



Research article

The relationship between adverse childhood experiences and depressive symptoms in rural left-behind adolescents: A cross-sectional survey

Caini Song^a, Libo Yao^b, Huisu Chen^a, Jingyi Zhang^a, Lihua Liu^{a,*}^a Department of Nursing, Hunan Normal University, Changsha, 410013, Hunan Province, China^b Minimally Invasive Surgery Center, The First Hospital of Changsha, Changsha, 410005, Hunan Province, China

ARTICLE INFO

Keywords:

Adolescents
Secondary school students
Adverse childhood experiences
Depressive symptoms

ABSTRACT

Objective: We assessed the current status of depressive symptoms and the associated factors in rural left-behind adolescents. Moreover, we investigated the relationship between adverse childhood experiences and depressive symptoms.

Methods: Students from two rural junior high schools in Huaihua City were enrolled from July to September 2022. Before distributing the questionnaires, guardians of the students were contacted, and consent was obtained from the students themselves. The questionnaires were filled out anonymously and collected on-site.

Results: The prevalence of depressive symptoms among the 325 left-behind teenagers was 23.40%; the rate of emotional abuse in adverse childhood experiences was 17.50%, physical abuse was 15.70%, sexual abuse was 9.50%, emotional neglect was 24.60%, while physical neglect was 27.70%. The five dimensions of adverse childhood experiences were associated with depressive symptoms ($r = 0.597, 0.395, 0.410, 0.498, 0.741, p < 0.01$).

Conclusions: Depressive symptoms were common among rural left-behind adolescents. Adverse childhood experiences were associated with depressive symptoms in rural left-behind adolescents. Occurrence of adverse childhood experiences should be reduced to improve on depressive symptoms.

1. Introduction

Left-behind children are minors under 16 years of age whose parents or one of their parents has been working outside their home for more than 6 months and who remain in their place of residence. Typically, they reside with one of their parents, an aging family member, or an additional parents' relatives and friends [1]. The number of "left-behind children" in China's rural areas is over 60 million, of which 57.20% of parents are single parents while 42.80% of both parents are away at the same time [2]. Huaihua City is located in the transition zone between the subtropical Sichuan-Exiang-Guizhou climate zone and the Yangtze River climate zone in the western part of Hunan Province, China. The city has 967,900 residents aged 0–15 years. In Huaihua, there are almost 180,000 rural left-behind teenagers, 39.70% of whom have both parents working outside. About 51.60% of these children are under single-parent guardianship, while 42.60% are under intergenerational guardianship [3].

* Corresponding author.

E-mail address: llhsd@163.com (L. Liu).

<https://doi.org/10.1016/j.heliyon.2024.e26587>

Received 23 February 2023; Received in revised form 9 February 2024; Accepted 15 February 2024

Available online 18 February 2024

2405-8440/Â© 2024 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Adverse childhood experiences (ACEs), also known as childhood adversity, are negative early life experiences that individuals have before reaching adulthood. They include emotional abuse, physical abuse, sexual abuse, emotional neglect, physical neglect, death of a parent, or parental divorce [4].

- ① Emotional abuse: This is rejection of pleasant emotions by parents, guardians, teachers, and others, resulting in actual or potentially substantial harm to a child's emotional and behavioral development. This includes sending the child various messages, such as; they are worthless, have many flaws, are unlovable, are at risk, are redundant, are useless, and other negative statements. This type of abuse is frequent when parents, guardians, or teachers are dismissive, blameful, and unhappy.
- ② Physical abuse: This refers to physical harm to a child as a result of a guardian's inadequate care. Children are frequently physically abused by parents, guardians, teachers, and other adults in the guise of punishment. The most prevalent types of physical abuse are kicking, shaking, burning with cigarettes or needles, hitting the child's body with hands or objects, restricting the child from eating, and throwing hard items at the child's body.
- ③ Sexual abuse: Any direct or indirect sexual usage or sexual-related abuse against a child is sexual abuse. Non-physical contact (for instance, showing one's sexual organs to the child, making verbal sexual approaches, or allowing the child to read pornography) is sexual abuse, as is a variety of physical contact (such as fondling the child's private parts or violent rape).
- ④ Emotional neglect: Failure to provide adequate love for the child, chronic or severe abuse between parents, denial of psychological care and affection to the child, delay or failure to provide psychological comfort, neglect of the child's emotional needs, and allowing inappropriate behaviors such as drug or substance abuse.
- ⑤ Physical neglect: Failure of a caregiver to provide for the child's bodily needs (such as clothing, food, shelter, and hygiene among others).

The prevalence of adverse childhood experiences among adolescents varies by country. It is about 50.00% in the United States [5], 79.00% in Korea [6], and 79.01% among Chinese adolescents [7]. Adverse childhood experiences cause immediate harm to individuals and have long-term adverse effects on their physical as well as mental health. They can contribute to hypertension, cancer, chronic lung disease, and liver disease [8,9]. Adolescents with ACEs are more likely to develop psychological problems, such as depression and anxiety [10].

