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Impulsivity, Mental Disorder, and Suicide in Rural China

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Abstract

Aims—The purpose of this study was to investigate the relationship among impulsivity, mental disorder, and suicide with a sample of rural young Chinese.

Methods—Subjects were 392 consecutively recruited male and female suicides aged 15–34 years and 416 community male and female controls of the same age range sampled in rural China. The case-control data were obtained using psychological autopsy method with structured and semi-structured instruments.

Results—Dysfunctional impulsivity was a significant risk factor regardless of mental disorder in rural China.

Conclusions—Dysfunctional impulsivity is a potential area for further study of suicidal behavior. The suicide prevention efforts in rural China may address impulsivity.

Keywords

Impulsivity; Mental Disorder; Suicide; Rural China

Introduction

One of the most commonly studied risk factor for suicide is the presence of mental disorder. About 90% of suicides in Western countries can be diagnosed with at least one type of mental disease (NIMH 2009). It is only about 30%–70% for the Chinese suicides (Hvistendahl, 2012; Phillips et al., 2002). In rural China, the prevalence of current mental illness is 48.0% for the suicides (Zhang, Xiao, & Zhou, 2010). Chinese and Western findings on suicide risk and protective factors are different. For example, religion tends not to emerge as a protective factor as it is in the West, and marriage is not a protective factor in China (Zhang, 2010; Zhang, Li, Tu, Xiao, & Jia, 2011; Zhang & Li, 2013). It is inferred that Western findings on suicide do not necessarily replicate in China. So other factors than psychiatric may play an important role in the life of the Chinese who died or attempted to

die of suicide. In the exploration of the practical measure in suicide prevention in China, we are focusing on impulsivity, a personality trait, and look into its effect on Chinese rural suicide.

Impulsivity is defined as “a predisposition toward rapid, unplanned reactions to internal or external stimuli with diminished regard to the negative consequences of these reactions to the impulsive individuals or to the others” (Chamberlain & Sahakian, 2007), and our study focuses on impulsivity as a personality trait, a relatively stable individual difference in the general population. Impulsivity was usually assumed as a negative trait in personality (Eysenck, Pearson, Easting, & Allsopp, 1985). However, Dickman (1990) proposed two types of impulsivity: 1) Functional Impulsivity (FI) as rapid, inaccurate performance in situations where it was optimal and 2) Dysfunctional Impulsivity (DI) as rapid, inaccurate performance in situations where this was non-optimal. The two impulsivity traits had low correlation, and they both differed in personality and cognition. He argued that the consequences of impulsivity were not always negative. When the task was very easy, high impulsivity, rapid responding had little cost in errors. High impulsivity was also more accurate than low impulsivity when the time available for making a decision was extremely brief (Dickman, 1985).

There had been a large body of literature concerning the relationship between individuals high impulsivity and high suicide risks (Beautrais, Joyce, & Mulder, 1999; Brezo, Paris, & Turecki, 2006; Brodsky et al., 2001; Gao, Zhang, & Jia, 2011; Neufeld & O'Rourke, 2009; Maria A. Oquendo et al., 2004). It was found as an independent risk factor in psychological autopsy in Western countries (A. McGirr et al., 2008; A McGirr & Turecki, 2007) and rural China (Gao, Zhang and Jia 2011). It indicated that the impulsivity trait might be directly correlated with suicidal behaviors.

Furthermore, Mann et al. (1999) found that a significant impulsive personality characterized individuals at risk for suicide attempts regardless of psychiatric diagnosis among 347 consecutive patients who were 14–72 years old (Mann, Waternaux, Haas, & Malone, 1999). Impulsivity also augmented the risk for suicidal behaviors associated with mental disorder (Corruble, Damy, & Guelfi, 1999; Gil, 2003; Maria A Oquendo et al., 2003). In China, researchers also reported the correlation between high impulsive personality and high suicide risks (Gao et al., 2011). However, majority of previous impulsivity studies as reviewed above was limited to suicide attempt behavior. In this current study, we focused on the relationship among impulsivity, mental disorder, and suicidal behavior in the sampled Chinese rural young suicides and their community counterparts.

Methods

Research design and study sample

Persons aged 15 to 34 years and lived in rural areas of China were the targeted sample for this study. We examined rural young women and men who died by suicide and various risk factors in comparison with community living controls from the same specific populations. We used established psychological autopsy methods and a case-control design to investigate the environmental and other factors of rural young suicides. Psychological autopsy was a

way for the reconstruction of suicidal death through interviews with survivors (Beskow, Runeson, & Åsgård, 1990). Psychological autopsy studies were widely used in suicide research in Western countries. Results of previous work showed psychological autopsy had high reliability and validity in Chinese suicide research (Zhang et al., 2002).

We selected three provinces in China for the study. Liaoning is an industrial province located in Northeast China, Hunan an agricultural province in the Central South China, and Shandong a province with economic prosperity in both industry and agriculture that is located on the east coast of China mid-way between Liaoning and Hunan. Sixteen rural counties were randomly selected from the three provinces (6 from Liaoning, 5 from Hunan, and 5 from Shandong). In each of the 16 counties, suicides aged 15–34 were consecutively recruited from October 2005 through June 2008. Similar numbers of community living controls were recruited in the same counties about the same time periods. After successful interviews with the informants of the suicides, a total of 392 suicide cases were entered for study. Among the 392 suicides 178 were female and 214 were male.

