Violence-related behaviors among adolescents and its association with cognitive emotion regulation strategies

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Original article

Background: **Adolescent violence is now regarded as a major public health concern. Despite growing interest in psychographic risk factors for violent behavior, few studies have explored the role of strategies to regulate cognitive emotion in adolescents. This study aimed to investigate the prevalence of adolescent violence behaviors and to identify the relationship between specific strategies to regulate cognitive emotion and forms of violent behavior.**

Methods: **We cross-sectionally surveyed 3315 students in grades 7 to 10 using anonymous, self-reporting questionnaires to examine strategies to regulate cognitive emotion and violence-related behaviors in young adolescents. A logistic regression model was used to identify the relationship between specific violent behaviors and strategies to regulate cognitive emotion.**

Results: **The most commonly reported type of violent behavior was verbal attack (48.6%), while 7.1% of students were involved in fights and 2.4% had been injured in fights. Boys were involved in all forms of violent behavior studied, and did so significantly more often than girls ($P<0.05$). Logistic regression revealed that six cognitive emotion strategies (self-blame, rumination, planning, reappraisal, catastrophisizing, and blaming others) were associated with violent behaviors, of which catastrophisizing was the most significant factor of all violent behaviors examined that were influenced by this strategy.**

Conclusions: **Violence-related behaviors, especially verbal attacks, were common among adolescents. Several cognitive emotion regulation strategies were positively associated with specific violent behaviors, but catastrophisizing was strongly related to all forms of violent behavior. Thus, programs targeting adolescent violence must address this and other maladaptive cognitive emotion regulation strategies.**

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Introduction

Violence is among the most common behavioral concerns in adolescence that are usually defined between 12-18 years old. Violence in this age group is directed mainly at other adolescents. Thus, in addition to a public safety issue, teenage violence is a serious adolescent health concern. The World Health Organization promotes a broad definition of violence: "The intentional use of physical force or power, threatened or actual, against oneself, another person, or against a group or community that either results in or has a high likelihood of resulting in injury, death, psychological harm, maladaptive development or deprivation".[1]

Studies from many countries showed that the prevalence of adolescent violence is increasing.[2] Children with concerning behaviors often have difficulty with aspects of emotional function, such as emotional reactivity and regulation. Cognitive emotion regulation (CER) strategies are cognitive responses to emotion-eliciting events that consciously or unconsciously attempt to modify the magnitude and/or types of emotional experience or the event itself.[3] In recent years, a substantial amount of work has been devoted to identifying associations between psychiatric disorders, such as depression, generalized anxiety disorder, eating disorders, and the predisposition to using certain cognitive emotional strategies.[4-6] Children who display negative emotions and have difficulty regulating these emotions are more likely to express anger and aggressive behaviors.[7] However, relatively little is known about how

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the choice of cognitive emotion strategy subsequently influences violent behavior. Therefore, we investigated the prevalence of violence-related behavior and identified the CER strategies associated (negatively or positively) with violent behaviors among middle school students.

Methods

Sampling methods and study population

The current study was designed as a cross-sectional clinical experimental design and conducted from January to April 2011 in Guangzhou, China. First, we calculated the sample size of adolescents, given α=0.05, $Z_{\alpha/2}$=1.96, and δ=0.01. After reviewing the results from other literature sources, we hypothesized the rate of violence P=0.08, and used the calculation formula for random sampling. The theoretical sample size was 2827, and in cases of occasional loss of data, we amplified 10% of the original sample until we obtained a population size of 3110. Then we chose four districts from eight as the place of study. There were 36 public schools in these districts, and the schools were then divided into metropolitan and suburban categories. Subsequently, six were chosen as candidate schools using stratified cluster sampling. In the calculation of student sample and school consent, four schools were chosen, two that were located in metropolitan Guangzhou and two in the suburbs. All of the selected schools included both middle schools and high schools. In the Chinese grade system, grades 7-9 were in the middle school and grades 10-12 were in the high school system. Due to the heavy school-work load of grade 9, 11 and 12 students, they were exempt from this survey. As a result, three grades (i.e., grades 7, 8, 10) of students were selected to participate in this study.

