

Association Between Bullying and Suicidal Behavior Among Chinese Adolescents: An Analysis of Gender Differences

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Background: Suicide has become the leading cause of death among 15–34 years old in China, and more attention should be paid to risk factors and prevention of suicidal ideation and suicide attempts. The school-based survey was conducted to test the associations of bullying behavior with suicidal ideation and suicide attempts, and to assess whether the biological gender can moderate these associations.

Methods: A multistage stratified cluster sampling method was used to recruit participants from high schools in Guizhou, China, and univariate and multivariate logistic regression models were fitted.

Results: A total of 23,392 students were included in the analysis, and 45.4% were boys. The mean age of the students was 15.2 (SD: 1.9) years. Overall, 3.8% (882) of the students were victims, 4.9% (1144) were bullies, and 3.2% (736) were bully-victims. A total of 18.9% of students reported having suicidal ideation, and 3.9% reported having suicide attempts. Victims (adjusted odds ratio [AOR]=2.15, 95% CI=1.84–2.51), bullies (AOR=3.17, 95% CI=2.78–3.62), and bully-victims (AOR=3.18, 95% CI=2.71–3.73) were at an elevated risk of suicidal ideation than neutrals; similar associations can be found in the associations between bullying behavior and suicide attempts. Further stratification analyses showed that the associations of being bullied or bullying others with suicidal ideation and suicide attempts were slightly stronger in girls than in boys.

Conclusion: Prevention or intervention programs are recommended to take the biological gender into consideration, and future studies are also warranted to investigate the reasons of differences by gender in the association of bullying and suicidal behavior.

Keywords: bullying behavior, suicidal ideation, Chinese adolescents, gender difference

Introduction

Suicidal behavior, ranging from suicidal ideation (having thoughts about killing oneself), suicide attempts (engagement in potentially self-injurious behavior in which there is some intent to die) to suicide death, is a leading cause of injury and death worldwide.^{1,2} Although the overall suicide death rate in China has been decreased from the ratio in the 1990s,³ suicidal ideation and suicide attempts are still a significant public health concern among Chinese adolescents, and a prior study demonstrated that approximately 16.1% of the Chinese adolescents reported having suicidal ideation, and 3.1% reported having suicide attempts during the last year.⁴ Suicidal ideation and suicide attempts are more common than suicide death and are considered risk factors for suicide death among adolescents.⁵ Moreover, suicidal ideation and suicide attempts

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among adolescents can lead to a substantial financial, social, and psychological burden for the individuals, families, and communities;⁶ girls were reported to have higher rates of suicidal behavior than boys.⁷ The causes of suicidal behavior are multifactorial, including many factors associated with psychological, biological, school, or social domains.^{8,9}

Bullying (i.e., bullying others, being bullied, and both bullying others and being bullied) includes teasing, verbal or written name-calling, threats, and social exclusion, as well as kicking, hitting, or another violent bodily contact, which is a common issue among adolescents worldwide.¹⁰ Recent attention has focused on the association between adolescent bullying and suicidal behavior, reflected in both the public health and research areas.¹¹ Previous evidence reported that adolescents who were involved in bullying in any capacity, including victims, perpetrators, and those who are both victims and perpetrators (i.e., bully-victims), were at a higher risk of suicidal ideation and suicide attempts.^{12,13} Additionally, some studies reported that both bullying others and being bullied have emerged as the most influential factor for suicidal behaviors,^{14,15} but this association has not been confirmed by other studies.^{13,16}

Evidence suggested that boys were more likely to be bullies, and girls were more involved as victims.¹⁷ Moreover, several studies have demonstrated that the association between bullying and suicidal behavior may vary by the biological gender.^{18,19} Klomek et al reported higher suicide risk for girls who are victims of bullying,¹⁸ Laukkanen et al found a stronger association between victimization and suicidal ideation,¹⁹ and Kim et al reported non-significant associations between bullying and suicidal ideation for both boys and girls.²⁰ Therefore, the biological gender may play a moderator in the association between bullying and suicidal behavior among adolescents. Due to the differences of social and cultural background between China and western or developed countries, we conducted this large-scale study aimed to test the associations between three types of bullying (bullying victimization, bullying perpetration, and bully/victim status) and suicidal behavior (suicidal ideation and suicide attempts), and to assess whether the biological gender can moderate these associations.