In 2014, the World Health Organization (WHO) report, "Global Adolescent Health", showed that depression is the leading cause of illness and disability among adolescents aged 10–19 years and that suicide is the third leading cause of death among adolescents worldwide [11]. Depression is a group of symptoms that are dominated by depressed moods, slowed thinking, and reduced volitional activities. Adolescence is associated with a high prevalence of psychological problems, and retention can make adolescents sensitive and prone to low self-esteem, depression, as well as other negative emotions [12]. Adolescents with poor childhood experiences are more prone to depression [13]. Compared to people with a good upbringing, their probability of getting depression is 2.35–3.79 times higher.

In summary, the prevalence of adverse childhood experiences and depression in adolescents varies across countries and there are cultural contextual differences. Negative childhood experiences increase the incidences of depressive symptoms in teenagers. However, the relationship between adverse childhood experiences and depressive symptoms in rural left-behind adolescents has not been fully established.

In this study, we investigated the factors influencing depression in children left behind in rural China and the relationship between unfavorable childhood events and depressive symptoms. Our study of the relationship between adverse childhood experiences and depressive symptoms in rural left-behind adolescents has not been reported elsewhere.

2. Methods

2.1. Study participants

From July to September 2022, one class of students from each of the three grades at two rural junior high schools in Huaihua City was randomly selected as the research population. Based on an empirical technique, a sample size of 143–312 was determined, with the sample size being 5 to 10 times the independent variable and taking a shedding rate into account of 10%–20%. A total of 330 questionnaires were distributed in this study, and 325 valid questionnaires were returned, yielding a return rate of 98.50%.

2.2. Methodology

Before collecting the questionnaire, the researcher was consistently trained to explain the language standards and to master the questionnaire specifications. Guardians of the students were contacted before the study, and approval was obtained from the students themselves before the survey questionnaires were disseminated. The self-reporting approach was employed to complete the questionnaire anonymously on-site and to collect data on the spot. Before and after collecting and collating the questionnaires, the researcher checked their quality and eliminated those with obvious logical errors. Ethical approved for this study was provided by the Hunan Normal University Ethics Committee (20,220,397).

2.3. Instruments for measurement

2.3.1. General information questionnaire

The information captured by the general questionnaire includes age, gender, grade level, parent's marital status, family life pattern, parents' education level, family financial status, and whether they are boarding students.

2.3.2. Childhood trauma questionnaire-short form (CTQ-SF)

This questionnaire was created by D. P. Bernstein et al. [14], and later translated and amended by X. F. Zhao et al. [15] in 2004. It measures traumatic childhood events (before the age of 16). The Childhood Trauma Questionnaire comprises 28 responses, which are broken down into 5 subscales: emotional abuse (items 3, 8, 14, 18, 25), physical abuse (items 9, 11, 12, 15, 17), sexual abuse (items 20, 21, 23, 24, 27), emotional neglect (items 5, 7, 13, 19, 28), and physical neglect (items 1, 2, 4, 6, 26). Each subscale has 5 items, and items 10, 16, and 22 serve as validity ratings. Each entry was graded on a 5-point scale: 1 for never, 2 for rarely, 3 for occasionally, 4 for often, and 5 for always. Reverse scoring was necessary for items 2, 5, 7, 13, 19, 26, and 28. Each abuse subscale had a score range of 5–25, and overall scores ranged from 25 to 125. Childhood abuse severity increased with increasing total score. The overall Cronbach' α coefficient for the scale was 0.77; the Cronbach' α coefficient for the subscales ranged from 0.41 to 0.68. In validation factor analysis, Emotional abuse: 0.39–0.59; Physical Abuse: 0.27–0.74; Sexual Abuse: 0.51–0.61; Emotional neglect: 0.15–0.61; and physical neglect: 0.30–0.43.

2.3.3. Scale for self-rating depression in flow calls (center for epidemiological survey, depression scale, CES-D)

This scale, created by Sirodff in 1977, has 20 entries, and the sum of the scores for each entry determines the final score [16]. The Cronbach alpha coefficient for this scale in this study was 0.92.

2.4. Statistical procedures

The SPSS 25.0 software was used for statistical analyses. Count data are presented as frequencies and percentages while measurement data are presented as means and standard deviations. The rates of adverse childhood experiences and depressive symptoms were calculated based on the total sample size and number of cases. Measurement data were compared using the *t*-test and ANOVA whereas the count data were compared using the X^2 test/exact Fisher's probability method. The association between negative

Table 1
Sociodemographic characteristics of participating left-behind adolescents.