The questionnaire

The questionnaire used to investigate the prevalence of violence was based on the "2011 Middle School Youth Risk Behavior Surveillance System" (YRBSS). Some questions were modified to better reflect the conditions and cultural norms of China, and new questions were added. The YRBSS was conducted by the United States Centers for Disease Control (U.S. CDC) to monitor the prevalence of health-risk behaviors among the youth and young adults. We added questions about violent behaviors that were not contained in the YRBSS. These questions were "Have you been involved in a verbal attack on someone?", "Have you asked others for property by force?", "Have you bullied, threatened, or intimidated your peer?", and "Have you ever hurt yourself to the extent that the injury had to be treated by a physician or nurse?". The questionnaire was a 5-point sliding scale: 1) "never"; 2) "rarely" (once per month); 3) "regularly" (2-4 times per month); 4) "often" (2-3 times a week) or 5) "always" (more than 4 times a week). We transferred 1, 2 into "nearly no violence", and 3-5 into "have violence". All of the questions were designed to test behaviors during the last year and had good validation (r=0.85) in the context with the test of self- and peer-report.[8]

CER can be interpreted as the cognitive way of managing the intake of emotionally arousing information.[9] To examine the dominant cognitive emotional strategies employed by these youth, we used the CER Questionnaire (CERQ).[9] The CERQ is a 36-item self-reporting questionnaire that measures nine cognitive emotional coping strategies that are used when experiencing a negative incident or situation; e.g., blaming oneself, accepting, ruminating, refocusing, concentrating on planning, positive reappraisal, putting into perspective, catastrophisizing, and blaming others. The participant assesses the prevalence of a particular coping strategy on a five-point scale: 1) "(nearly) never"; 2) "sometimes"; 3) "regularly"; 4) "often" or 5) "(nearly) always". The total score of 4 questions in each subscale represents how often an individual uses this strategy. The higher that the score is found to achieve, then the more often a coping strategy is used. In addition, the CERQ was translated into Chinese by Zhu et al.[10] The Chronbach's alpha coefficient is 0.81 for the whole instrument and ranges from 0.48 to 0.91 for the nine subscales. It also has good validity (α=0.68).[11]

Data collection

Data were collected using a self-administered questionnaire after general information about the survey was distributed to the students. In order to protect the privacy of students, we allowed for anonymous and voluntary participation. Before survey administration, both students and their parents provided informed consent. Consenting students were informed of the aims and procedures of the study, and their right to abstain from completing any of the questions or to withdraw from the survey without penalty. In addition, students were assured that all of data collected would remain confidential. Before the survey, we trained all of the researchers and teachers in charge of the classes about the information, systems and processes of this study. We also conducted a pre-survey of 100 students to make sure the questions were clearly understood by them. The formal survey was carried out by one teacher in charge, and two investigators who were present in each of the participating classes.

Statistical analysis

Before testing for specific relationships between cognitive emotion strategies and violent behaviors,

preliminary analyses were performed to reveal the salient characteristics of the study, including the frequency of violent behavior that was stratified according to gender and grade, and the coping strategies generally used by middle school students during conflicts. Univariate statistical analysis was used to examine the influence of grade and gender on cognitive strategies and violent behaviors, and to determine which possible confounders (e.g., gender and grade) had to be controlled in the multivariate regression analysis. Then, multiple logistical regression analysis was used to investigate the relationship between CER strategies and violent behaviors. The odds ratios and 95% confidence intervals were calculated. All statistical analyses were performed using the Statistical Product and Service Solutions statistical software package (version 16.0). Due to some missing answers, the denominator that was used in the percentage computation varied according to the number of responses that we obtained.

Results

The basic information of this survey

There were 3315 students recruited for this survey and 3157 completed the questionnaire (95.2% response rate). We asked teachers of those students who had not finished the questions to fill out the violence behaviors questionnaires. We found that the rate of violence had no significant difference between students who had finished or those who had not finished the survey. The adolescents were evenly distributed by gender (i.e., 1699 males: 53.8% and 1458 females: 46.2%) in this study. The mean age was 14.1 years, and total number of students surveyed in grades 7, 8 and 10 were 1185, 1364 and 606 respectively.

Common violent behaviors and CER strategies among adolescents

Table 1 shows the prevalence of different violence-related behaviors among adolescents classified by gender and grade. Verbal attack and threatening of others were the most frequent violent acts, and were committed by 48.6% and 21.4% of respondents within the past year. By contrast, other more serious violent behaviors such as involvement in fights were not frequent. Since the missing data of each behavior were less than 5% of the total number, we believed that the data was representative for all of the students involved in this research.