In each of the 16 counties, a project coordinator from the county level Center for Disease Control and Prevention (CDC) monitored suicide occurrences. In each of the three provinces, a project director from the provincial CDC or the university the study was affiliated with received reports on suicide cases each month.

The community living control group was a random sample stratified by age range and county. In each province, we used the 2005 census database of the counties in our research. For each suicide, we utilized the database of the county where the deceased lived to randomly select a living control in the same age range (i.e. 15–34). As to gender, the random selection of controls aged 15–34 from each county database yielded approximately 50% of males and 50% of females, which also approximated the gender distribution of suicide cases in the study. The control sample did not exclude individuals who had been diagnosed with mental disorders or previous suicide attempts. This way, the prevalence of mental disorders and suicidal attempts can be assessed in the rural general populations aged 15–34, and more important, the effects (direct, moderating, and intervening) of mental disorders on suicide can be studied. Followings are specific sampling methods for suicide cases and living controls.

Information sources

For each suicide and each control, we tried to interview at least two informants. To obtain some parallel data as from the suicide cases, we also used proxy information from the controls. However, we recognized that the type of informants rather than the number of informants used in psychological autopsy studies was an extremely important and complex consideration (Kraemer et al., 2003). We selected the informants based on the context or environment (how people observe the target, e.g. home vs. non-home setting). This way, each informant was carefully selected to optimize the information available on each case so that home, work, family and non-family aspects were included in the data.

Based on the above considerations, we used the following three guidelines for the inclusion of informants: (1) Suicide informants were selected with recommendations from the village

head and the village doctor, and control group informants were recommended by the controls themselves and then randomly selected by the research team, as those individuals were most familiar with the subject's life and circumstances, who were available for, and consented to, in-person interviews. However, we tried to avoid as much as possible husbands and the in-laws of those female suicides triggered by family disputes. Interviewing these people could result in very biased reports, if marital infidelity and family oppression were possible causes of suicide. (2) Although target persons could be as young as 15 years of age, informants had to be 18 years of age or older. Characteristics of the informants for both suicides and controls were noted in a standardized fashion (i.e., most recent contact, number of contacts in the last month, frequency of contacts in the last year, number of years informant has known the target, relationships, and the informant's impression of their familiarity with target). (3) For both suicides and controls, informant #1 was always a parent, spouse, or another important family member, and informant #2 was always a friend, co-worker, or a neighbor.

Interviewing procedures

Informants were first approached by the local health agency or the village administration by a personal visit. Upon their agreement on the written informed consent, the interview time was scheduled between two and six months after suicide incident. Interviews with informants regarding living controls were scheduled as soon as the control targets and their informants were identified. Each informant was interviewed separately by one trained interviewer, in a private place of a hospital/clinic or the informant's home. The average time for each interview was 2.5 hours.

Due to the fact that cases were deceased and controls were living, blinding of raters to case status was not possible. Inter-rater reliability was established and maintained by limiting the principal data gathering role to the 24 trained clinical interviewers and by comparison of duplicate ratings of the interviewers on a regular basis. The same interviewers participated in data collection for both case and control samples, promoting inter-rater reliability across that study.

Measures

The case-control status was the dependent variable, with suicide coded as 1 and control coded as 0. Predicting variables besides impulsivity included gender, age, education, family annual income, marital status, physical health condition, status in the family, impulsivity and mental disorder.

Impulsivity was measured by Dickman Impulsivity Inventory (DII), a 23-item scale developed and validated in English by Dickman (1990) and then translated into Chinese for the current project (Gao et al., 2011). Translations and back-translations were performed numerous times on all measures by bilingual scholars. To ensure that the original meaning of the measures was precisely translated into Chinese, native speakers of English were consulted to resolve discrepancies that occurred during the translation and back-translation procedure.

Dickman proposed the existence of two different impulsivity traits: Functional Impulsivity (FI) and Dysfunctional Impulsivity (DI). FI resulted in rapid, inaccurate performance in situations where this was optimal and DI resulted in rapid, inaccurate performance in situations where this was non-optimal. An example item for FI was “I don’t like to make decisions quickly, even simple decisions, such as choosing what to wear, or what to have for dinner,” and an example for DI was “I will often say whatever comes into my head without thinking first.” The response for each of the 23 impulsivity items was no (0) or yes (1). Dickman Impulsivity Inventory was proved to have stable reliability and validity. The Cronbach’s alpha was used to assess the internal consistency and it was 0.74 and 0.85 respectively for FI and DI scales in original American version (Dickman, 1990). Both two scales were correlated with all of the other impulsivity scale (Dickman, 1990). The inventory was also translated and adapted in different language context within high reliability and validity (Caci, Nadalet, Baylé, Robert, & Boyer, 2003; Chico, Tous, Lorenzo-Seva, & Vigil-Colet, 2003). In China, the Cronbach’s alpha was around 0.863 and 0.779 respectively for DI and FI scales in suicides and it was 0.746 and 0.680 in normal individuals (Gao et al., 2011). All the evidences suggested that the Dickman Impulsivity Inventory was quite stable across languages and populations.

