

Original article

## Family Factors Associated With Suicide Attempts Among Chinese Adolescent Students: A National Cross-Sectional Survey

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### Abstract

**Purpose:** To determine the prevalence and associated family factors of suicide attempts among junior and/or senior high school students, so as to provide bases for preventive measures of suicide in China.

**Methods:** A total of 13,512 students from 32 junior and/or senior high schools in grades 7 to 11 in eight cities of China participated in a self-administered anonymous survey to report their frequency of suicide attempts during the past year. Sociodemographic characteristics, tobacco, and alcohol use in the past 30 days were asked. Stressful family life events were used to evaluate the subjects' family characteristics.

**Results:** Overall, 2.7% (338/12,470) in-school adolescents reported a suicide attempt during the past year, girls significantly more often than boys. Considered independently, all stressful family life events were strongly associated with increased risk for self-reported suicide attempts. When taking sociodemographic characteristics, life style, and all the five family factors selected from factor analysis into consideration, there was a significant independent impact of three family factors on increasing suicide attempts risk among adolescents. The most notable risks were derived from improper parental rearing behavior, separation from parents, and social problems of the family members. However, neither poor material conditions of family life nor family member's adversity contribute significantly to the risk.

**Conclusions:** This study not only indicates that suicide attempt is a significant public health issue among in-school adolescents in China, but also confirms that adolescents with family problems commonly manifest suicide attempts, which highlights the importance of considering family environmental factors when assessing suicide risk. © 2010 Society for Adolescent Health and Medicine. All rights reserved.

### Keywords:

Suicide attempts; Stressful life events; Family factors; Parent-child relations; Adolescent; China

Suicide in adolescents has been identified as a serious public health problem worldwide. Although the rates vary among different countries, suicide is currently one of the top three causes of death for adolescents 15–19 years old [1].

Suicide attempts are relatively common among adolescents, with a recent international systematic review of popu-

lation-based studies estimating a mean proportion of 9.7% of adolescents reporting having attempted suicide at some point in their lives [2]. Although few young people who report having tried to kill themselves may in fact have wished to die, and very few will go on to complete suicide, there is an agreement that a prior suicide attempt is one of the best predictors of both a repeat attempt and an eventual completed suicide [2, 3]. In addition, the ratio of suicide attempts to completed suicides among adolescents is estimated to be 50:1 to 100:1 [1]. Therefore, early identification and intervention of suicide attempts is of great importance to prevent youth suicide.

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Despite much concern about the high completed suicide rate in young women in China [4], there is increasing public and policy concern about the issue of adolescent suicide attempts. Recently, we investigated the suicidal behavior and risk factors in a sample of 10,894 adolescents in four rural counties of China, and found that 5.8% of the sample reported having made suicide attempts during the past 12 months [5].

For adolescents, family life is the most important specific domain of their lives, and it is evident in Pfeffer et al.'s argument that suicidal behavior often represented a final effort to escape from a miserable and unbearable family situation [6]. In Asian societies like China, the family characteristics are very unique. For instance, Chinese parents are less likely to communicate with their children but more likely to use physical discipline if their children break the rules made by parents [7]. Liu et al. reported that 14% of Chinese rural adolescents had been beaten by parents during the past year, and adolescents who reported physical punishment by parents during the past year were at two- to threefold greater risk for suicide attempts than those who did not report physical punishment by parents [8]. However, there is neglect of family factors. To date, relatively little is known about epidemiological characteristics of suicide attempts and its family-related risk factors for a representative national sample in Chinese school-going adolescents. Hence, using data collected through a self-reported anonymous survey administered to students of eight cities in China ( $N = 12,470$ ), the current study investigated the following: (1) the prevalence of 1-year suicide attempts among Chinese in-school adolescents in total and by gender, and (2) the family factors associated with adolescent 1-year suicide attempts.