Factors	Number of people surveyed	Depressive symptoms		X^2 value	<i>P</i> value	
		Number of people	Rate (%)			
Gender	Male	146	26	17.8	3.924	0.048
	Female	179	50	27.9		
Grade	Grade one	105	0	0.0	95.995	< 0.001
	Grade two	109	28	25.7		
	Junior grade three	111	48	43.2		
Parents' marital status	Stable	250	47	18.8	6.595	< 0.001
	Divorced	40	10	25.0		
	Single parent	18	15	83.3		
	Remarried	17	4	23.5		
Family life pattern	Single parent	55	16	29.1	0.963	0.383
	Two parents	72	11	15.3		
Father's education level	Large family	198	49	24.7	2.493	0.060
	Primary school	49	10	20.4		
	Junior High School	209	51	24.4		
	High School	58	12	20.7		
Mother's education level	University	9	3	33.3	4.874	0.002
	Primary School	64	21	32.8		
	Junior High School	188	38	20.2		
	High School	63	12	19.0		
Family economic status (Yuan/month)	University	10	5	50.0	2.601	0.036
	Better (≥ 4001)	25	5	20.0		
	Relatively Good (3001–4000)	87	11	12.6		
	Fair (2001–3000)	181	53	29.3		
	Relatively Poor (1001–2000)	25	7	28.0		
Boarding students	Poor (≤ 1000)	7	0	0.0	6.732	< 0.001
	Yes	87	42	48.3		
	No	238	34	14.3		

childhood events and depression symptoms was determined by multiple linear regression while relationships between variables were determined by Pearson correlation analysis. $P \leq 0.05$ was set as the threshold for statistical significance.

3. Results

3.1. General information on rural left-behind youth

This study involved a total of 325 pupils (aged 12–16 years old, the mean age; 13.95 ± 0.88 years). Among them, 146 (44.90%) were male while 179 (55.10%) were female; 105 in Grade one, 109 in Grade two, and 111 in Junior grade three; 87 (26.80%) were boarding students while 238 (73.20%) were non-boarding students. These findings are presented in Table 1. Currently, 37.70% of the left-behind rural adolescents had both parents working outside the home, while 58.20% have one father working outside the home, and 47.70% have one mother working outside the home. Most of them lived with their grandparents or grandmothers. The rates of adverse childhood experiences were: emotional abuse, 17.50% (57/325); physical abuse, 15.70% (51/325); sexual abuse, 9.50% (31/325); emotional neglect, 24.60% (80/325) and physical neglect, 27.70% (90/325).

3.2. Depressive symptoms among rural left-behind adolescents

The 325 left-behind adolescents in this survey had depression scores ranging from 0 to 60, with a mean score of (10.86 ± 10.5). The rate of depressive symptoms was 23.40% (76/325). Differences in depression scores by gender, grade, parent's marital status, mothers' education, family economic status, and accommodation were significant ($p < 0.05$) (Table 1).

3.3. The association between adverse childhood experiences and depressive symptoms

3.3.1. The relationship between adverse childhood experiences and depressive symptoms

The results of correlation between all five dimensions of adverse childhood experiences and depressive symptoms were positively correlated ($r = 0.597, 0.395, 0.410, 0.498, 0.741, p < 0.01$) (Table 2).

3.3.2. Analysis of depressive symptoms and multiple linear regressions of traumatic childhood events

Depression scores were the dependent variables in multiple linear regression analyses. The independent variables were 5 dimensions of adverse childhood experiences ("emotional abuse", "physical abuse", "sexual abuse", "emotional neglect", "physical neglect"). The results showed that emotional abuse, sexual abuse, emotional neglect, and physical neglect were the main influences on depressive symptoms (Table 3).

4. Discussion

4.1. The status of adverse childhood experiences among rural left-behind adolescents

In this study, we found a high detection rate of physical neglect (27.70%). Consistent with the findings of Zhang et al. [17] who found that physical neglect was the most common type of abuse (28.20%), followed by emotional abuse (23.70%), physical abuse (16.00%), emotional neglect (12.40%), with sexual abuse being the least common type of abuse (10.30%). A study on American adolescents' Adverse Childhood Experiences (ACEs) by Nagata et al. [18] found a prevalence of 81.30%. In contrast, Luft et al. [19] conducted a questionnaire survey on 142 students and reported that 86.00% of them experienced at least one adverse childhood experience, the most common being physical abuse (49.00%), and that adverse childhood experiences were associated with depressive symptoms. Another cohort study showed that the prevalence of adverse childhood experiences among Brazilian adolescents was about 85 percent, with a prevalence of emotional neglect of 19.7 percent [20].

4.2. Current status of depressive symptoms among rural left-behind adolescents

The present results, found that the prevalence of depressive symptoms among rural left-behind adolescents was 23.40%. This is

Table 2

Correlation between adverse childhood experiences and depressive symptoms among rural left-behind adolescents.