We used univariate logistic regression analysis to explore the differences of violence by gender and grade. Male students were more likely than female students to engage in all of the behaviors we examined, but the frequencies were similar between school grades (Table 2).

Table 3 shows the predominant CER strategies employed by these students. The Student's *t* test was used in gender comparisons, and one-way analysis of variance was used in grade. The missing data of each question were less than 3% of the total number, and we used average score for compensation. Adolescents in middle school were more likely to choose the perspective and refocusing strategies when facing potential conflicts. Most of these strategies were used differently between genders and school grades. Girls

Table 1. Prevalence of violence-related behaviors in adolescents by gender and school grade (*n*=3157)

Variables	Missing data *n* (%)	Gender, *n* (%)		Grade, *n* (%)			Total, *n* (%)
		Male (*n*=1699)	Female (*n*=1458)	7 (*n*=1185)	8 (*n*=1364)	10 (*n*=606)	
Carried weapon	152 (4.8)	98 (6.3)	22 (1.6)	42 (3.7)	68 (5.1)	10 (1.8)	120 (4.0)
Involved in fights	125 (4.0)	185 (11.4)	31 (2.2)	64 (6.0)	130 (9.9)	22 (3.4)	216 (7.1)
Injured in fights	88 (2.8)	50 (3.1)	23 (1.6)	31 (2.9)	36 (2.7)	6 (0.9)	73 (2.4)
Had verbal attacks	89 (2.8)	850 (52.1)	641 (44.6)	468 (43.2)	703 (52.8)	320 (48.9)	1491 (48.6)
Ask for property	61 (1.9)	94 (5.7)	40 (2.8)	47 (4.3)	66 (4.9)	21 (3.2)	134 (4.3)
Threatened others	64 (2.0)	395 (24.0)	267 (18.5)	205 (18.8)	319 (23.7)	138 (21.0)	662 (21.4)
Hurted him/herself	53 (1.7)	79 (4.8)	35 (2.4)	52 (4.8)	40 (3.0)	22 (3.4)	114 (3.7)

Table 2. Violence-related behaviors by gender and school grade [OR (95% CI)]

Factors	Carried weapon	Involved in fights	Injured in fights	Had verbal attacks	Ask for property	Threatened others	Hurted him/herself
Gender							
Male	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Female	0.24 (0.15-0.38)	0.18 (0.12-0.26)	0.52 (0.32-0.86)	0.74 (0.64-0.86)	0.49 (0.33-0.71)	0.72 (0.60-0.86)	0.49 (0.33-0.74)
Grade							
7	0.77 (0.52-1.14)	0.58 (0.43-0.79)	1.06 (0.65-1.73)	0.68 (0.58-0.80)	0.88 (0.60-1.29)	0.75 (0.61-0.91)	1.64 (1.08-2.50)
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	0.34 (0.17-0.66)	0.32 (0.20-0.51)	0.33 (0.14-0.79)	0.86 (0.71-1.03)	0.64 (0.39-1.06)	0.86 (0.68-1.07)	1.13 (0.67-1.92)

OR: odds ratio; CI: confidence interval.

Table 3. Cognitive emotion regulation strategies by gender and school grade

Cognitive emotion regulation	Gender			Grade				Total
	Male	Female	*t*	7	8	10	*F*	
Self-blame	10.29±3.43	11.05±2.93	-6.29*	10.01±3.50	10.69±3.15	11.60±2.61	48.13*	10.65±3.22
Acceptance	11.35±4.28	10.63±3.57	4.81*	11.19±4.37	10.95±3.89	10.82±3.44	1.79	11.01±3.97
Rumination	10.90±4.11	11.66±3.61	-5.21*	10.99±4.29	11.27±3.83	11.69±3.29	6.20*	11.26±3.90
Refocusing	12.78±3.91	11.98±3.48	5.70*	12.61±4.13	12.41±3.62	12.01±3.22	4.85*	12.39±3.73
Planning	11.42±4.21	10.46±3.80	6.29*	11.02±4.51	10.86±3.97	11.04±3.38	0.58	10.96±4.05
Reappraisal	11.55±4.24	10.55±3.90	6.37*	11.18±4.53	11.01±4.02	11.00±3.54	0.59	11.07±4.11
Perspective	14.92±3.64	14.78±3.40	1.00	15.21±3.79	14.96±3.47	14.09±3.07	20.41*	14.85±3.53
Catastrophising	8.15±3.68	8.04±3.53	0.80	7.83±3.79	7.98±3.64	8.72±3,18	12.41*	8.09±3.61
Blaming	9.08±3.57	8.82±3.23	2.00*	8.63±3.60	8.95±3.34	9.45±3.17	10.92*	8.95±3.41
Total	99.16±15.04	97.02±14.01	3.88*	97.44±15.57	97.83±14.81	99.80±12.28	5.42*	98.13±14.59

