


Violent Injuries Among College Students in China: An Exploration of Gender Mental Stress Model

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Abstract

The purpose of this study was to explore the gender-specific mental stress model of violent injuries among Chinese college students. A cross-sectional, multistage sampling process was employed to recruit a total of 5025 college students from 22 universities in China. Survey respondents reported their exposure to violent injuries and noted individual and environmental factors that could relate to violent injuries. Both unadjusted and adjusted statistical methods were used to examine the relationships between selected individual and environmental variables with violent injuries among male and female college students. The overall prevalence of violent injuries among male and female college students in this study was 4.40% (95% CI [0.10%, 7.80%]) and 5.20% (95% CI [0.05%, 10.35%]). The study found that higher mental stress (OR: 3.32), lower level universities (OR: 5.99), and family location in rural areas (OR: 4.00) were associated with a higher likelihood of violent injuries, and mothers employed as professionals (OR: 0.07) was associated with lower prevalence of violent injuries among male students. Unlike male students, mental stress and mothers' occupation were not associated with violent injuries among female students. University type was also associated with violent injuries but this association was inverted (OR: 0.06) among female students. This study found gender-specific relationships affecting violent injuries among college students in China. Prevention strategies need to be developed in consideration of gender influences and should be enacted to reduce the negative impact of violent injuries on society and personal health in China.

Keywords

violent injuries, mental stress, gender norms, gender role, university students

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Globally, violence and related injuries among adolescents and young adults are an increasingly important public health issue (Marcus & Reio, 2002). The World Health Organization reported that millions of people suffer violence-related injuries every year, and the prevalence peaks during late adolescence and early adulthood (World Health Organization, 2008, 2018). This is a time when young people are undergoing a unique stage of psychosocial-behavioral development that makes them especially vulnerable to high risk or violent behavior and resulting injuries (Arnett, 2000; Malak, 2015). Some studies have demonstrated that people in countries transitioning from low to middle income were far more susceptible to violence and related injuries (Herbert et al., 2011;

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World Health Organization, 2008). China is a developing country and has been experiencing a social transition from a center-directed to a market-based economy since 1978. Chinese people have had to face many social problems accompanying this long transition such as uncertain social environments, social inequity, unequal development, and fierce competition (Yang et al., 2009). Chinese college students typically come from one-child families, are economically disadvantaged, and have poorly developed psychological coping skills (Jiang et al., 2018). This makes them vulnerable to mental and behavioral problems in today's society. A study demonstrated that 27.7% of Chinese college students have a tendency toward violent behavior (Guo et al., 2010). Violence-related injuries have become a severe social and public health problem among Chinese college students.

There are many causes of violent injuries, and physical violence is one such cause (World Health Organization, 2018; Yang et al., 2015). Violent injuries in this study were defined as any physical pain or damage that was intentionally inflicted by another person. This definition had been used in previous studies (Yang et al., 2015). Ecological models emphasize that violent injuries are influenced by both individual and environmental variables. Previous studies have reported factors associated with violent injuries, but most focused only on the individual level (Guo et al., 2010; World Health Organization, 2018). Few studies have examined violent injuries at the environmental level (World Health Organization, 2018; Yang et al., 2015). Many studies explored gender differences in violent injuries (Faergemann et al., 2009; Subba et al., 2010; Tingne et al., 2014). No comparative studies were found with men and women that examined patterns influencing violent injury using a multilevel framework. This study will explore gender and the mental stress model in relation to violent injuries at both the individual and environmental level.

According to the familiar Stimulus, Cognition, and Response (SCR) stress model, various stimuli (S) affect the internal states of people through cognition (C) that, in turn, leads to a mental response (R) (Mehrabian & Russell, 1974). In turn, violent injuries affect people's physical and mental health (Ponsford, 2016; Schwartz et al., 2015). This model is important to understand how a stimulus, such as mental stress, may affect a person's violent injuries. Courtenay et al. (2002) argued that socially constructed gender roles have a far-reaching influence on the ascriptive guidelines of what is considered appropriate for each gender. Chinese society is dominated by patriarchy. Masculinity is deeply rooted in the cultural mandates of any patriarchy, which expects men to be the leaders of society and the heads of their families. In a patriarchal society, men are expected to take primary responsibility for maintaining the economic well-being

of their society and family, while women are relegated with subordinate roles primarily in the domestic sphere. Thus, men may face more stressful situations and could, therefore, be more vulnerable to stress which could lead to more mental and health problems that in turn could result in violent injuries.