Variables	1	2	3	4	5	6
1 Emotional Abuse	1					
2 Physical Abuse	0.431**	1				
3 Sexual Abuse	0.281**	0.205**	1			
4 Emotional Neglect	0.451**	0.302**	0.168**	1		
5 Physical Neglect	0.586**	0.432**	0.322**	0.514**	1	
6 Depressive Symptoms	0.597**	0.395**	0.410**	0.498**	0.741**	1

Note : ** $p < 0.01$ (two-tailed).

Table 3

Correlations between emotional abuse, physical abuse, sexual abuse, emotional neglect, physical neglect and depressive symptoms.

Variables	B value	SE	t	p
Constant term	-8.926	1.135	-7.862	< 0.001
Emotional Abuse	0.403	0.095	4.240	< 0.001
Physical Abuse	0.071	0.110	0.644	0.520
Sexual Abuse	0.728	0.157	4.628	< 0.001
Emotional Neglect	0.217	0.076	2.846	0.005
Physical Neglect	1.054	0.098	10.723	< 0.001

a. Dependent variable: depression score.

consistent with findings from a study conducted in Ethiopia where the prevalence of depressive symptoms among adolescents was 22.10% [21]. However, it was lower than the rate reported in several low-income countries such as Uganda (39.00%) [22] and Nepal (44.20%) [23]. In a cross-sectional survey of adolescents aged 12–15 years from 22 low-income and middle-income countries by Smith et al. [24], it was found the prevalence of depressive symptoms was 29.30%. Faisal-Cury et al. [25] postulated that the economic status influences the occurrence of depressive symptoms. This is consistent with the findings of the present study. Elsewhere, good family economic status was reported to be a protective factor for depressive symptoms [26].

In this study, gender, grade, parent's marital status, mother's education level, and boarding were found to be factors influencing depressive symptoms among left-behind adolescents. A previous meta-analysis [27] showed that the prevalence of depressive symptoms among female adolescents was higher than that of males. In a study conducted by Dong et al. [28], it was discovered that female students were more prone to experiencing depressive symptoms among a sample of 1896 secondary school students. The more sensitive personalities of the female participants, coupled with psychological immaturity in dealing with emotions at this age and the inability to cope positively with negative emotions, may have contributed to this [29]. A study in Yellowstone yielded similar findings, indicating that higher grade level and increased academic pressure were associated with a higher prevalence of depressive symptoms [30]. Additionally, another study demonstrated that grade level had an impact on the occurrence of depressive symptoms [31]. The findings of Liu et al. [32] are consistent with those of the present study, that is, adolescents with single or divorced parents have higher scores of depressive symptoms. Another cross-sectional study of 4100 adolescents found that single parenting was a risk factor for developing depressive symptoms [33]. Tao et al. [34] emphasized the significance of a stable family environment in fostering adolescent mental health. Additionally, Sheikh et al. [35] highlighted that lower maternal literacy levels elevated the risk of depression in their children. Further supporting this, Chen et al. [36], in a survey of college students, identified a significant correlation between maternal literacy and adolescent depression. Other scholars concluded that boarding students were at higher risk of becoming depressed due to loss of family interaction and crowded living environment [37]. In a study of 72 students in the United States, it was observed that negative mood was associated with prolonged boarding stay [38].

4.3. Relationship between adverse childhood experiences and depressive symptoms among rural left-behind adolescents

We found that adolescents with unpleasant childhood memories were more likely to suffer depressive symptoms, in tandem with findings from a previous study, depressive symptoms were positively correlated with all five categories of poor childhood experiences [39]. According to T. Zhang et al. [40], childhood maltreatment experiences are a significant factor in depressive symptoms. Adverse childhood experiences can seriously impair the normal development of assessment, cognitive, and coping abilities about life events, ultimately causing depressive symptoms [41]. A descriptive study of 409 undergraduate nursing students revealed that students who scored high on adverse childhood experiences also had a higher prevalence of depressive symptoms [42].

Multifactorial regression analysis revealed that emotional neglect, sexual abuse, emotional abuse, and physical abuse were high-risk influencing factors for depressive symptoms in rural left-behind adolescents. A study involving 3600 adolescents revealed a positive correlation between high levels of adverse childhood experiences and increased levels of depressive symptoms [43]. These findings align with those obtained on Portuguese adolescents, which also established a connection between adverse childhood experiences and health-related behaviors [44]. In a study by Ling et al. [45], emotional abuse and neglect demonstrated the strongest correlation with adolescent depression. A comprehensive meta-analysis underscored adverse childhood experiences as a significant risk factor for various health conditions [46]. Furthermore, it emphasized that adverse childhood experiences and psychological issues serve as predictors for suicidal ideation in adolescents [47]. Such experiences may also lead to behaviors like substance abuse, internet addiction, and alcohol consumption [48,49]. In a prospective cohort study, Houtepen et al. [50] found that adverse childhood experiences were linked to depressive symptoms. The study recommended the development of intervention strategies encompassing adverse childhood experiences, economic factors, and mental health. It also uncovered the positive impact of favorable childhood experiences on mental health [51]. Another meta-analysis demonstrated the effectiveness of cognitive behavioral therapy in alleviating depressive symptoms among adolescents [52]. Parents should pay attention to their children's psychological conditions during childhood, avoid adverse events, and increase communication with their children to help reduce the occurrence of depressive symptoms in left-behind adolescents.