Methods

Study Design and Participants

A cross-sectional study was conducted in 2014 in Guizhou province, located in southwest China. A multistage stratified

cluster sampling method was adopted to obtain a representative sample. In stage 1, Guizhou province was divided into three economic stratifications (high-economic, middle-economic, and low-economic levels) according to per capita gross domestic product in 2013. Then, we randomly selected two representative districts (or primary sampling units) from each stratification. In stage 2, a total of four general and four vocational high schools were randomly chosen from each selected district. In stage 3, two classes (or minimum sampling units) were randomly selected from each grade within the selected schools. All available students in the selected classes were invited to participate in this study voluntarily. Of the total students who were invited, 23,391 student's questionnaires were completed and qualified for the survey, resulting in a response rate of 95.4%. A rigorously anonymous method for collecting self-report data was guaranteed to protect the student's privacy. The study received approval from the Sun Yat-sen University, School of Public Health Institutional Review Board. Written informed consent letters were obtained from each participating student who was at least 18 years of age. If the student was under 18 years of age, the purpose and nature of the study were explained to the student and his/her parents (or legal guardians), and a written informed consent letter was obtained from one of the student's parents (or legal guardians). This study was conducted in accordance with the Declaration of Helsinki.

Measures

Suicidal Ideation and Suicide Attempts

Suicidal ideation was assessed by the question: "How many times did you consider attempting suicide during the past 12 months?" Responses were coded as zero and once or more. Suicide attempt was defined as responding "one or more times" to the question: "How many times did you actually attempt suicide during the past 12 months?"^{21,22}

Bullying Behaviors

Bullying behaviors were assessed using the 12 questions adapted from a previous study,¹⁶ which has been widely used in prior studies among Chinese adolescents.²³ In the present study, the Cronbach's alpha of the bullying items was 0.80, and that of victimization was 0.74. These questions were about how frequently the students had been bullied/bullied others during the last month, with the answers given on a 3-point scale as follows: one=never, two=sometimes or rarely (one or more times), and three=often (more than three times). The six bullying items were posed: "Have you ever threatened another student or say something mean to him or

her?"; "Have you ever hit, pushed, or hurt another student?"; "Have you ever made fun of or teased another student in a hurtful way?"; "Have you ever made fun of another student with sexual jokes, comments, or gestures?"; "Have you ever blackmailed another student for money?"; "Have you ever bullied someone in other ways?". The six being bullied questions were the following: "Have you ever been threatened or said something mean by another student?"; "Have you ever been hit, pushed, or hurt by another student?"; "Have you ever been made fun of or teased in a hurtful way by another student?"; "Have you ever been made fun of with sexual jokes, comments, or gestures by another student?"; "Have you ever been blackmailed for money by another student?"; "Have you ever been bullied by another student in some other way?". Bullies were the students who reported at least one type of bullying behavior with a frequency of "often". Students who reported at least one being bullied experience with a frequency of "often" were classified as victims. Bully-victims were those who met the criteria for bullying others and also being bullied, with a frequency of "often", and neutrals were students who reported having never been bullied nor bullying others.

Other Characteristics

Information about gender, age, living arrangement, household socioeconomic status (HSS), classmate relations, teacher–classmate relations, academic performance, smoking, and drinking were also collected. Living arrangement was measured by asking students whom they lived with all or most of the time. Household socioeconomic status (HSS) was assessed by asking students to rate their perceptions of their family economic status. Classmate relations and teacher–classmate relations were measured based on the student's perception. Considering all the recruited students know their place in academic performance (each grade in each recruited high school has the recorded ranking of the final exam at the academic semester, and this record is always distributed to students), academic performance was measured by asking the students to report their ranking in the final exam at the academic semester closest to the survey period.²⁴ Smoking or drinking was evaluated by asking students the question: "have you smoked a cigarette (or drunk alcohol) in your lifetime?"