## Methods

### *Participants*

This was a cluster sampling. Because China has a vast territory with diversities in geographic and economic development, we divided the eight sampled cities into three areas: east (including Beijing, Shaoxing in Zhejiang province, and Guangzhou in Guangdong province), middle (including Ezhou in Hubei province, Harbin in Heilongjiang province, and Taiyuan in Shanxi province), and west (including Guiyang in Guizhou province and Chongqing) areas. Four schools (including two rural and two urban schools) in each city were selected, and all the schools included were general junior and/or senior high schools (excluding experimental, professional, or key schools). A total of 13,512 students from 32 schools in eight cities of China were recruited in the present study, and participants were from grades 7 through 11 (excluding Grade 9 and Grade 12 because of entrance examination), indicating that students with different socioeconomic background were included. In the participating schools, 559 of the 13,512 sampled students were excluded from the study

because of absence from school on the day of the survey or because they did not want to respond to the questionnaire. Thus 12,953 of the 13,512 sampled students submitted questionnaires (95.9%), of which 483 questionnaires were discarded because of high levels of missing data or their answers were clearly fictitious or inconsistent. Finally 12,470 usable questionnaires remained. The overall response rate was 92.3%.

### *Procedure*

We administered a pilot study of the survey questionnaires in September 2007, and carried out the data collection in March 2008. Because of the nature of this project, ethical approval was granted from the Ethics Commission of Anhui Medical University. Written parental consent was not a requirement for survey research in Chinese. However, students were asked for verbal consent to take part in the study and were also given the option to withdraw from the study at any point in time, without penalty, as well as assured that their responses would be kept either anonymous or confidential. The purpose of the study was clearly explained to the students and consent to participate in the study was obtained from all students involved. Students completed the questionnaire during a regular class period, spending about 20 minutes to record their responses to the survey questions.

### *Measures*

The variables were selected from a battery of survey instruments, many of which had been used in the previous local studies. The questionnaires were designed to comprise the following items:

*Demographic characteristics.* Demographic variables include gender, age, grade, city, ethnicity (Han nationality, other ethnic minority), household registration (rural areas, urban areas), and whether only one child.

*Tobacco and alcohol use.* Current smoking referred to any cigarette smoking during the past month. Current alcohol use was defined as at least one drink of alcohol during the past month.

*Stressful family life events.* Seventeen family events (e.g., experiencing physical punishment from parents) were assessed in response to the following question: "Whether the following family-related life event happened to you? And if so, whether it remained having an impact on you during the past 6 months?" The answers were assigned the following scores: "the event has never happened to you, or happened but without significant impact on you" was coded as "no" (score 1), and "the event happened with impact" was coded as "yes" (score 2).

**Suicide attempt.** The dependent variable in our analyses, self-reported suicide attempt, was assessed in response to a single question: “During the past 12 months, how many times did you actually attempt suicide?” with responses of 0, 1, 2–3, and 4 times or more. Suicide attempt was defined according to the questionnaire of Youth Risk Behavior Survey [9]. Participants who reported having made at least one suicide attempt during the past year were coded as “attempters,” and the others were coded as “non-attempters.”

### Data analysis

Data were input using the EpiData 3.1, and all statistic analyses were performed by SPSS, version 10.0. First,  $\chi^2$  tests were used to identify statistically significant gender differences with respect to household registration, grade level, race/ethnicity, siblings (if any), current smoking, and alcohol use, and then to explore univariate associations between suicide attempts and demographic characteristics, life style variables and family items (yes/no). Factor analysis was then conducted on all family items. Factors were extracted by principal components and subjected to a varimax rotation. The number of factors to preserve was determined by eigenvalues  $> 1$ . Finally, cross-sectional logistic regression analyses using the Forward: likelihood ratio method were performed, with demographic characteristics, life style variables, and family factors selected from factor analysis as independent variables onto suicide attempts as dichotomous dependent outcomes. The level of significance was set at  $p < .05$ .

## Results

### Characteristics of the study participants

The age of the sample ranged from 11–19 years old (mean = 14.67; SD = 1.92). The distribution of the student participants is presented in Table 1. Most of them were of Han nationality (95.2%). In terms of gender differences, self-reported current cigarette smoking and alcohol use were both more prevalent among boys compared with girls. Significant gender differences were also found in household registration and number of siblings irrespective of whether an only child, but not in ethnicity and grade.