5. Summary

The increased prevalence of depressive symptoms among rural left-behind youth is associated with traumatic early life events. Therefore, young people who are left behind require proper psychological care from their families, schools, and society. Parents should emphasize creating a happy home environment, use the proper parenting techniques, and quickly recognize and deal with their kids' negative emotions. Schools should set up suitable prevention, screening, and intervention programs. Finally, the society should actively and favorably distribute knowledge. The psychological well-being of young people left behind in rural areas can be supported by combining the efforts of parents, schools, and society.

6. Limitations

This study has some limitations: i. The sample size is small and should be increased in future studies; ii. The source of the study population is only Huaihua City, Hunan Province, China, which has limited representativeness; iii. This is a cross-sectional research design, with inherent limitations in inferring the causal relationships between variables. Longitudinal follow-up studies should be performed to verify our findings.

Ethics statement

Before the survey, each participant was briefly introduced to the purpose of the study and informed consent was obtained. Participants are informed of the voluntary nature of their participation and their right to withdraw at any time. Ethical approval for this study was provided by the Hunan Normal University Ethics Committee (No. 20220397).

Funding statement

Hunan Provincial Education Department in China (HNJG-2020-0172);
Hunan Postgraduate Scientific Research Innovation Project (CX20220521);
Changsha City Soft Science Research Program Project (kh2302026);
Hunan Normal University School of Medicine Open Fund Project (KF2023042).

Data availability statement

Data will be made available on request.

CRediT authorship contribution statement

Caini Song: Writing – review & editing, Writing – original draft, Funding acquisition, Data curation, Conceptualization. **Libo Yao:** Writing – original draft, Software, Formal analysis, Conceptualization. **Huisu Chen:** Resources, Investigation. **Jingyi Zhang:** Methodology, Investigation. **Lihua Liu:** Supervision, Resources, Project administration, Funding acquisition.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Caini Song reports financial support was provided by Hunan Normal University School of Medicine Open Fund Project. Caini Song reports financial support was provided by Hunan Postgraduate Scientific Research Innovation Project. Lihua Liu reports financial support was provided by Hunan Provincial Education Department in China. Lihua Liu reports financial support was provided by Changsha City Soft Science Research Program Project. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

- [1] M. Manyema, L.M. Richter, Adverse childhood experiences: prevalence and associated factors among South African young adults, *Heliyon* 5 (12) (2019) e03003, <https://doi.org/10.1016/j.heliyon.2019.e03003>.
- [2] M. Li, Y. Ren, H. Sun, Social anxiety status of left-behind children in rural areas of Hunan Province and its relationship with loneliness, *Child Psychiatr. Hum. Dev.* 51 (6) (2020) 1016–1024.
- [3] <http://tjj.hunan.gov.cn/hntj/index.html>.
- [4] M.T. Merrick, D.C. Ford, K.A. Ports, A.S. Guinn, J. Chen, J. Klevens, M. Metzler, C.M. Jones, T.R. Simon, V.M. Daniel, P. Ottley, J.A. Mercy, Vital signs: estimated proportion of adult health problems attributable to adverse childhood experiences and implications for prevention - 25 States, 2015–2017, *MMWR Morb. Mortal. Wkly. Rep.* 68 (44) (2019) 999–1005.
- [5] Y. Wang, M.R. Raffeld, N. Slopen, L. Hale, E.C. Dunn, Childhood adversity and insomnia in adolescence, *Sleep Med.* 21 (2016) 12–18.
- [6] J.S. Lee, J.S. Kwon, D. Kim, S.W. Kim, J.J. Kim, J.H. Kim, H.J. Nam, S. Ryu, I.H. Park, S.K. An, H.S. Oh, S. Won, K. Lee, K.Y. Lee, S.H. Lee, Y.S. Lee, J.S. Yi, K. S. Hong, Y.H. Joo, Prevalence of metabolic syndrome in patients with schizophrenia in Korea: a multicenter nationwide cross-sectional study, *Psychiatry Investig* 14 (1) (2017) 44–50.
- [7] Z. Zhang, C. Yu, P. Yuan, Q. Lian, C. Lou, X. Tu, X. Zuo, Relationship between adverse childhood experiences and depression in early adolescence, *Chin. J. Sch. Health* 40 (6) (2019) 874–877 (in Chinese).