Statistical Analysis

First, descriptive analyses stratified by gender were used to describe sample characteristics. The chi-square test for categorical variables and the *T*-test for the continuous variables were used to compare differences between boys and

girls. Second, all demographic variables were simultaneously entered into the multivariate logistic regression models to estimate the adjusted association of bullying behavior with suicidal ideation and suicide attempts. Third, multiplicative interaction items were tested by entering a cross-product term for bullying behavior and gender along with the main effect terms for each to the multivariate logistic regression models, and *P*-values for the multiplicative interaction were calculated. If the interaction item was significantly associated with suicidal ideation and suicide attempts, stratification analyses would be conducted to assess whether the associations of bullying behavior with suicidal ideation and suicide attempts varied with the student's gender. The percentage of missing data was less than 0.6% for all relevant variables. Regarding the logistic regression models, observation with missing data was eliminated. All statistical tests were two-sided, and *P*-values less than 0.05 were considered statistically significant. All statistical analyses were conducted using Stata SE 12.0 (StataCorp, Houston, Texas, USA).

Results

Demographic Characteristics of the Study Sample

As shown in Table 1, of the total sample, 45.4% (10,625) were boys, and 54.6% (12,767) were girls. The mean age of the students was 15.2 (SD: 1.9) years, and the age range of the students was 12 to 19 years. The majority of students lived in two-parent families (66.0%), and the proportion of students who reported above-average HSS was 10.7%. The proportion of students who reported above-average academic performance, poor classmate relations, and poor relationships with teachers was 28.6%, 2.1%, 5.0%, respectively. Approximately 10.7% of students admitted smoking, and 52.2% reported drinking. Overall, 3.8% (882) of the students were victims, 4.9% (1144) were bullies, and 3.2% (736) were bully-victims. A total of 18.9% of students reported having suicidal ideation, and 3.9% reported having suicide attempts. There were significant differences between boys and girls in the distribution of living arrangement, age, HSS, academic performance, classmate relations, relationships with teachers, smoking, drinking, bullying behavior, suicidal ideation, and suicide attempts ($P < 0.05$).

Association of Bullying Behavior and Gender with Suicidal Ideation and Suicide Attempts

Without adjusting for other variables, bullying behavior and gender were significantly associated with suicidal ideation

Table 1 Sample Characteristics Stratified by the Students' Gender (N=23,392)

Variable	Total, n (%)	Boys, n (%)	Girls, n (%)	P-value [#]
Living arrangement				
Living in two-parent family	15,381 (66.0)	6839 (64.7)	8542 (67.2)	<0.001
Living in a single-parent family	3102 (13.3)	1446 (13.7)	1656 (13.0)	
Living with others	4804 (20.6)	2284 (21.6)	2520 (19.8)	
Missing data	105			
Age, mean (SD)	15.2 (1.9)	15.2 (1.9)	15.3 (1.8)	<0.001
HSS				
Above average	2484 (10.7)	1300 (12.3)	1184 (9.3)	<0.001
Average	13,453 (57.7)	6050 (57.2)	7403 (58.2)	
Below average	7369 (31.6)	3232 (30.5)	4137 (32.5)	
Missing data	86			
Academic performance				
Above average	6671 (28.6)	3007 (28.4)	3664 (28.8)	<0.001
Average	8967 (38.4)	3470 (32.7)	5497 (43.2)	
Below average	7685 (33.0)	4120 (38.9)	3565 (28.0)	
Missing data	69			
Classmate relations				
Poor or fair	499 (2.1)	289 (2.7)	210 (1.6)	
Average	8945 (38.3)	3621 (34.2)	5324 (41.8)	
Excellent or good	13,890 (59.5)	6688 (63.1)	7202 (56.5)	
Missing data	58			
Relationships with teachers				
Poor or fair	1159 (5.0)	762 (7.2)	397 (3.1)	<0.001
Average	13,628 (58.4)	5695 (53.8)	7933 (62.3)	
Excellent or good	8533 (36.6)	4134 (39.0)	4399 (34.6)	
Missing data	72			
Smoking				
No	20,885 (89.3)	8568 (80.6)	12,317 (96.5)	<0.001
Yes	2507 (10.7)	2057 (19.4)	450 (3.5)	
Drinking				
No	11,193 (47.8)	4073 (38.3)	7120 (55.8)	<0.001
Yes	12,199 (52.2)	6552 (61.7)	5647 (44.2)	
Bullying behavior				
Neutral	20,481 (88.1)	8711 (82.7)	11,770 (92.6)	<0.001
Victim	882 (3.8)	607 (5.8)	275 (2.2)	
Bully	1144 (4.9)	700 (6.6)	444 (3.5)	
Bully-victim*	736 (3.2)	515 (4.9)	221 (1.7)	
Missing data	149			
Suicidal ideation				
No	18,963 (81.1)	8899 (83.8)	10,064 (78.8)	<0.001
Yes	4429 (18.9)	1726 (16.2)	2703 (21.2)	
Suicide attempts				
No	22,491 (96.1)	10,261 (96.6)	12,230 (95.8)	0.002
Yes	901 (3.9)	364 (3.4)	537 (4.2)	