Social resources are necessary to help prevent mental stress and associated violent injuries. The violent injuries that occur may be different in males and females due to different socioeconomic resources and their respective gender roles (Yang, 2018). Individual, family, and organizational situations are very different and thus may be associated with different mental stressors and different violent injuries based on gender (World Health Organization, 2008; Yang, 2018).

Family and organizational socioeconomic positions among college students play a critical role in behavioral and health problems. Since 1978, China has been transitioning from a centralized to a market-based economy (Yang et al., 2009). The transition has promised improved living standards, and markedly increased choice in consumer consumption, education, health, and employment for the Chinese population (Hao, 2006; Yang et al., 2009). However, the Chinese countryside still typically lags far behind urban areas (Lin, 1992; Yang et al., 2009). It was predicted rural college students would have more life challenges that would lead to more behavioral and health problems. In China, there are great social resource inequalities between different universities. High level universities are heavily invested in by the government, have more financial resources, excellent physical facilities and equipment, and more opportunities for educational advancement. The difference between the high level universities and lower level universities may have an influence on violent injuries. This influence may also be experienced differently between male and female students, because they have different cognitions in part due to differences in gender norms and roles (Mao & Bottorff, 2016; Mehrabian & Russell, 1974). This study will examine how mental stress and other factors affect violent injuries among male and female Chinese college students.

Methods

Study Area and Participants

A nationwide, cross-sectional, multistage sampling method was used in this study. To obtain a representative sample, geographic location, cultural diversity, and economic development were considered in the sampling process. This was important since China is such a large country with diverse cultures. In stage one, 22 universities were selected across mainland China differentiated

by regional location. In stage two, levels within each university were selected. All levels selected had to have medical/health courses to be included. In stage three, one-third of medical/health courses were randomly selected from each level. On average, three classes were selected to participate in the study at each university. In stage four, all students in the selected classes were surveyed. The sample size was determined based upon the need to obtain accurate prevalence estimates for violent injuries. It was calculated by $Var(p) = D^*(\langle 1-p \rangle / N)$, where D is the “design effect,” which resulted from the sampling technique (Yang, 2018).

Data Collection

All responses to the survey questionnaire were anonymous. The same data collection protocol was used across all 22 universities to ensure homogeneity of questionnaire administration and data collection techniques. Participants were asked to complete a standardized questionnaire after receiving instructions from survey administrators in the classroom. It took about 15 min to complete the paper-based questionnaire, but every student was given enough time to ask clarifying questions if needed. This study was approved by the Ethics Committee at the Medical Center, Zhejiang University (ZM, 14201), and verbal consent was obtained from all respondents, following verbal instruction from an investigator. Each participant's consent status was uniformly recorded in the record books. Students had an opportunity to request information or clarification about the survey items and were given adequate time for questionnaire completion.

Measures

Dependent Variable. There are various definitions of violent injuries. As in previous research, violent injuries in this study were defined as any physical pain or damage that had been intentionally inflicted by another person (Grisso et al., 1999). Specifically, the participants were asked if they had received any violent injuries during the past 12 months. A reportable injury was defined as any injury satisfying at least one of the following criteria: (a) required nonemergency medical treatment, (b) required emergency room or other kinds of emergency treatment, or (c) required to rest for one-half day or longer (Yang et al., 2015).

Independent Variables

Individual-Level Independent Variables. Given that some studies have stressed that culture and family environments are associated with violent injuries (Herbert et al., 2011; Yang et al., 2015). Ethnicity (Han Chinese/minority status) and both father's and mother's occupations were included as variables in this study. Age was included as a

routine control variable. Other research has indicated that low socioeconomic status is associated with high mental stress and mental problems (Yang et al., 2009, 2015). So family income was included as a variable in this study. This variable was measured through the question: “how much was the income of each person in your family last year (in RMB Yuans)?” Categories included below ¥10,000, ¥10,000 to less than ¥20,000, ¥20,000, and over ¥20,000 (see Table 1).

Mental stress was an individual variable included in this study and it was measured by the Perceived Stress Scale, Chinese version (CPSS) (Yang & Huang, 2003). This questionnaire has acceptable levels of reliability and validity, and has been widely used to assess respondents' mental stress (Ge et al., 2020; Lin et al., 2019; Peng et al., 2019; Yang et al., 2009). This scale is comprised of 14 items that assess a participant's perception of stress during the month prior to taking the survey. Items were rated on a five-point Likert type scale. The higher the total score, the greater the perceived level of stress. Following prior practice, high stress was operationalized as a total score ≥ 25 (Yang et al., 2009).

