

Associations of Childhood Maltreatment with Single and Multiple Suicide Attempts among Older Chinese Adolescents

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Objectives To test, among older Chinese adolescents, the associations of childhood maltreatment with single and multiple suicide attempts and whether these associations vary in relation to the presence of sleep disturbance.

Study design We analyzed data collected from 10th to 12th graders from 7 randomly selected provinces of China in the 2015 School-based Chinese Adolescents Health Survey. There were 83 200 students who were invited to participate, and 75 715 students' questionnaires were completed and qualified for the survey. Adjusted multinomial logistic regression models were conducted to evaluate the associations of childhood maltreatment with suicide attempts.

Results Compared with no suicide attempts, each type of adjusted childhood maltreatment (physical abuse, emotional abuse, sexual abuse, physical neglect, or emotional neglect) was associated with an increased risk of single and multiple suicide attempts ($P < .05$). The magnitude of the aORs in multiple suicide attempters was greater than those in single suicide attempters. Moreover, the adjusted interaction effects for a single suicide attempt between each type of childhood maltreatment and sleep disturbance were all statistically significant in the multivariable multinomial logistic regression models ($P < .001$). However, the adjusted interaction effects for multiple suicide attempts were not significant ($P > .05$).

Conclusions Maltreatment during one's childhood is associated with an increased risk of single and multiple suicide attempts among older Chinese adolescents. Sleep disturbances play a moderating role in these associations for a single suicide attempt. (*J Pediatr* 2018;■■■:■■■-■■■).

Suicidal behavior, including suicidal ideation, suicide attempts, or completed suicide, is a major and preventable public health problem causing more than 800 000 deaths worldwide every year¹; suicide was the leading cause of death among 15- to 34-year-old adolescents and adults in China from 1995 to 1999.² Although the overall rate of suicide in China has been significantly reduced in the past decade,³ suicide attempts are still a current problem among adolescents. Our previous studies showed that the prevalence of suicide attempts among Chinese adolescents was 3.1% (95% CI 2.9%-3.3%).⁴ A previous suicide attempt has been reported to be an important risk factor for completed suicide in adolescence and has shown an increased risk of recurrence.⁵ A stress–diathesis model proposed by Mann et al demonstrated that a history of adverse life events is associated with suicidal behaviors.⁶ This model also shows that in contrast to individuals without a history of suicide attempts, those having attempted suicide report fewer reasons for living.⁶ Moreover, previous studies also indicate that there might be differences in characteristics between individuals with a history of 1 suicide attempt and those with multiple attempts^{7,8}; multiple suicide attempters present with more severe psychiatric symptoms, including depressive symptoms and sleep disturbance,⁹ and greater rates of psychiatric comorbidities such as anxiety or bipolar disorder than single attempters.¹⁰

Childhood maltreatment includes experiences of physical, emotional, and sexual abuse and emotional and physical neglect. Child maltreatment not only has long-lasting effects on social functioning, mental health, and health risk behaviors into adulthood¹¹ but also places a heavy economic burden on individuals and society.¹² Exposure to childhood maltreatment and adverse life events can lead to a disruption in early development of the nervous system, which may impede individuals' ability to cope with negative or disruptive emotions and contribute to suicidal behaviors.¹³ Previous studies have reported that a history of childhood maltreatment can lead to a lower self-concept and increase the likelihood of suicide attempts among adolescents.¹⁴⁻¹⁶

Although suicide attempts are multifactorial, a growing body of literature indicates that sleep disturbance is a potent contributor to suicidal behaviors.¹⁷ Previous studies have demonstrated that a large number of adolescents have sleep problems (estimated prevalence of 25%-40%),¹⁸ and inhibition of the serotonin (5-hydroxytryptamine) system plays an important role in both sleep and suicidal

CTQ	Childhood Trauma Questionnaire
HSS	Household socioeconomic status
PSQI	Pittsburgh Sleep Quality Index
SCAHS	School-based Chinese Adolescents Health Survey

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behavior.^{19,20} Among adolescents, insomnia has been reported to be associated with suicide.²¹ Research shows that individuals suffering from childhood maltreatment are vulnerable to sleep disturbances.²² Therefore, one potential factor that may play a moderating role in the association between childhood maltreatment and suicide attempts is sleep disturbance.

To our knowledge, there have been no studies in China that have examined the associations of childhood maltreatment with single and multiple suicide attempts in general adolescents, and no studies have assessed the potential moderating effects of sleep disturbance on these associations. Therefore, the present study aimed to test the hypotheses that childhood maltreatment may be associated with an increased risk of single and multiple suicide attempts, and the effect size may be greater for multiple suicide attempters than for single suicide attempters; sleep disturbance is associated with single and multiple suicide attempts, and the associations of childhood maltreatment with single and multiple suicide attempts are moderated by sleep disturbance.