- [8] K. Petrucci, J. Davis, T. Berman, Adverse childhood experiences and associated health outcomes: a systematic review and meta-analysis, *Child Abuse Negl.* 97 (2019) 104127.
- [9] Q. Wang, Association of adverse childhood experiences with frailty index level and trajectory in China, *JAMA Netw. Open* 5 (8) (2022) e2225315.
- [10] J. LeMoult, K.L. Humphreys, A. Tracy, J.A. Hoffmeister, E. Ip, I.H. Gotlib, Meta-analysis: exposure to early life stress and risk for depression in childhood and adolescence, *J. Am. Acad. Child Adolesc. Psychiatry* 59 (7) (2020) 842–855.
- [11] B. Dick, B.J. Ferguson, Health for the world's adolescents: a second chance in the second decade, *J. Adolesc. Health* 56 (1) (2015) 3–6.
- [12] H. Zhang, P. Chi, H. Long, X. Ren, Bullying victimization and depression among left-behind children in rural China: roles of self-compassion and hope, *Child Abuse Negl.* 96 (2019) 104072.
- [13] R.Y. Lee, M.L. Oxford, J. Sonney, D.A. Enquobahrie, K.D. Cato, The mediating role of anxiety/depression symptoms between adverse childhood experiences (ACEs) and somatic symptoms in adolescents, *J. Adolesc.* 94 (2) (2022) 133–147.
- [14] D.P. Bernstein, J.A. Stein, M.D. Newcomb, E. Walker, D. Pogge, T. Ahluvalia, J. Stokes, L. Handelsman, M. Medrano, D. Desmond, W. Zule, Development and validation of a brief screening version of the Childhood Trauma Questionnaire, *Child Abuse Negl.* 27 (2) (2003) 169–190.
- [15] X.F. Zhao, Y. Zhang, F. Li, Y. Zhou, Reliability and validity of the Chinese version of childhood trauma questionnaire, *China Clin. Rehab.* 16 (2005) 209–211 (in Chinese).
- [16] G.A. Fava, I. Pilowsky, A. Pierfederici, M. Bernardi, D. Pathak, Depression and illness behavior in a general hospital: a prevalence study, *Psychother. Psychosom.* 38 (1) (1982) 141–153.
- [17] Y.H. Zhang, J.Y. Li, X.Q. Yin, J.L. Wang, Relative weights analysis on the impacts of childhood maltreatment forms on adolescent anxiety and depression, *Chin. J. School Health* 43 (3) (2022) 407–410 (in Chinese).
- [18] J.M. Nagata, N. Trompeter, G. Singh, J. Raney, K.T. Ganson, A. Testa, D.B. Jackson, S.B. Murray, F.C. Baker, Adverse childhood experiences and early adolescent cyberbullying in the United States, *J. Adolesc.* 95 (3) (2023) 609–616, <https://doi.org/10.1002/jad.12124>.
- [19] H.S. Luft, J.P. Mersky, C. Choi, J.A. Canario Guzmán, M.V. Quezada Ortiz, G.T. Sehi, J.R. Temple, Prevalence of adverse childhood experiences (ACEs) and association with dating violence and symptoms of mental illness among adolescents in the Dominican Republic, *Child Abuse Negl.* (129) (2022) 105668, <https://doi.org/10.1016/j.chiabu.2022.105668>.
- [20] A.L. Soares, L.D. Howe, A. Matijasevich, F.C. Wehrmeister, A.M. Menezes, H. Gonçalves, Adverse childhood experiences: prevalence and related factors in adolescents of a Brazilian birth cohort, *Child Abuse Negl.* 51 (2016) 21–30, <https://doi.org/10.1016/j.chiabu.2015.11.017>.
- [21] A.T. Chekol, M.A. Wale, A.W. Abate, E.A. Beo, E.A. Said, B.T. Negash, Predictors of depression among school adolescents in Northwest, Ethiopia, 2022: institutional based cross-sectional, *BMC Psychiatr.* 23 (1) (2023) 429, <https://doi.org/10.1186/s12888-023-04899-2>.
- [22] H.E. Ainamani, R. Weierstall-Pust, R. Bahati, A. Otwine, S. Tumwesigire, G.Z. Rukundo, Post-traumatic stress disorder, depression and the associated factors among children and adolescents with a history of maltreatment in Uganda, *Eur. J. Psychotraumatol.* 13 (1) (2022) 2007730, <https://doi.org/10.1080/20008198.2021.2007730>.
- [23] D. Bhattarai, N. Shrestha, S. Paudel, Prevalence and factors associated with depression among higher secondary school adolescents of Pokhara Metropolitan, Nepal: a cross-sectional study, *BMJ Open* 10 (12) (2020) e044042, <https://doi.org/10.1136/bmjopen-2020-044042>.
- [24] L. Smith, G.F. López Sánchez, H. Oh, M. Rahmati, M.A. Tully, D.K. Yon, L. Butler, Y. Barnett, G. Ball, J.I. Shin, A. Koyanagi, Association between food insecurity and depressive symptoms among adolescents aged 12–15 years from 22 low- and middle-income countries, *Psychiatr. Res.* 328 (2023) 115485, <https://doi.org/10.1016/j.psychres.2023.115485>.
- [25] A. Faisal-Cury, C. Ziebold, D.M.O. Rodrigues, A. Matijasevich, Depression underdiagnosis: prevalence and associated factors. A population-based study, *J. Psychiatr. Res.* 151 (2022) 157–165, <https://doi.org/10.1016/j.jpsychires.2022.04.025>.
- [26] D. Cao, Z. Zhou, Y. Ren, Q. Deng, X. Zhai, G. Liu, D. Zhao, Y. Zhao, C. Shen, The relationship between duration of subjective poverty and health among Chinese adults: evidence from the China Family Panel Study, *Front. Public Health* 10 (2022) 939569.