Notes: *Bully-victim represents both bullying others and being bullied. [#]The chi-square tests were used for a categorical variable, and T-tests were used for continuous data.

Abbreviations: SD, standard deviation; HSS, household socioeconomic status.

and suicide attempts among students. After adjusting for gender, living arrangement, age, HSS, academic performance, classmate relations, relationships with teachers, smoking, and drinking, victims (adjusted odds ratio [AOR]=2.15, 95% CI=1.84–2.51), bullies (AOR=3.17, 95% CI=2.78–3.62), and bully-victims (AOR=3.18, 95% CI=2.71–3.73) were at an elevated risk of suicidal ideation than neutrals; similar associations can be found in the associations between bullying behavior and suicide attempts (Table 2).

Association of Bullying Behavior with Suicidal Ideation and Suicide Attempts: Moderated by the Students' Gender

First, the interaction item (between bullying behavior and gender) was significantly associated with suicidal ideation and suicide attempts (P for suicidal ideation = 0.019 and P for suicide attempts = 0.015). Then, further stratification analyses by the students' gender were performed. In Table 3,

multivariate logistic regression models demonstrated that among boys, being bullied, bullying others, and both bullying others and being bullied were positively associated with suicidal ideation and suicide attempts; similar associations can be found in the associations of bullying behavior with suicidal ideation and suicide attempts among girls. The associations of being bullied with suicidal ideation and suicide attempts were slightly stronger in girls (suicidal ideation: AOR= 2.25, 95% CI= 1.74–2.91; suicide attempts: AOR=2.60, 95% CI=1.76–3.84) than in boys (suicidal ideation: AOR=2.08, 95% CI=1.71–2.53; suicide attempts: AOR=2.22, 95% CI=1.56–3.18), and the associations of bullying others with suicidal ideation and suicide attempts were also slightly greater in girls (suicidal ideation: AOR=3.34, 95% CI=2.73–4.08; suicide attempts: AOR=3.74, 95% CI=2.76–5.07) than in boys (suicidal ideation: AOR=2.95, 95% CI=2.47–3.53; suicide attempts: AOR=2.92, 95% CI=2.10–4.05). Moreover, the associations of both bullying others and being bullied with

Table 2 Association of Bullying Behavior and Gender with Suicidal Ideation and Suicide Attempts

Variable	Model 1				Model 2			
	Suicidal Ideation		Suicide Attempts		Suicidal Ideation		Suicide Attempts	
	OR (95% CI)	P-value	OR (95% CI)	P-value	AOR (95% CI)	P-value	AOR (95% CI)	P-value
Bullying behavior								
Neutral	1.00 (reference)		1.00 (reference)		1.00 (reference)		1.00 (reference)	
Victim	2.40 (2.07–2.78)	<0.001	3.19 (2.50–4.08)	<0.001	2.15 (1.84–2.51)	<0.001	2.37 (1.83–3.08)	<0.001
Bully	3.10 (2.74–3.51)	<0.001	3.50 (2.83–4.33)	<0.001	3.17 (2.78–3.62)	<0.001	3.41 (2.73–4.26)	<0.001
Bully-victim*	3.46 (2.97–4.02)	<0.001	5.36 (4.28–6.70)	<0.001	3.18 (2.71–3.73)	<0.001	4.30 (3.39–5.45)	<0.001
Gender								
Boys	1.00 (reference)		1.00 (reference)		NA		NA	
Girls	1.39 (1.30–1.48)	<0.001	1.24 (1.08–1.42)	0.002	NA		NA	

Notes: Model 1 was unadjusted models. Model 2 was adjusted for gender, living arrangement, age, household socioeconomic status, academic performance, classmate relations, relationships with teachers, smoking, and drinking. *Bully-victim represents both bullying others and being bullied.