### Prevalence of suicide attempt and its distribution by demographic characteristics and life style variables

In this study, 2.7% (338/12,470) of respondents reported attempting suicide in the past year, with 2.1% reporting one suicide attempt, 0.4% reporting two to three times, and 0.2% reporting four or more times. This was more common among females (3.6%) than among males (1.9%). By applying  $\chi^2$  tests, we found that all demographic and life style variables that were evaluated, with the exception of ethnicity and grade, exhibited statistically significant associations with self-reported suicide attempts. Suicide attempters were significantly more likely than nonattempters to be females

( $\chi^2 = 34.80$ ,  $p < .001$ ), have rural household registration ( $\chi^2 = 12.79$ ,  $p < .001$ ), have no siblings ( $\chi^2 = 4.499$ ,  $p = .034$ ), be current smokers ( $\chi^2 = 42.45$ ,  $p < .001$ ), and alcohol users ( $\chi^2 = 83.00$ ,  $p < .001$ ).

### Family factors extracted from factor analysis

Five factors with eigen values  $> 1.0$  were identified, and together they accounted for 52.7% of the overall variance, with each factor explaining 23.4%, 9.3%, 7.5%, 6.5%, and 5.9% of the total variance. The factor loadings for adolescents are presented in Table 2. The most important factor (factor 1) represented “improper parental rearing behaviour” such as “experiencing physical punishment from parents.” The second factor (in order of eigenvalue size) seemed to represent “separation from parents,” particularly “parental divorce.” The third factor seemed to embody “social problems of the family members.” The fourth factor extracted seemed to represent “poor family material life condition” and the fifth factor was labeled “family member’s adversity.”

### Family factors associated with suicide attempts among adolescents in China: bivariate analysis

As indicated in Table 3, comparing the difference in family stressful life events (organized by factor) between the adolescents who attempted suicide and those who did not, all family stressful life events were more common in families in which adolescents attempted suicide.

### Family factors associated with suicide attempts among adolescents in China: logistic regression analysis

Table 4 presents results from logistic regression analyses. Considered independently, all family factors that were selected from factor analysis, except factor 4, were strongly associated with increased risk for self-reported suicide attempts. Group-specific odds ratios are listed in the second set of columns in Table 4.

Family factors were then evaluated for their associations with risk for self-reported suicide attempts while controlling for demographic and/or life style characteristics in each model. A series of logistic regression analyses were conducted, each including a single family factor variable as an independent variable in addition to the demographic and/or life style variables. In other words, for these analyses, the family factor variables were adjusted for demographic and/or life style variables but were not adjusted for each other. These results are summarized in the third set of columns in Table 4 (Demographic model). The first three factors remained significantly associated with suicide attempts, indicating that these factors may be independent correlates of suicidality when controlling for demographic characteristics and/or life style variables. Additionally, risk associated with factor 4 attenuated.

The final set of analyses involved determination of a multiple-logistic regression model for all of the five family

Table 1  
Distribution of the student sample according to gender in China (N = 12,470)

Demographic and life style variables	Total 100 (12,470)	Males 49.8 (6,216)	Females 50.2 (6,254)	$\chi^2$	<i>p</i>
Household registration				7.11	.008
Urban	58.3 (7,269)	57.1(3,550)	59.5 (3,719)		
Rural	41.7 (5,201)	42.9(2,666)	40.5 (2,535)		
Ethnicity				.06	.807
Han nationality	95.2 (11,874)	95.2 (5,916)	95.3 (5,958)		
Other ethnic minority	4.8 (596)	4.8 (300)	4.7 (296)		
Grade				16.90	.001
7th	25.6 (3,196)	26.5 (1,645)	24.8 (1,551)		
8th	24.6 (3,066)	24.7 (1,538)	24.4 (1,528)		
10th	25.4 (3,168)	25.9 (1,613)	24.9 (1,555)		
11th	24.4 (3,040)	22.8 (1,420)	25.9 (1,620)		
Only one child				60.45	<.001
No	42.3 (7,195)	38.9 (2,415)	45.7 (2,860)		
Yes	57.7 (5,275)	61.1 (3,801)	54.3 (3,394)		
Current smoking				418.86	<.001
No	94.9 (11,839)	90.9 (5,651)	98.9 (6,188)		
Yes	5.1 (631)	9.1 (565)	1.1 (66)		
Current alcohol use				225.16	<.001
No	89.3 (11,141)	85.2 (5,295)	93.5 (5,846)		
Yes	10.7 (1,329)	14.8 (921)	6.5 (408)		

factors mentioned earlier in the text. After demographic and/or life style variables and all of the five family factors were added to the model, suicide attempts were only strongly correlated with three factors: the highest contribution was noted for factor 1; factor 2 and factor 3 also had a significant, but comparatively smaller influence. These results are summarized in the rightmost column of Table 4 (family factors model).