- [27] S. Shorey, E.D. Ng, C.H.J. Wong, Global prevalence of depression and elevated depressive symptoms among adolescents: a systematic review and meta-analysis, *Br. J. Clin. Psychol.* 61 (2) (2022) 287–305, <https://doi.org/10.1111/bjc.12333>.
- [28] G.X. Dong, X.M. Lin, F. Gao, D.S.H. Xue, Y.M. Gong, Epidemiological situation and influencing factors of depressive emotions among middle school students in Yantai, *J. Clin. Psychosomatic Dis.* (5) (2023) 114–117+157 (in Chinese).
- [29] G.W.K. Ho, D. Bressington, T. Karatzias, W.T. Chien, S. Inoue, P.J. Yang, A.C.Y. Chan, P. Hyland, Patterns of exposure to adverse childhood experiences and their associations with mental health: a survey of 1346 university students in East Asia, *Soc. Psychiatr. Psychiatr. Epidemiol.* 55 (3) (2020) 339–349.
- [30] X. Zhang, Y. Yan, Z. Ye, J. Xie, Descriptive analysis of depression among adolescents in Huangshi, China, *BMC Psychiatr.* 23 (1) (2023) 176, <https://doi.org/10.1186/s12888-023-04682-3>.
- [31] X.Q. Yu, Y.L. Zhang, G.L. Guo, Prevalence of mental health problems among senior high school students in mainland of China from 2010 to 2020: a meta-analysis, *Adv. Psychol. Sci.* (5) (2022) 978–990 (in Chinese).
- [32] X. Liu, Y.B. Zhang, Relationship between depressive symptoms and adverse childhood experiences of rural middle school students, *Chin. J. Child Health Care* (9) (2021) 951–954+959 (in Chinese).
- [33] W. Sun, J. Mei, Y. Wang, X. Zhao, Z. Zhu, C. Zhang, C. Pan, G. Li, Y. Chen, J. Miao, Y. Lan, X. Qiu, Y. Xu, Psycho-social factors associated with high depressive symptomatology in female adolescents and gender difference in adolescent depression: an epidemiological survey in China's Hubei Province, *BMC Psychiatr.* 21 (1) (2021) 168, <https://doi.org/10.1186/s12888-021-03165-7>.
- [34] H. Tao, X. Zeng, M. Hou, S. Chen, J. Shen, X. Liao, C. Zou, Association of adverse childhood experiences and depression among medical students: the role of family functioning and insomnia, *Front. Psychol.* 14 (2023) 1134631, <https://doi.org/10.3389/fpsyg.2023.1134631>.
- [35] M.A. Sheikh, B. Abelsen, J.A. Olsen, Role of respondents' education as a mediator and moderator in the association between childhood socio-economic status and later health and wellbeing, *BMC Publ. Health* 14 (2014) 1172, <https://doi.org/10.1186/1471-2458-14-1172>.
- [36] L. Chen, L. Wang, X.H. Qiu, X.X. Yang, Z.X. Qiao, Y.J. Yang, Y. Liang, Depression among Chinese university students: prevalence and socio-demographic correlates, *PLoS One* 8 (3) (2013) e58379, <https://doi.org/10.1371/journal.pone.0058379>.
- [37] X.Q. Yin, L.H. Wang, G.D. Zhang, X.B. Liang, J. Li, M.A. Zimmerman, J.L. Wang, The promotive effects of peer support and active coping on the relationship between bullying victimization and depression among Chinese boarding students, *Psychiatr. Res.* 256 (2017) 59–65, <https://doi.org/10.1016/j.psychres.2017.06.037>.
- [38] P.I. Chow, K. Fua, Y. Huang, W. Bonelli, H. Xiong, L.E. Barnes, B.A. Teachman, Using mobile sensing to test clinical models of depression, social anxiety, state affect, and social isolation among college students, *J. Med. Internet Res.* 19 (3) (2017) e62, <https://doi.org/10.2196/jmir.6820>.
- [39] I.A.M. Brummelhuis, W.J. Kop, A.C. Videler, Psychological and physical wellbeing in adults who grew up with a mentally ill parent: a systematic mixed-studies review, *Gen. Hosp. Psychiatr.* 79 (2022) 162–176.
- [40] T. Zhang, L. Kan, C. Jin, W. Shi, Adverse childhood experiences and their impacts on subsequent depression and cognitive impairment in Chinese adults: a nationwide multi-center study, *J. Affect. Disord.* 323 (2023) 884–892.
- [41] Z.Y. Hu, P.S. Li, L. Guo, S.Y. Pan, C.Y. Lu, Correlation between childhood maltreatment and depressive symptoms among middle school students in Shenzhen city, *Chin. J. Public Health* 35 (6) (2019) 703–707 (in Chinese).
- [42] J. Hedrick, V. Bennett, J. Carpenter, L. Dercher, D. Grandstaff, K. Gosch, L. Grier, V. Meek, M. Poskin, E. Shotton, J. Waterman, A descriptive study of adverse childhood experiences and depression, anxiety, and stress among undergraduate nursing students, *J. Prof. Nurs.: Off. J. Am. Assoc. Colleges of Nurs.* 37 (2) (2021) 291–297, <https://doi.org/10.1016/j.profnurs.2021.01.007>.
- [43] Y. Zhang, Y. Li, T. Jiang, Q. Zhang, Role of body mass index in the relationship between adverse childhood experiences, resilience, and mental health: a multivariate analysis, *BMC Psychiatr.* 23 (1) (2023) 460, <https://doi.org/10.1186/s12888-023-04869-8>.
- [44] M. Amorim, S. Soares, A. Abrahamyan, M. Severo, S. Fraga, Patterns of childhood adversity and health outcomes in early adolescence: results from the Generation XXI cohort, *Prev. Med.* 171 (2023) 107500, <https://doi.org/10.1016/j.jypmed.2023.107500>.