Environmental-Level Variables

Two environmental-level variables, prior environment and current environment, were included in this study. The former refers to the home environment in which one grew up before age 13 years; the latter refers to the environment one is currently living in at his or her university.

Prior environment is related to family location. It is known that the social and economic development of a young person can vary greatly between city, urban, and rural environments. To determine prior environment, participants were asked, “where did you grow up before 13 years of age?” The possible responses were a city, a county or town, or a rural area. A host of studies have confirmed that birthplaces and places of residence before 13 years of age play an important role in later behavioral patterns (Yang, 2018).

Current environment was measured by university type. In China, universities are ranked from low to high and ranking is directly related to social and economic resources available to a given college. Thus, college ranking or type may impact mental health and ultimately violent injuries. University type was determined using the China university ranking system (low, middle, and high level) as established by the National Ministry of Education (National Ministry of Education, 2015).

Data Analysis

All data were entered into a Microsoft Excel database. The dataset was then imported into SAS (9.3 version) for

Table 1. Demographic Characteristics of Sample, Violent Injures Prevalence, and Associated Factors.

Group	Female					Male						
	N	% of the Sample	Prevalence (%)	Unadjusted OR	Null Model	Full Model (Adjusted OR)	N	% of the Sample	Prevalence (%)	Unadjusted OR	Full Model	Adjusted OR
Individual-Level Variables												
Age (Years)												
<20	834	16.0	10.8	1.00	1.00	1.00	302	17.3	6.8	1.00	1.00	1.00
20-	788	42.4	3.4	0.29 (0.02, 4.67)	0.18 (0.01, 2.96)	0.18 (0.01, 2.96)	347	34.3	6.2	0.91 (0.55, 1.50)	1.66 (1.03, 2.66)*	1.66 (1.03, 2.66)*
21-	580	20.6	2.3	0.20 (0.02, 1.77)	0.05 (0.004, 0.77)*	0.05 (0.004, 0.77)*	266	25.8	2.4	0.33 (0.20, 0.56)**	0.69 (0.38, 1.27)	0.69 (0.38, 1.27)
22-	535	12.3	2.2	0.19 (0.05, 0.74)*	0.11 (0.02, 0.58)**	0.11 (0.02, 0.58)**	256	13.5	7.1	1.04 (0.56, 1.94)	1.30 (0.54, 3.15)	1.30 (0.54, 3.15)
23-	613	8.6	5.7	0.50 (0.15, 1.67)	0.25 (0.05, 1.52)	0.25 (0.05, 1.52)	382	29.1	3.5	0.49 (0.10, 2.50)	0.41 (0.11, 1.48)	0.41 (0.11, 1.48)
Ethnicity												
Han	3057	90.9	4.6	1.00	1.00	1.00	1420	89.2	5.2	1.00	1.00	1.00
Minority	293	9.1	2.4	0.51 (0.14, 1.87)			133	10.8	5.1	0.97 (0.20, 4.87)		
Major												
Medical	3047	27.3	4.3	1.00	1.00	1.00	1302	21.1	5.4	1.00	1.00	1.00
Others	303	72.7	4.4	1.01 (0.38, 2.68)			251	78.9	5.1	0.96 (0.18, 5.06)		
Father's Occupation												
Operation and commercial work	2744	75.9	5.1	1.00	1.00	1.00	1261	64.9	6.2	1.00	1.00	1.00
Staff and administration	426	14.9	3.1	0.59 (0.17, 2.04)			189	16.9	6.7	1.07 (0.33, 3.46)		
Professionals	180	9.2	1.0	0.31 (0.06, 1.64)			103	18.1	0.5	0.07 (0.01, 0.61)*		
Mother's Occupation												
Operation and commercial work	2790	72.6	5.3	1.00	1.00	1.00	1274	62.0	6.8	1.00	1.00	1.00
Staff and administration	354	17.6	2.6	0.47 (0.09, 2.30)			170	12.1	7.5	1.10 (0.40, 3.06)		2.02 (0.77, 5.29)
Professionals	206	9.8	0.8	0.14 (0.03, 0.74)*			109	25.8	0.3	0.04 (0.004, 0.31)**		0.07 (0.01, 0.35)**
Family Income												
<10,000	1227	35.1	4.9	1.00	1.00	1.00	543	31.2	5.7	1.00	1.00	1.00

(continued)

Table 1. (continued)