## Discussion

Findings from this study show that Chinese in-school adolescents, particularly females, revealed a relatively higher rates of suicide attempts than Chinese university

students [10]. More importantly, our analyses show a robust association between being exposed to harmful family environments and suicide attempts among adolescents. This has important implications in reducing adolescent suicidal behavior. Efforts to address family risk factors must be a high priority, and this study provides evidence of the importance of the family environments in reducing risk for adolescents.

### Prevalence of suicide attempts and gender difference

Suicide attempts were reported by 2.7% of students in this study. This is relatively lower than the results of surveillance of adolescents in many other countries, where 4.6%–13.2%

Table 2  
Loadings on first five rotated principal components for all adolescents

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Scolding by parents	.80 <sup>a</sup>	.03	.07	.03	.05
Experiencing physical punishment from parents	.73 <sup>a</sup>	.07	.08	.02	.06
Perceived much parental control	.72 <sup>a</sup>	.03	.02	.09	.02
Failed to live up to the expectations of parents	.48 <sup>a</sup>	−.03	.05	.16	.29
Perceived poor relationship with family member	.44 <sup>a</sup>	.22	.20	.09	.17
Perceived parental conflict	.42 <sup>a</sup>	.10	.30	.30	−.05
Perceived low parental care	.36 <sup>a</sup>	.31	.25	.30	−.04
Parental divorce	.05	.83 <sup>a</sup>	.06	.01	.06
Reconstituted family	.04	.83 <sup>a</sup>	.05	.00	.08
Parent's employment away-from-home	.13	.44 <sup>a</sup>	.19	.27	.01
Parental gambling problem	.13	.06	.77 <sup>a</sup>	.12	.06
Family member's alcohol abuse problem	.12	.01	.76 <sup>a</sup>	.11	.08
Family member's violations of the law	.03	.25	.49 <sup>a</sup>	−.04	.19
Perceived poor residential conditions	.10	.06	.08	.80 <sup>a</sup>	.08
Perceived economic adversity	.16	.04	.06	.79 <sup>a</sup>	.15
Family member or relative died	.11	.05	.09	−.00	.82 <sup>a</sup>
Serious illness or injury suffered by an family member	.12	.10	.16	.22	.66 <sup>a</sup>

<sup>a</sup> Indicate the largest loadings on each component.

Table 3  
Family associated factors of Chinese school-in adolescents, with and without suicide attempts

Family factors	Full sample n	Non-attempters n	Attempters n (%)	$\chi^2$	<i>p</i>
Factor 1 (improper parental rearing behavior)					
Scolding by parents				54.49	<.001
No	5,707	5,619	88 (1.5)		
Yes	6,763	6,513	250 (3.7)		
Experiencing physical punishment from parents				78.45	<.001
No					
Yes	8,451	8,297	154 (1.8)		
Perceived much parental control	4,019	3,835	184 (4.6)		
No					
Yes					
Failed to live up to the expectations of parents				36.07	<.001
No	4,915	4,835	80 (1.6)		
Yes	7,555	7,297	258 (3.4)		
Perceived poor relationship with family member				161.55	<.001
No	10,068	9,886	182 (1.8)		
Yes	2,402	2,246	156 (6.5)		
Perceived parental conflict				54.12	<.001
No	7,905	7,755	150 (1.9)		
Yes	4,565	4,377	188 (4.1)		
Perceived low parental care				134.02	<.001
No	9,709	9,533	176 (1.8)		
Yes	2,761	2,599	162 (5.9)		
Factor 2 (separation from parents)					
Parental divorce				81.86	<.001
No	11,399	11,136	263 (2.3)		
Yes	1,071	996	75 (7.0)		
Reconstituted family				50.75	<.001
No	11,785	11,495	290 (2.5)		
Yes	685	637	48 (7.0)		
Parent's employment away-from-home				42.10	<.001
No	10,564	10,320	244 (2.3)		
Yes	1,906	1,812	94 (4.9)		
Factor 3 (social problems of the family members)					
Parental gambling problem				58.33	<.001
No	10,656	10,416	240 (2.3)		
Yes	1,814	1,716	98 (5.4)		
Family member's alcohol abuse problem				22.61	<.001
No	10,614	10,357	257 (2.4)		
Yes	1,856	1,775	81 (4.4)		
Family member's violations of the law				25.09	<.001
No	11,863	11,561	302 (2.5)		
Yes	607	571	36 (5.9)		
Factor 4 (poor material conditions of family life)					
Perceived poor residential conditions				20.35	<.001
No	10,203	9,958	245 (2.4)		
Yes	3,267	2,174	93 (4.1)		
Perceived economic adversity				8.05	.005
No					
Yes	7,959	7,768	191 (2.4)		
Factor 5 (family member's adversity)					
Family member or relative died	4,511	4,364	147 (3.3)	31.38	<.001
No	9,586	9,369	217 (2.3)		
Yes	2,884	2,763	121 (4.2)		
Serious illness or injury suffered by an family member				27.53	<.001
No	10,356	10,111	245 (2.4)		
Yes	2,114	2,021	93 (4.4)		
Total n	12,470	12,132	338 (2.7)		