- [45] Y. Ling, J. Yang, B. Zhong, Effects of childhood traumatic experience and self-esteem on adolescents' depression, *Chin. J. Clin. Psychol.* 17 (1) (2009) 54–56 (in Chinese).
- [46] K. Hughes, M.A. Bellis, K.A. Hardcastle, D. Sethi, A. Butchart, C. Mikton, L. Jones, M.P. Dunne, The effect of multiple adverse childhood experiences on health: a systematic review and meta-analysis, *Lancet Public Health* 2 (8) (2017), [https://doi.org/10.1016/S2468-2667\(17\)30118-4](https://doi.org/10.1016/S2468-2667(17)30118-4) e356–e366.
- [47] A. Casas-Muñoz, Á.E. Velasco-Rojano, A. Rodríguez-Caballero, E. Prado-Solé, M.G. Álvarez, ACEs and mental health problems as suicidality predictors in Mexican adolescents, *Child abuse & neglect*, *Adv. Online Publ.* (2023) 106440, <https://doi.org/10.1016/j.chiabu.2023.106440>.
- [48] T. Fan, M. Twayigira, L. Song, X. Luo, C. Huang, X. Gao, Y. Shen, Prevalence and associated factors of internet addiction among Chinese adolescents: association with childhood trauma, *Front. Public Health* 11 (2023) 1172109, <https://doi.org/10.3389/fpubh.2023.1172109>.
- [49] A.N. Banks, Adverse Childhood Experiences and Alcohol Use Among Black College Students: Examining the Mediating Roles of Depression and Coping Drinking Motives, *Substance Use & Misuse*, Advance online publication, 2023, pp. 1–7, <https://doi.org/10.1080/10826084.2023.2247058>.
- [50] L.C. Houtepen, J. Heron, M.J. Suderman, A. Fraser, C.R. Chittleborough, L.D. Howe, Associations of adverse childhood experiences with educational attainment and adolescent health and the role of family and socioeconomic factors: a prospective cohort study in the UK, *PLoS Med.* 17 (3) (2020) e1003031, <https://doi.org/10.1371/journal.pmed.1003031>.
- [51] J. Tang, J. Wang, Y. Pei, S.B. Dereje, Q. Chen, N. Yan, Y. Luo, Y. Wang, W. Wang, How adverse and benevolent childhood experiences influence depression and suicidal ideation in Chinese undergraduates: a latent class analysis, *Environ. Health Prev. Med.* 28 (17) (2023), <https://doi.org/10.1265/ehpm.22-00242>.
- [52] B. Gee, S. Reynolds, B. Carroll, F. Orchard, T. Clarke, D. Martin, J. Wilson, L. Pass, Practitioner Review: effectiveness of indicated school-based interventions for adolescent depression and anxiety - a meta-analytic review, *J. Child Psychol. Psychiatry Allied Discip.* 61 (7) (2020) 739–756, <https://doi.org/10.1111/jcpp.13209>.