First quartile, Q₃ = Third quartile, SD = Standard deviation, CES-DC = The Center for Epidemiological Studies Depression Scale for Children, SCARED = The Screen for Child Anxiety Related Emotional Disorders, C-FAI = The Chinese Family Assessment Instrument.

	N (%)	CES-DC		SCARED	
		χ^2 value	<i>p</i> value	χ^2 value	<i>p</i> value
Daily time spending on exercising (minute)	60(60, 120)	6.235	0.000	-2.518	0.012
Frequency of drinking soft-drinks (times in a week)	1(1, 2)	16.575	0.000	-2.925	0.003
Relationship with caregiver	9(7,10)	134.134	0.000	-8.386	0.000
N = Number, M = Median, Q ₁ = First quartile, Q ₃ = Third quartile, SD = Standard deviation, CES-DC = The Center for Epidemiological Studies Depression Scale for Children, SCARED = The Screen for Child Anxiety Related Emotional Disorders, C-FAI = The Chinese Family Assessment Instrument.					

Median of resilience was 5.33 (first quartile to third quartile range from 4.67 to 5.83). The prevalence of anxiety and depression among students in this study was 30.3% (SCARED index score \geq 25) and 40.6% (CES-DC index score \geq 15), respectively. For depression status, the prevalence of each category was 59.5% (no depression), 10.3% (potential depression) and 30.3% (definite depression), respectively (Table 1).

3.2. The associations between anxiety, depression, and resilience

According to univariate analysis, anxiety ($H = 167.622, p < 0.001$) and depression ($Z = -11.771, p < 0.001$) were correlated with resilience (Table 1). Furthermore, anxiety and depression were associated with gender, grade, age, resilience, family function, daily time spending on sleep, sports, and electronic products, frequency of soft-drinks consumption and relationship with caregiver (p values ranged from 0.033 to 0.000) (Table 1). Resilience and variables with $p \leq 0.05$ in the univariate analysis were entered into binary logistic regression and ordinal logistic regression to explore the independent effect of different variables on anxiety and depression.

Binary logistic regression revealed that resilience was an independent protective factor of anxiety (OR = 0.700, $p < 0.001$). Furthermore, senior (OR = 0.900, $p < 0.001$) and male students (OR = 0.479, $p < 0.001$) and students with good relationship with caregivers (OR = 0.943, $p < 0.001$) experienced lower levels of anxiety. Family dysfunction (OR = 1.418, $p < 0.001$) and internet use duration (OR = 1.001, $p < 0.001$) were positively associated with anxiety. However, anxiety showed no difference among participants with different ages, soft-drinks consumption, sleep duration, and sports (Table 2).

Table 2
Independent effects of resilience and different variables on anxiety.

Constants		B	SE	p value	OR (95% CI)
Gender	Female	0 ^a	-	-	-
	Male	-0.735	0.096	0.000	0.479(0.397, 0.578)
Grade	Grade = 7	0 ^a	-	0.009	-
	Grade = 8	-0.664	0.242	0.006	0.515(0.320,0.828)
	Grade = 9	-0.560	0.171	0.001	0.571(0.409, 0.798)
Age		-0.106	0.095	0.267	0.900(0.747,1.1084)
Resilience		-0.357	0.056	0.000	0.700(0.627, 0.781)
C-FAI		0.349	0.075	0.000	1.418(1.224,1.642)
Daily time spending on electronic products		0.001	0.000	0.001	1.001(1.001,1.002)
Daily time spending on sleeping		0.000	0.001	0.790	1(0.998,1.001)
Daily time spending on exercising		0.000	0.001	0.568	1(0.999,1.002)
Frequency of drinking soft-drinks		0.002	0.001	0.591	1.001(0.998,1.004)
Relationship with caregiver		-0.059	0.028	0.037	0.943(0.892,0.996)
SE = standard error, OR = Odds ratio, CI = Confidence interval, CES-DC = The Center for Epidemiological Studies Depression Scale for Children, C-FAI = The Chinese Family Assessment Instrument.					
Cox & Snell R ² = 0.096					
NagelkerkeR ² = 0.136					

Based on ordinal logistic regression, resilience was an independent protective factor of depression (OR = 0.796, $p < 0.001$). On top of this, students with anxiety were more likely to report higher levels of depression (OR = 0.145, $p < 0.001$). Relationship with caregiver (OR = 0.899, $p < 0.001$) and sleep duration (OR = 0.998, $p = 0.031$) were found to be positively correlated with depressive symptoms. Family dysfunction (OR = 1.570, $p < 0.001$) and internet use duration (OR = 1.002, $p < 0.001$) were positively associated with depression as well. However, gender, grade, age, soft-drinks consumption, and sports had no significant impact on depression according to our data (Table 3).