of students reported suicide attempts [11–14]. Moreover, the rate of suicide attempt in this study is lower than international means identified by Evans et al [2]. However, this finding is consistent with some previous studies of Chinese youth,

which reported that the prevalence of adolescent suicide attempts ranged from 2.6% to 5.8% in the past decade [5, 15, 16]. The prevalence rates vary among different population. For example, a cross-sectional Malaysian school

Table 4  
Suicide attempts and correlated family factors using univariate and multiple logistic regression analysis

Family factors	Unadjusted odds ratios with 95% CI	Adjusted odds ratios with 95% CI	
		Demographic model <sup>a</sup>	Family factors model <sup>b</sup>
Factor 1	1.83 (1.66, 2.02) <sup>c</sup>	1.74 (1.57, 1.92) <sup>c</sup>	1.76 (1.59, 1.95) <sup>c</sup>
Factor 2	1.38 (1.29, 1.48) <sup>c</sup>	1.31 (1.23, 1.40) <sup>c</sup>	1.30 (1.22, 1.40) <sup>c</sup>
Factor 3	1.34 (1.23, 1.45) <sup>c</sup>	1.27 (1.17, 1.38) <sup>c</sup>	1.25 (1.15, 1.35) <sup>c</sup>
Factor 4	—	—	—
Factor 5	1.18 (1.07, 1.29) <sup>d</sup>	1.11 (1.01, 1.22) <sup>e</sup>	—

CI = confidence interval; — = being excluded from the final model.

<sup>a</sup> The odds ratios for risk factors were adjusted only for demographic/life style variables.

<sup>b</sup> The odds ratios for risk factors were all adjusted for each other in addition to demographic/life style variables.

<sup>c</sup>  $p < .001$ .

<sup>d</sup>  $p < .01$ .

<sup>e</sup>  $p < .05$ .

survey showed that Malay adolescents had lower rate of suicide attempts than Indian and Chinese [13], whereas Kim and Kim found that delinquent adolescents reported a higher rate of suicide attempts than student adolescents [12]. Furthermore, variation in findings may be partly explained by differences in designs and definition of suicide attempts.

Our findings support previous research indicating gender difference in the prevalence of suicide attempts, that girls were more significantly likely than boys to report making suicide attempts [17–19]. On the contrary, it is inconsistent with a previous study of urban youth, which reported that no gender difference had been found [16].

#### *Stressful family life events as risk factors of adolescent suicide attempts*

Chinese adolescents who attempted suicide showed significantly greater exposure to adverse family environments: improper parental rearing behavior (e.g., experiencing physical punishment from parents), separation from parents (e.g., parental divorce), and social problems of the family members (e.g., parental gambling problem). These family variables are therefore generally risk factors of suicidal behavior during adolescence, which is similar to most previous reports showing adolescent suicide attempters often suffer from a greater dysfunctional family dynamic environment than nonattempters [8, 12, 20–22].

*Improper parental rearing behavior.* Independent ratings of adolescents' descriptions of their parents suggested that those exhibiting suicide attempts perceived their parent(s) as more likely to use inadequate parental rearing patterns such as physical discipline, less caring, and much control. There is also consistent evidence that suicide attempters had experienced significantly more negative parental rearing factors than normals [23].