*: $P<0.05$. Values are mean±standard deviation.

Table 4. Results of multiple logistic regression for the cognitive emotion regulation strategies related to violence-related behaviors

Variables	Violence-related behaviors [OR (95% CI)]						
	Carried weapons	Involved in fights	Injured in fights	Had verbal attacks	Ask for property	Threatened others	Hurted him/herself
Self-blame	-	-	0.84 (0.78-0.92)	1.04 (1.01-1.07)	-	-	1.06 (1.00-1.11)
Acceptance	-	-	-	-	-	-	-
Rumination	1.14 (1.08-1.22)	1.06 (1.01-1.12)	-	1.05 (1.02-1.07)	-	-	-
Refocusing	-	-	-	-	-	-	-
Planning	-	-	-	1.05 (1.03-1.08)	1.14 (1.08-1.21)	-	-
Reappraisal	1.10 (1.03-1.17)	1.10 (1.05-1.16)	-	-	-	1.07 (1.04-1.10)	-
Perspective	-	-	-	-	-	-	-
Catastrophising	-	1.16 (1.11-1.21)	1.15 (1.07-1.22)	1.05 (1.02-1.08)	1.09 (1.02-1.15)	1.08 (1.05-1.11)	1.13 (1.08-1.19)
Blaming	1.09 (1.02-1.16)	-	-	1.05 (1.01-1.08)	1.13 (1.05-1.21)	1.07 (1.03-1.11)	-

"-": the OR (95% CI) contains 1; OR: odds ratio; CI: confidence interval.

used self-blame, refocusing and rumination more than boys. While boys tended to use acceptance, planning, reappraisal and blaming strategies. The higher grade students were more likely to use self-blame, rumination, catastrophisizing and blaming strategies.

Multivariable analysis of CER strategies was associated with violence-related behaviors. Forward stepwise logistical regression was applied to study the associations between specific CER strategies and violent behaviors. Gender and grade were controlled as confounding factors. This analysis revealed that catastrophisizing was related to every one of the violent behaviors studied, while perspective was not associated with any of the violent behaviors. Most behaviors were related to 3 or 4 cognitive factors (Table 4). Verbal attack was a behavioral trait most strongly influenced by CER.

Discussion

This cross-sectional survey of 3157 middle school students revealed that threats and verbal attacks were the most common violence-related behaviors among this age group. More serious acts of violence, such as actual fighting or carrying weapons, were less common. However, 7.1% reported involvement in physical fighting. These violence-related behaviors were associated with maladaptive CER (coping) strategies, particularly catastrophisizing, which underpinned the importance of including emotional coping skills training in programs to reduce school violence.

Fighting among school-age children is a significant concern in many parts of the world.[12-14] A study by the U.S. CDC found that 22.9% (21.4%-24.4%) of girls and 39.3% (36.9%-41.7%) of boys had been involved in at least one physical fight at school during the past year.[15] A study[16] found dramatic variations in the rate of violence-related behavioral traits in adolescents (from 2.9% to 32.9%), which possibly reflected diverse socio-environmental conditions across China or the use of different research instruments. Other studies[17,18] showed that rural places and provision of a poor environment present in the school system were risk factors of violence. The present study was performed in a relatively developed city and excluded rural places. In addition, the participants were all selected from public schools, and the rate of violence-related behaviors was in the middle and lower levels in China.