Table 3
Independent effects of resilience and different variables on depression.

constants		β	OR (95%CI)	<i>p</i> value
Gender	Female	-0.088	0.916(1.085, 0.831)	0.344
	Male	0 ^a	-	-
Grade	Grade = 7	0.224	1.251 (1.524,0.783)	0.352
	Grade = 8	0.074	1.077 (1.263,0.786)	0.669
	Grade = 9	0 ^a	-	-
SCARED	No	-1.929	0.145(.120, 1.127)	0.000
	Yes	0 ^a	-	-
Age		-0.013	0.987(1.102, 0.851)	0.886
Resilience		-0.228	0.796 (0.918, 0.791)	0.000
C-FAI		0.451	1.570(1.563, 1.275)	0.000
Daily time spending on electronic products		0.002	1.002(1.001, 1.001)	0.000
Daily time spending on sleeping		-0.002	0.998(0.999, 0.999)	0.031
Daily time spending on exercising		0.000	1.000(1.002, 0.998)	0.812
Frequency of drinking soft-drinks		-0.005	0.995(1.005, 0.989)	0.414
Relationship with caregiver		-0.106	0.899(0.962, 0.893)	0.000
OR = Odds ratio, CI = Confidence interval, SCARED = The Screen for Child Anxiety Related Emotional Disorders, C-FAI = The Chinese Family Assessment Instrument.				
Cox & Snell R ² = 0.263				
NagelkerkeR ² = 0.315				
McFadden R ² = 0.169				

4. Discussion

The results of this study revealed a high prevalence of anxiety (30.3%) and depression (40.6%) among Chinese adolescents, which was supported by some previous studies. The prevalence found in our study was similar to the results of several published studies(32–35). Additionally, we found that students reported anxiety were more likely to reported higher levels of depression. This finding was supported by other studies which showed that anxiety and depression were significantly positively correlated with each other (36, 37).

Resilience is defined as a multisystemic dynamic process of successful adaptation or recovery in the context of risk or a threat(38), that is, the ability to bounce back to regain functional equilibrium in a state of health in response to stressful events and positive adaptation even in face of significant threat and/or adversity(39). A study in 339 adolescents reported that higher levels of resilience were related to fewer symptoms of depression(40). A cross-sectional survey of Ghanaian adolescents aged 13–17 years showed there was a negative correlation between resilience and anxiety(41). In the current study, we observed the similar correlation between resilience and anxiety and depression as well.

The literature regarding the effect of internet use on mental health outcomes remains controversial. Thom et al found there was an inverse correlation between time spending on website and anxiety scores, but no association between internet use and depression (42). Results of Maras's study showed screen time is associated with depression and anxiety in Canadian youth(43). In our study, we found daily time spending on electronic products (including television, mobile phone and computer) was positively associated with anxiety and depression. This might be explained by the different research backgrounds.

Family is an important source of support for adolescents. Our study found a positive correlation between family dysfunction and anxiety and depression, which was consistent with previous studies. Lee et al. found that adolescents exposed to multiple family dysfunction (e.g., parental divorce, substance abuse, and witnessing violence) were more likely to report depression and anxiety(44). Lin et al recruited 9586 adolescents to explore influential factors of depression and found that adolescents with higher family conflict and poorer family function were prone to be depressed(45). A longitudinal study including 1,600 adolescents showed family cohesion predicted significant increases in anxiety symptoms(46).

There are several limitations of this study. First, although satisfactory response rate was achieved by onsite data collection, the data collection was based on participants' self-report and therefore subject to some degree of reporting bias. Second, despite the cluster randomization and multi-center sampling were adopted, the current study was conducted in Sichuan Province only, which may undermine its representativeness. Participants from other regions of China should be considered in further studies. Lastly, the cross-sectional research design of this study limited the possibility to draw clear causal associations from such an observational study.

5. Conclusion

We assessed anxiety, depression, and their associations with resilience among Chinese adolescents. The prevalence of anxiety and depressive symptoms among adolescents was 30.3% and 40.5% respectively in our study. Resilience was an independent protective factor for both anxiety and depression. Family dysfunction, including poor interaction with caregivers and internet use were correlated with anxiety and depression. Measures that improve resilience and family function might be considered by stakeholders. A healthy lifestyle should also be stressed among adolescents.

List Of Abbreviations

Abbreviations	Full name
CPYDS	Chinese Positive Youth Development Scale
C-FAI	Chinese Family Assessment Instrument
CES-DC	the Center for Epidemiological Studies Depression Scale for Children
SCARED	the Screen for Child Anxiety Related Emotional Disorders
UK	The United Kingdom
OR	Odds Ratio
SD	Standard Deviation

Declarations

Ethical statement

This study was approved by the Medical Ethical Committee of XX University, with the registration number of KXXXXXXX. Informed written consent was obtained before recruitment. Participants' names were replaced by numbers for confidentiality.

Data Accessibility

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

Conflict of interest statement

The authors have nothing to declare.

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Authors' contributions

Y. Y. contributed to the analysis and the drafting of this manuscript.

B. L. contributed to the interpretation of data and revising the manuscript.

L.Z. contributed to the acquisition of data.

J.H. contributed to the statistical analysis.

S. L. contributed to the conception and design of the work, and revising of the manuscript.

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