Numerous previous studies of childhood physical and emotional abuse showed it to be risk factors for youth suicide attempts [24–26]. In China, especially rural areas, physical

punishment is common among children. Adolescents who reported physical punishment by parents during the past year were found to be at a high risk for suicide attempts [8, 27]. This study makes a contribution by adding further evidence that association between physical or emotional abuse and suicide attempts among young persons exists in China. Adolescents' experience of physical or verbal punishment from parents belongs to parent-child conflict, which is one of the most common precipitating factors of suicide attempts [28]. A study of 40 adolescents who had engaged in attempted suicide behaviors showed that 77.5% of them reported conflict with their parents in the few hours before the event [29]. Hence, suicide attempts may be a way of escaping from family conflict, which may exert a direct effect on adolescent suicidal behavior, perhaps through a direct stressful effect or the lack of support [7]. It was also found in a study by Ackard et al. that perceiving low parental caring was associated with suicide attempts [30]. These findings suggest that comprehensive interventions to reduce adolescent suicide attempts must include reducing abusive parenting and improving the parent-child communication.

*Separation from parents.* Similar to other studies, a significant association was noted between threat of separation from a parental figure such as parental divorce and the increased risk of adolescent suicide attempts. Generally, for many children with divorced parents or parents working out of town for a long time, the divorce and parent's employment away from home reduce social resources within families because children have fewer interactions with the parents, which will lead to a lower level of child well-being.

It was shown in reports by Benjaminsen et al. that parental loss as a result of divorce had occurred significantly more often among psychiatric patients (aged: 18–29) who had attempted suicide than that among both nonsuicidal psychiatric patients and normals [23]. Results from a study sample of 1,845 students aged 14–20 in Massachusetts reported that respondents from divorced families had higher suicide attempts relative to those from other family structures, whereas intact families had the lowest rate for suicide

attempts [31]. Garnefski and Diekstra also found that the lowest risk of suicide attempts was in the intact family structure compared with other family structures [20]. Previous study has shown parental divorce to be a significant risk factor for children's anxiety and depression in China [32]. A longitudinal study of adolescents indicated that family structure and stressful life events were associated with affective disorders in adolescents [33]. The fact that adolescents of divorced parents, as a group, have more depression and adjustment problems than do children of never-divorced parents [34], may be one of the reasons.

*Social problems of the family members.* In our logistic regression analysis, the risk of suicide attempts increased with the presence of social problems such as parental gambling problem in the family. As Brown and Coventry have noted, "children can sometimes be the unwitting sufferers of (parental) gambling behaviour" [35]. However, the effects of parental problem gambling on adolescents have seldom been investigated. It has been reported by Vitaro et al. that children of parents with gambling problems reported more depressive feelings and more conduct problems by mid-adolescence than children of parents without gambling problems, showing that children of parents with gambling problems were at risk for a variety of adjustment problems [36]. Gambling behaviors can disrupt family functioning and directly influence family processes. The children who live within a gambling problem family will become an important area of concern for child health. Therefore, we suggest that family interventions to decrease social problems such as gambling in the family may also be helpful in decreasing the risk of adolescent suicide attempts.

All the evidences mentioned earlier suggest that a wide array of adverse family factors appear to be associated with an increased risk of adolescent suicide attempts. Such adolescents often view their family situations as oppressive, and as a result generating a great deal of dissatisfaction with the family functioning. It has been indicated that suicide attempts in young people are frequently preceded by exposure to stress and personal adversity [37], reflecting an attempt to resolve, solve, or avoid the personal difficulties and stress associated with exposure to negative life events. This has also usually been interpreted as evidence of a causal process in which exposure to family disadvantages and stressful life events increases an individual's vulnerability to later psychopathology and adjustment difficulties, with this in turn reflected in increased rates of suicide attempts [38].

In addition, although physical discipline by parents in adolescents is relatively common in China, rate of suicide attempt in our study was relatively lower than that in the United States or Europe. Adolescent's attempted suicide behavior has very complex causes. It cuts across all cultural and socioeconomic levels. So there are many complicated factors that can interpret these differences between studies, among which culture plays an important role. For example, suicidal behaviors are not advocated as the method of solving

personal difficulties and stress associated with exposure to adverse life events in the context of Chinese culture. Moreover, males are less likely than females to choose suicidal behaviors in China.