In this study, gender was an important effect on delinquent behavior. Boys in middle school were found

to be four times more likely than girls to fight or carry weapons to school, as reported else where.[18] In contrast, we found little variation in violence-related behaviors among grades, while earlier studies[15,19] found that students in lower grades participated in violence more often than older students. However, the overall prevalence of violent behavior was relatively low in this study, and certain types were rare, especially after stratifying for gender and age. Larger scale studies may be required to reveal age-dependent changes in violent behavior, particularly more serious acts.

Most middle school students used adaptive cognitive emotional strategies, such as accepting, refocusing, positive reappraisal, and putting matters into perspective, in order to solve personal and emotional conflicts. Perspective was the most frequently used strategy while catastrophisizing was the least common. Girls were more likely to use self-blame and rumination strategies when facing conflicts, which were concordant with previous study results of Nolen-Hoeksema et al.[6] Females were found to be generally more sensitive to emotional experiences, especially negative ones, than males.

However, according to the study of Xiao et al,[20] girls in high school were less adept at refocusing and planning than boys. This observation is also in contrast to our study, but may simply reflect the younger age group examined in the current study. It is generally believed that psychological development is different between girls and boys in early adolescence, which includes the age group studied.[21] We also found that students in different grades tended to use different cognitive emotional strategies to cope with potential conflicts. Students used self-blame, rumination, catastrophisizing, and blaming others more frequently as a function of age (i.e., higher grades), and did so roughly in accordance with earlier published studies, while refocusing and perspective were used less frequently by students in upper grades.[22,23] Given these characteristics of CER, we infer that gender and grade are two indispensable factors that need to be considered when analyzing the correlation between CER strategies and violent behavior in future.

Multiple regression analysis revealed associations between violence-related behaviors and six of the nine CER strategies, with only acceptance, refocusing, and perspective being unrelated to violent behaviors. Different violent behaviors where associated with different clusters of CER strategies, and yet catastrophisizing was significantly associated with all violent behaviors studied. Self-blame was a bifacial factor in students who tended to blame themselves or held themselves responsible for conflicts. They were less likely to get hurt in a fight but at greater risk for self-harm. Rumination and blaming others made students more likely to commit violent acts. Thus, rumination increases negative mood-congruent thinking, interferes with problem-solving and instrumental behavior, and drives away social support, thus explaining the association with adolescent violence.[24] Planning and reappraisal are also associated with violence-related behaviors. Planning involves choosing the appropriate steps needed to cope with a conflict, and is usually an adaptive strategy. Similarly, in the process of adaptive reappraisal, one may bestow positive value on the event, such as an opportunity for personal growth. However, teenagers may use these strategies incorrectly to solve problems or personal concerns, ultimately leading to confrontation and violence.

Clearly, difficulties in emotional regulation, maladaptive coping strategies (like catastrophisizing), or misuse of adaptive strategies (planning and reappraisal), are associated with violent behaviors. Maladaptive CER strategies, including catastrophisizing, rumination, and blaming (both self and others), could lead to mistaken beliefs about negative events or exaggerating their importance, which could ultimately contribute to violent behaviors. Self-blame may reduce or aggravate violence. Planning and reappraisal strategies can also be used constructively or destructively, and thus teenagers need to be trained to evaluate events positively and correctly. Although we found no significant relation, either positive or negative to violence, numerous studies have found that refocusing, perspective, and acceptance are protective strategies that prevent emotional and behavioral concerns in adolescents.[6,25] These relations showed that cognitive emotion strategies are types of psychological processes that influence violent behaviors of adolescents. Thus, educators and other practitioners should pay attention to cognitive coping strategies when giving prevention or interference in the context of preventing or dealing with violent behaviors. The adaptive strategies could be strengthened by teaching adolescents with such approaches through rational cognitive therapy, the importance of role playing games, or any other practices to prevent violence.

The present study identified several cognitive emotional strategies that can increase the risk of violent behaviors. These are the results of either inherently maladaptive coping strategies or misused strategies that may be appropriate topics in the context of violence prevention or interventional programs in healthcare systems. Nonetheless, we urge caution against over-generalization in light of several limitations. For example, self-reporting measures could be used for both CER and violence-related behaviors, thus introducing reporter bias to the study design. Additionally, the study included only adolescents in public schools, so these

findings are not reflective of all youth in this age group. Therefore, a comprehensive study should include proportional sampling of adolescents in different situations and environments to confirm the results in our study.

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