Abbreviations: OR, odds ratio; 95% CI, 95% confidence interval; AOR, adjusted odds ratio; NA, not applicable or no data available.

Table 3 Association of Bullying Behavior with Suicidal Ideation and Suicide Attempts: Moderated by the Students' Gender

Variable	Suicidal Ideation [#]				Suicide Attempts [#]			
	Boys		Girls		Boys		Girls	
	AOR (95% CI)	P-value	AOR (95% CI)	P-value	AOR (95% CI)	P-value	AOR (95% CI)	P-value
Bullying behavior								
Neutral	1.00 (reference)		1.00 (reference)		1.00 (reference)		1.00 (reference)	
Victim	2.08 (1.71–2.53)	<0.001	2.25 (1.74–2.91)	<0.001	2.22 (1.56–3.18)	<0.001	2.60 (1.76–3.84)	<0.001
Bully	2.95 (2.47–3.53)	<0.001	3.34 (2.73–4.08)	<0.001	2.92 (2.10–4.05)	<0.001	3.74 (2.76–5.07)	<0.001
Bully-victim*	3.16 (2.59–3.85)	<0.001	3.16 (2.39–4.17)	<0.001	4.47 (3.28–6.08)	<0.001	3.82 (2.62–5.58)	<0.001

Notes: [#]Models were adjusted for living arrangement, age, household socioeconomic status, academic performance, classmate relations, relationships with teachers, smoking, and drinking. *Bully-victim represents both bullying others and being bullied.

Abbreviations: AOR, adjusted odds ratio; 95% CI, 95% confidence interval.

suicidal ideation were similar between boys (suicidal ideation: AOR=3.16, 95% CI=2.59–3.85) and girls (suicidal ideation: AOR=3.16, 95% CI=2.39–4.17), and the associations of both bullying others and being bullied with suicide attempts were slightly greater in boys (suicide attempts: AOR=4.47, 95% CI=3.28–6.08) than in girls (suicide attempts: AOR=3.82, 95% CI=2.62–5.58).

Discussion

The present study found that a total of 18.9% of students reported having suicidal ideation, and 3.9% reported having suicide attempts, and the results were in line with a previous study among Chinese adolescents (suicidal ideation: 16.1%; suicide attempts: 3.1%).⁴ It has been well established that the rate of suicidal behavior was associated with the biological gender,⁷ and our study also demonstrated that the prevalence of suicidal ideation or suicide attempts in girls (suicidal ideation: 21.2%; suicide attempts: 4.2%) was higher than that in boys (suicidal ideation: 16.2%; suicide attempts: 3.4%).

Our univariate logistic analyses first found that adolescents who were involved in all three types of bullying (i.e., victims, perpetrators, and bully-victims) were at a higher risk of suicidal ideation and suicide attempts. After adjusting for living arrangement, age, household socioeconomic status, academic performance, classmate relations, relationships with teachers, smoking, and drinking, these associations remain statistically significant, with bully-victims having the strongest associations with suicidal ideation and suicide attempts. Similarly, Brunstein et al found that victims, bullies, and bully-victims were at a higher risk of suicidal ideation, and the most troubled adolescents were those who were bully-victims;²⁵ Hepburn et al reported that students who reported having been involved in bullying as a perpetrator, victim, or bully-victim were more likely than those who had not been involved in bullying to report having suicidal ideation;²⁶ Hong et al also observed independent associations of all 3 categories of bullying (perpetration, victimization, and both) with suicidal ideation among Chinese adolescents;¹² Alavi et al found that a history of being bullied was a significant predictor of suicidal ideation among adolescents.²⁷ A possible explanation for these findings might be that adolescents who bully others tend to exhibit higher levels of delinquent behaviors,¹⁷ which are reported to be related to suicidal behavior;⁹ adolescents involved in bullying were more likely to experience mental health problems (e.g., depression or anxiety),²⁵ which are risk factors for

suicidal behavior.²⁸ However, there were also some studies with contrary findings. Liang et al found that victims and bullies, but not bully-victims, were more likely to consider attempting suicide;²⁹ Klomek et al found that bullying behavior at age 8 years was not associated with suicidal ideation ten years later.³⁰ The differences between our findings and other studies might be related to the measurement of bullying (e.g. the present study measuring the traditional bullying, but some studies measuring the cyberbullying or both traditional bullying and cyberbullying), the study design or sample size, and the nature of the samples (e.g., age or gender).