### Limitations

Although the current research is large and diverse, there are some limitations that should be considered when interpreting these findings. First, we were unable to conduct a multimethod assessment (the measure in our study was only self-report). Second, because of the retrospective nature of the survey, the reliability of the information collected may have been affected by recall biases. Third, the experiences of the students who did not respond are not known, so the findings of this study cannot be generalized to adolescents who are not in the school system, dropouts, absent, or nonrespondents. Fourth, no causal relationships could be made on the basis of cross-sectional data. Finally, the time covered by the various instruments differs from past 6 months (stressful family life events) to past year (suicide attempt). We defined the time covered by the effect of family stressful life events on adolescents as "during the past 6 months" for two reasons. We wanted to avoid recall bias and at the same time covered by suicide attempt in most of the studies was defined as "during the past 12 months." If we also defined it as "during the past 6 months," the prevalence of suicide attempts would be very low, which would make comparisons among studies difficult. In addition, when assessing family factors, we considered their permanent impact on adolescents during the past 6 months. So the variables assessed could be relatively stable.

### Conclusions

Taken together, to the best of our knowledge, this is the first study to examine the association between family factors and suicide attempts for a representative national sample in Chinese school-going adolescents. Regardless of cultural differences, these findings highlight the importance of family intervention as one possible strategy to prevent adolescent suicide in China. Future research is warranted to disentangle prospectively the interconnections between family environmental factors and suicidal behaviors among adolescents.