Methods

Data were drawn from the School-based Chinese Adolescents Health Survey (SCAHS). SCAHS is an ongoing study of the health-related behaviors among Chinese adolescents, in 7th through 12th grade, that collects large-scale cross-sectional data (conducted every 2 years since 2007)²³⁻²⁵ and longitudinal data (between 2009 and 2012)²⁶ through questionnaires administered in classrooms. In this study, we focused on older adolescents, at least 16 years of age, as this is the period when most Chinese adolescents start attending senior high school (10th-12th grade) in China and is the transitional stage from puberty to adulthood.²⁷ Moreover, students are more likely to have a sleep disturbance in this period,²⁸ and older adolescents require less sleep than younger adolescents.²⁹ The 2015 SCAHS uses a 3-stage, stratified cluster, random sampling method from 7 randomly selected provinces of China, was the most recent version at the time of analysis, and added additional questions about childhood maltreatment.

The procedures for data collection were as follows. In stage 1, we divided each province into 3 economic stratifications (high, middle, and low) by gross domestic product per capita, and then randomly selected 2 representative cities from each stratification with SAS 9.2 software (SAS Institute, Inc, Cary, North Carolina).³⁰ In stage 2, senior high schools in each representative city were divided into 2 categories: general high schools (preparing students for university) and vocational high schools (Zhongzhuan, providing specific vocational training). Four general and 4 vocational high schools were selected randomly from each representative city. In stage 3, 2 classes were selected randomly from each grade within the selected schools. All available students in the selected classes were invited to participate. Of the 83 200 students invited, 75 715 students' questionnaires were completed, resulting in a response rate of 91.0%. Of the total sample, 44.8% were boys, and 55.2% were girls. The students ranged in age from 16 to 21 years, and the mean age was 16.6 (SD: ± 1.2) years. Self-report questionnaires were

anonymous and administered during the normal class by research staff. Teachers were not present. Parental permission and adolescent assent was obtained for students <18 years; students ≥ 18 years provided their own written consent.

Measures

Suicide attempt was assessed by the question "During the past 12 months, how many times did you actually attempt suicide?" Available responses were zero, once, and at least 2 times. The category "no attempt" was treated as reference in multinomial logistic regression analyses.^{26,31}

Childhood maltreatment was assessed via use of the short form of the Childhood Trauma Questionnaire (CTQ) in Chinese,^{32,33} and exhibits high internal consistency (Cronbach alpha = 0.75) in this study sample. The short form of the CTQ has 5 subscales that assess different types of childhood maltreatment, including physical abuse, emotional abuse, sexual abuse, physical neglect, and emotional neglect. Each subscale includes 5 questions about experiences that occurred in childhood, with the answers given on a 5-point Likert-type scale, ranging from never to very often. Examples include: "When I was growing up, people in my family called me stupid, lazy, or ugly" (emotional abuse); "When I was growing up, people in my family hit me so hard that it left bruises or marks" (physical abuse); "When I was growing up, someone threatened to hurt me or tell lies about me unless I did something sexual with them" (sexual abuse); "When I was growing up, I knew there was someone to take care of me and protect me" (emotional neglect); "When I was growing up, there was someone to take me to the doctor if I needed it" (physical neglect). Each of the 5 CTQ subscale scores ranged from 5 to 25, and greater scores indicated more severe maltreatment.

The Pittsburgh Sleep Quality Index (PSQI) in Chinese is a 19-item self-rated questionnaire for assessing subjective sleep quality and disturbances over a 1-month time interval. The PSQI consists of 19 items are combined into 7 clinically derived component scores, each weighted equally from 0 to 3; the sum of the scores for these 7 components yields one global score with a range of 0-21 points in which greater scores indicate worse sleep quality.^{28,34} A PSQI global score >7 points indicates poor sleep quality or sleep disturbance.³⁵ The PSQI exhibits high internal consistency (Cronbach alpha = 0.73) in this study sample.

Covariates included age, sex, grade level, living arrangement, household socioeconomic status (HSS), academic achievement, the number of friends who have dropped/are dropping out of school, classmate relations, teacher-classmate relationships, current smoking, current drinking, and suicidal ideation.^{9,28,36} Living arrangement was assessed by asking who lived in the student's primary home (both parents, only with father or mother, or living with others). HSS was measured by asking about the student's perception of his or her household's current socioeconomic status (excellent or very good, good, or fair/poor). Academic achievement was captured by the ranking of the overall end-of-year examination results (above average, average, below average). The number of friends who have dropped/are dropping out of school was

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