Group	Female						Male					
	N	% of the Sample	Prevalence (%)	Unadjusted OR	Null Model	Full Model (Adjusted OR)	N	% of the Sample	Prevalence (%)	Unadjusted OR	Full Model	Adjusted OR
10,000–19,999	886	21.9	8.8	1.87 (0.21, 16.49)			354	21.9	8.2	1.47 (0.75, 2.90)		
≥20,000	1237	42.9	1.7	0.34 (0.04, 2.85)			656	46.8	3.5	0.60 (0.36, 0.96)*		
Stress												
Low score	1605	56.6	4.7	1.00			926	72.3	2.6	1.00	1.00	1.00
High score	1745	43.4	3.9	0.84 (0.25, 2.75)			626	27.7	12.2	5.00 (2.51, 11.03)**	3.32 (1.98, 5.57)**	
Environmental-Level Variables												
Family Location												
Rural	2228	58.5	6.2	1.00		1.00	1041	61.0	7.1	1.00	1.00	1.00
Town or country	530	19.9	2.9	0.45 (0.10, 1.97)		0.35 (0.06, 1.95)	219	13.4	4.3	0.59 (0.35, 0.99)*	0.49 (0.23, 1.02)	
City	592	21.6	0.9	0.13 (0.03, 0.65)*		0.14 (0.03, 0.68)*	293	25.6	1.1	0.15 (0.03, 0.72)**	0.25 (0.07, 0.75)*	
Universities Types												
High level	1231	56.6	3.1	1.00		1.00	573	58.3	0.9	1.00	1.00	1.00
Middle level	1546	33.3	7.5	0.25 (0.69, 9.08)		0.80 (0.26, 2.29)	573	36.3	11.4	14.70 (1.76, 22.47)*	5.99 (1.22, 29.51)*	
Low level	573	10.2	1.4	0.47 (0.36, 0.56)**		0.06 (0.01, 0.43)**	106	5.4	7.0	8.26 (1.31, 51.98)*	3.56 (0.87, 14.35)	
Fixed parameters					2.2563**	1.9843*					5.2345**	2.4416**
Random parameters					1.5628**	1.3223**					2.1333**	1.9928**
between universities												

*p < 0.05; **p < 0.01.

statistical analyses. Descriptive statistics were used to calculate the prevalence of violent injuries among male and female students, respectively. Both unadjusted and adjusted methods were considered in the analyses to assess associations between the dependent variable and selected factors that could be related to violent injuries. The unadjusted method used only the selected factors of interest as independent variables. SAS survey procedures were applied in all analyses using university as the clustering unit to account for a within-clustering correlation attributable to the complex sample. Associations were confirmed through application of a multilevel logistic regression model using the SAS GLIMMIX procedure (Wang et al., 2008). In this analysis, multiple level models were built respectively by female and male. It started with the Null Model, a two-level (individual and university city) model with random intercepts, which did not include any predictors except a constant, in assessing variation of an individual experiencing a violent injury. From this base, full models were constructed. The significance of the random parameter variance estimates was assessed using the Wald joint *t*-test statistic.

All analyses were weighted. Weights included: (a) sampling weights, as the inverse of the probability of selection, calculated by university and (b) post-stratification weights, calculated in relation to sex, based on estimated distributions of this characteristic from a national survey (National Ministry of Education, 2015). The final overall weights were computed as the product of the above two weights. A nonresponse weight was not considered because nonresponse rates were low in this study.

Results

A total of 5025 individuals were identified as potential subjects for this study. After excluding incomplete responses, a final sample of 4903 (97.6%) valid questionnaires were included in this study. Of the respondents, 3350 (68.3%) were female and 1553 (31.7%) were male. The study found violent injury prevalence among male college students was 5.2% (95% CI [0.05%, 10.35%]) and among female college students was 4.4% (95% CI [0.1%, 7.8%]). This difference in prevalence was not significant. The unadjusted model indicated that age, mother's occupation, family location, and university types were associated with violent injuries among female students. Age, father's occupation, mother's occupation, family income, family location, stress, and university types were associated with violent injuries among male students.

The multilevel logistic regression model showed that higher mental stress (OR: 3.32 < 95% CI [1.98, 5.57]), lower level universities (OR: 5.99 < 95% CI [1.22, 9.51]), and being raised in a rural setting (OR: 4.00 < 95% CI [1.33, 14.28]) were associated with a higher

likelihood violent injuries, while having a mother with a professional occupation (OR: 0.07 < 95% CI [0.01, 0.35]) was associated with a lower incidence of violent injuries among male students. Unlike male students, mental stress and mothers' occupation were not associated with violent injuries among female students. University type was associated with violent injuries, but this association was inverted (OR: 0.06) among female students. In addition, being raised in a rural area (OR: 7.14 < 95% CI [1.47, 33.33]) was also associated with higher violent injuries in females (see Table 1).