Additionally, consistent with previous evidence,³¹ our univariate logistic models also found that compared to boys, girls were more likely to report having suicidal ideation or suicide attempts. Furthermore, there was a significant interaction between bullying behavior and gender (P for suicidal ideation = 0.019 and P for suicide attempts = 0.015), and stratification analyses across gender demonstrated that although being bullied, bullying others, and both bullying others and being bullied were positively associated with suicidal ideation and suicide attempts among both boys and girls, the associations of being bullied or bullying others with suicidal ideation and suicide attempts were slightly stronger in girls, and the associations of both being bullied and bullying others with suicidal ideation and suicide attempts were more significant in boys. These results suggested that the biological gender may modify the influences of bullying on suicidal ideation and suicide attempts among adolescents. Similarly, Klomek et al found that frequent bullying and victimization were associated with later suicide attempts among boys, and only frequent victimization was associated with suicide attempts among girls;¹⁸ Park et al reported that all 3 types of bullying behavior were predictive of suicidal ideation for males, and the only victim of bullying behavior was predictive of suicidal ideation for females.³² A possible explanation for the difference by sex is that boys were more likely to be involved as bullies, and girls were more likely to be victims.¹⁷ Another plausible explanation might be related to the different responses to bullying behavior among boys and girls, and girls have been found to be more vulnerable to stress or mental health problems than boys,³³ which has been found to increase the risk of suicidal behavior.²⁸ Moreover, genetic risk of suicidal behavior (a functional variant in the serotonin transporter gene) has been observed to be particularly high for female subjects.³⁴ Thus, being a victim or bully had a slightly strong association with suicidal ideation and suicide attempts in girls. Overall, these findings suggest some preventive recommendations against bullying and suicidal behavior

among adolescents: (1) providing early risk assessment to adolescents who have experienced bullying behavior; (2) improving families' and schools' awareness of the adverse effects of bullying behavior; (3) establishing school-based prevention or intervention program (e.g., the Olweus Bullying Prevention Program) which have essential functions to attenuate the detrimental effects of bullying behavior. All the suggestions above are recommended to take the biological gender into consideration, and future studies are also warranted to investigate the reasons of differences by gender in the association of bullying and suicidal behavior.

Although the study findings may enhance our understanding of the correlates of suicidal ideation and suicide attempts among adolescents, this study has several limitations which should be noted. First, due to its cross-sectional study design, all reported associations should be interpreted with caution, and prospective studies are needed to estimate cause-effect associations. Second, this study used a self-report questionnaire to collect information about bullying and suicidal behavior. Although the measurements of bullying and suicidal behavior were defined with detailed questions, and this method has been widely accepted, the answers may still be subjectively biased. Third, this study only included school students, but bullying or suicidal behavior may be more common among those who were absent from school. Fourth, although in this study we mainly focused on the presence of suicidal ideation or suicide attempt among Chinese adolescents, there may be differences in characteristics between adolescents with a history of single suicidal behavior (suicidal ideation or suicide attempt) and those with multiple suicidal behavior. We may lose some information by dichotomizing the variables of suicidal ideation and suicide attempt. Fifth, due to the large sample size in this study, the clinical significance of the statistically significant interaction effects is needed to be verified by future studies.

Conclusions

In summary, bullying (bullying others, being bullied, and both bullying others and being bullied) can increase the probability of suicidal ideation and suicide attempts among Chinese adolescents, and the risk was highest in bully-victims. Moreover, compared to boys, girls were at a higher risk of suicidal ideation and suicide attempts. Further stratification analyses by gender showed that the associations of bullying others and being bullied with suicidal ideation and suicide attempts were slightly stronger in girls than those in boys, indicating that the biological gender may play a moderating role in the association of

bullying with suicidal behavior. Even though the precise mechanism for the associations found in the present study is still unclear, the findings are essential for families, schools, and communities who strive to support adolescents who have been involved in bullying behavior.

Disclosure

The authors report no conflicts of interest in this work.

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