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## References

- [1] Shain BN. American Academy of Pediatrics Committee on Adolescence: Suicide and suicide attempts in adolescents. *Pediatrics* 2007;120:669–76.
- [2] Evans E, Hawton K, Rodham K, et al. The prevalence of suicidal phenomena in adolescents: A systematic review of population-based studies. *Suicide Life Threat Behav* 2005;35:239–50.
- [3] Spirito A, Esposito-Smythers C. Attempted and completed suicide in adolescence. *Annu Rev Clin Psychol* 2006;2:237–66.
- [4] Phillips MR, Li X, Zhang Y. Suicide rates in China, 1995–1999. *Lancet* 2002;359:835–40.
- [5] Xing XY, Tao FB, Hao JH, et al. Study on the school-related-factors of attempted suicide among rural middle school students [in Chinese]. *Zhonghua Liu Xing Bing Xue Za Zhi* 2009;30:21–5.
- [6] Pfeffer CR, Plutchik R, Mizruchi MS, et al. Suicidal behavior in child psychiatric inpatients and outpatients and in nonpatients. *Am J Psychiatry* 1986;143:733–8.
- [7] Liu X, Sun Z, Yang Y. Parent-reported suicidal behavior and correlates among adolescents in China. *J Affect Disord* 2008;105:73–80.
- [8] Liu X, Tein JY, Zhao Z, et al. Suicidality and correlates among rural adolescents of China. *J Adolesc Health* 2005;37:443–51.
- [9] Kolbe LJ, Kann L, Collins JL. Overview of the Youth Risk Behavior Surveillance System. *Public Health Rep* 1993;108(suppl 1):2–10.
- [10] Ai M, Kuang L, Wang MJ, et al. A study on suicide attempts and related factors of college students in Chongqing. *Chin J Nerv Ment Dis* 2008;34:594–7.
- [11] Hawton K, Rodham K, Evans E, et al. Deliberate self harm in adolescents: Self report survey in schools in England. *BMJ* 2002;325:1207–11.
- [12] Kim HS, Kim HS. Risk factors for suicide attempts among Korean adolescents. *Child Psychiatry Hum Dev* 2008;39:221–35.
- [13] Chen PC, Lee LK, Wong KC, et al. Factors relating to adolescent suicidal behavior: A cross-sectional Malaysian school survey. *J Adolesc Health* 2005;37:337.
- [14] Schilling EA, Aseltine RH Jr, Glanovsky JL, et al. Adolescent alcohol use, suicidal ideation, and suicide attempts. *J Adolesc Health* 2009;44:335–41.
- [15] Sun Y, Tao FB, Gao M. Suicidal behaviors and correlated psychological factors in secondary school students [in Chinese]. *Zhonghua Liu Xing Bing Xue Za Zhi* 2006;27:33–6.
- [16] Zhang ZQ, Guo LT. A cross-sectional study on suicide attempts in urban middle school students in Chengdu [in Chinese]. *Zhonghua Liu Xing Bing Xue Za Zhi* 2003;24:189–91.
- [17] Joe S, Baser RS, Neighbors HW, et al. 12-month and lifetime prevalence of suicide attempts among black adolescents in the National Survey of American Life. *J Am Acad Child Adolesc Psychiatry* 2009;48:271–82.
- [18] Bossarte RM, Swahn MH, Breiding M. Racial, ethnic, and sex differences in the associations between violence and self-reported health among US high school students. *J Sch Health* 2009;79:74–81.
- [19] Kutcher SP, Szumilas M. Youth suicide prevention. *CMAJ* 2008;178:282–5.
- [20] Garnefski N, Diekstra RF. Adolescents from one parent, stepparent and intact families: Emotional problems and suicide attempts. *J Adolescence* 1997;20:201–8.
- [21] Garcia C, Skay C, Sieving R, et al. Family and racial factors associated with suicide and emotional distress among Latino students. *J Sch Health* 2008;78:487–95.
- [22] Fortuna LR, Perez DJ, Canino G, et al. Prevalence and correlates of lifetime suicidal ideation and suicide attempts among Latino subgroups in the United States. *J Clin Psychiatry* 2007;68:572–81.
- [23] Benjaminsen S, Krarup G, Lauritsen R. Personality, parental rearing behaviour and parental loss in attempted suicide: A comparative study. *Acta Psychiatr Scand* 1990;82:389–97.
- [24] Brezo J, Paris J, Vitaro F, et al. Predicting suicide attempts in young adults with histories of childhood abuse. *Br J Psychiatry* 2008;193:134–9.
- [25] Salzinger S, Rosario M, Feldman RS, et al. Adolescent suicidal behavior: Associations with preadolescent physical abuse and selected risk and protective factors. *J Am Acad Child Adolesc Psychiatry* 2007;46:859–66.
- [26] Hacker KA, Suglia SF, Fried LE, et al. Developmental differences in risk factors for suicide attempts between ninth and eleventh graders. *Suicide Life Threat Behav* 2006;36:154–66.
- [27] Gureje O, Kola L, Uwakwe R, et al. The profile and risks of suicidal behaviours in the Nigerian Survey of Mental Health and Well-Being. *Psychol Med* 2007;37:821–30.
- [28] Chiou PN, Chen YS, Lee YC. Characteristics of adolescent suicide attempters admitted to an acute psychiatric ward in Taiwan. *J Chin Med Assoc* 2007;69:428–35.
- [29] Pillay AL, Wassenaar DR. Recent stressors and family satisfaction in suicidal adolescents in South Africa. *J Adolesc* 1997;20:155–62.
- [30] Ackard DM, Neumark-Sztainer D, Story M, et al. Parent-child connectedness and behavioral and emotional health among adolescents. *Am J Prev Med* 2006;30:59–66.
- [31] Ali A, Maharajh HD. Social predictors of suicidal behaviour in adolescents in Trinidad and Tobago. *Soc Psychiatry Psychiatr Epidemiol* 2005;40:186–91.
- [32] Dong Q, Wang Y, Ollendick TH. Consequences of divorce on the adjustment of children in China. *J Clin Child Adolesc Psychol* 2002;31:101–10.
- [33] Cuffe SP, McKeown RE, Addy CL, et al. Family and psychosocial risk factors in a longitudinal epidemiological study of adolescents. *J Am Acad Child Adolesc Psychiatry* 2005;44:121–9.
- [34] Kelly JB. Children's adjustment in conflicted marriage and divorce: A decade review of research. *J Am Acad Child Adolesc Psychiatry* 2000;39:963–73.
- [35] Brown S, Coventry L. *Queen of Hearts: The Needs of Women with Gambling Problems*. Melbourne, Australia: Financial and Consumer Rights Council, 1997.
- [36] Vitaro F, Wanner B, Brendgen M, et al. Offspring of parents with gambling problems: Adjustment problems and explanatory mechanisms. *J Gambli Stud* 2008;24:535–53.
- [37] Fergusson DM, Woodward LJ, Horwood LJ. Risk factors and life processes associated with the onset of suicidal behavior during adolescence and early adulthood. *Psychol Med* 2000;30:23–39.
- [38] Beautrais AL. Risk factors for suicide and attempted suicide among young people. *Aust N Z J Psychiatry* 2000;34:420–36.