Discussion

This study examines violent injury prevalence and identifies related factors among male and female college students in mainland China. The study found violent injury prevalence among male college students was 5.2% (95% CI [0.05%, 10.35%]) and among female college students was 4.4% (95% CI [0.1%, 7.8%]). Male prevalence of violent injuries was slightly higher than female but this difference was not significant. The prevalence of violent injury was lower in college females than that reported in female adults (10.7% < 95% CI [7.8%, 15.5%]), while the prevalence of violent injury in college males was similar to that reported in male adults (4.5% < 95% CI [1.3%, 6.2%]) (Yang et al., 2015). In Chinese society, men are in the stronger position and women are in the weaker position. This difference is especially prominent within Chinese families. After females are married, the male assumes the dominant role and the female accepts the more passive role. Males in the dominant role may find it perfectly acceptable to violently abuse women to keep women in their passive and dependent role (Yang et al., 2015). This may explain why violent injuries are higher in adult females than in college student females who are typically unmarried (Zhao et al., 2006).

Addressing a gap in the literature, this study found mental stress was positively associated with violent injuries among male students but did not find this association among female students. Culturally related gender norms and gender roles may contribute to this difference. Gender norms and roles influence attitudes and behaviors in many areas, including relationships, parenting, schooling, work, and health practices (Johnson et al., 2009; Mao & Bottorff, 2016). Gender roles can also create economic and cultural pressures that affect the lives of females and males differently (Mao & Bottorff, 2016). Chinese society is dominated by patriarchy, which refers to a social system where males are the central authority figures. Demonstrating masculinity is deeply rooted in the cultural mandates of any patriarchy. In a patriarchal society, men are expected to take primary responsibility for maintaining the economic well-being of their society and family, while women are

relegated to subordinate roles in the domestic sphere. Thus, men may feel high levels of pressure and stress to take care of their wives and families, which may lead to mental health problems that can contribute to violent injuries. This study provided support for this relationship in that males reported significantly higher stress scores than females. The prevalence of high stress levels among males was 70.9% (95% CI [64.2%, 77.6%]) and among females was 56.2% (95% CI [49.0%, 63.4%]).

This study found male students attending low level universities have a higher prevalence of violent injury than male students attending higher level universities, but this association was inverted among female students. Both university environment stress and gender norms and roles may contribute to this difference within the context of Chinese culture. Lower level universities have less financial and social resources, poor living environments and equipment, and fewer educational opportunities. This situation is in conflict with the male social role which requires males to obtain a good education, obtain a good job, and provide for their family. Females expect a comfortable life. Low university may lack resources but they also have lower academic expectations which may make college life easier and less stressful. For female college students, this may lead to less mental and behavioral problems, including violent injuries.

This study found that mothers working as professionals was a protective factor against violent injuries among male students, but it had no influence on violent injuries among female students. This may be due to the difference in demand for social resources between men and women because of gender role. Parents' social position is an important social resource. Male students may need this resource more than females because they have more social and family responsibilities. Parents who were employed as professionals typically had relatively good social reputations, high income, stable work, and more free time, which tended to reduce the risk of violent injuries for them and their children (Yang et al., 2015).

This study found there is a strong association between living in urban or rural environments and violent injuries among both female and male college students. This is most likely because of the distinct social and economic differences between urban and rural areas. Rural areas throughout most of China are still lagging behind urban areas in terms of income, education level, public facilities, medical care, and old-age care. Rural residents have great life challenges (Yang et al., 2009). This situation may impact both their male and female children.

There are several limitations of this study. Firstly, this study was a cross-sectional sample, and thus causal relationships could not be determined. Secondly, the research results were from college students and thus cannot be generalized to noncollege populations of the same age or

to other populations in China. Finally, our range of environmental factors was relatively limited. In future work, more environmental variables such as regional location, level of economic development, city population size, and unemployment rate should be considered.

Conclusion

This study found gender-specific mental stress and contextual variables were related to violent injuries among college students in China. In China, culturally related gender norms and gender roles may contribute to gender models. The findings from this study can be used to inform future violent injury prevention programs and policies in China. Greater attention needs to be given to males due to the mental stress they experience and the relationship between mental stress and violent injuries.

Declaration of Conflicting Interests

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