The Structured Clinical Interview for the Diagnostic and Statistical Manual of Mental Disorders (SCID) (Spitzer, Williams, Gibbon, & First, 1988) was used to generate diagnoses for both the suicides and living controls. A Chinese version of the SCID (Gu & Chen, 1993) was used based on Taiwanese and Hong Kong samples (Zhang et al., 2003). Diagnoses were made by the psychiatrists on each team in consensus meeting at which all responses from each informant were presented by the interviewers.

Although all the interviews were trained mental health professionals, experienced psychiatrists were employed to make the psychiatric diagnose for both suicides and controls based on two independent interviews from two different informants, supplemented, on occasions, by a meeting with the interviewers.

Integrating the information from different sources

There were two proxy interviews for each suicide case and each living control. The vast majority of the responses for the target person were the same or quite similar. For different responses pertaining to the target person, data were integrated with the following three principles. For demographic information, we basically relied on the answers by the informant who had the best access to the information. For example, a family member should be able to tell the target person’s age and birth date more accurately than does a friend. Second, in estimating the cultural values of the target person, we used the higher score of the two informants’ responses if they are different. Finally, to determine a diagnosis with the SCID, we selected the response representing a positive symptom, because the other informant might not have an opportunity to observe the specific characteristic or behavior. These three guidelines were applied in integrating responses of both cases and controls.

Ethics

This study was approved by the institutional review boards of the university in the United States where the corresponding author was affiliated as well as of the three universities in China where the collaborators were affiliated. Every informant knew the nature, the background, as well as the detailed rights in participating in the research before the interview. Whenever an informant did not want to continue during the interview, the interview would be stopped and a replacement would be chosen.

Statistical analysis

T tests and chi-square tests were carried out to describe and compare the socio-demographic characteristics, impulsivity and mental disorder. The relationship between impulsivity and mental disorder was statistically analyzed by independent-samples t test. Three unconditional logistic regression models were used to describe what factors predict suicide with relevant variables.

Both age and education were measured by the number of years. The family annual income was measured with Chinese *Renminbi* (RMB), with the exchange rate of \$1.00 to 7.00 RMB at the time of data collection. Marital status was dichotomized as “0=never married” and “1=ever married” with the latter including those who were currently married and living together, currently married but separated because of work, remarried, divorced, widowed and those non-married couples who lived together. All statistical analyses were carried out using SPSS, version 19.0.

Role of the funding source

The US NIMH funded this project but had no role in study design, data collection, data analyses, data interpretation, or the writing of the paper.

Results

During the study period, the proxy informants of 392 suicides and 416 controls were interviewed. Table 1 illustrated some major characteristics of the two groups. Compared with the controls, the suicides were older ($p=0.01$), had less education years ($p<0.001$), had lower annual family income ($p<0.001$), had worse physical health condition ($p<0.001$) and lower status in the family ($p<0.001$). However, relative to comparison subjects, suicides scored higher on DI ($p<0.001$) but lower on FI ($p=0.003$). We also found significant differences in the distribution of mental disorder between the suicides and controls ($p<0.001$).

Table 2 compared the relationship between impulsivity and mental disorder. We divided the suicides and the controls into two subcategories each on the basis of the presence of mental illness. Although both had mental disorder, the suicides scored higher than the controls on DI while scored lower than controls on FI. However, the results were not significant. As for those in the suicides and controls without mental illness, the suicides scored higher than controls on DI ($p<0.001$).

All the independent variables listed in Table 1 were taken into different logistic regressions models, which were practiced to explore how impulsivity and mental disorder predict suicide as well as the effects of impulsivity in suicides with mental disorder and suicides without mental disorder. As seen in Table 3, age, DI and mental disorder were risk factors for suicide. Education, marital status, and FI were protective factors in the total model. However, in suicides with mental disorder, the family annual income, physical health condition and status in the family was taken into the regression model as protective factors compared to the total model. In suicides without mental disorder, the family annual income entered to the regression model as a protective factor compared to the total model. In all three models, DI was always a risk factor of suicide.

Discussion

This study had several strengths. The samples were representative of rural young people in the selected areas of China. The assessment of suicides and their life was based on psychological autopsy and standardized instruments rather than clinical structured interview about suicide attempters. The diagnosis was based on administration of SCID by trained researchers who had excellent reliability, and rigorous quality control measures were enforced throughout the study. Furthermore, a project coordinator from the county level Center for Disease Control and Prevention (CDC) monitored suicide occurrences. The current study was one of the largest and most rigorous psychological autopsy (PA) studies ever conducted in China. Other PA studies with Chinese samples included those by Cheng et al. (2000) and Phillips et al. (2002).

In this psychological autopsy study, we identified 392 suicide cases and 416 living controls during the 2.5-year study period. The case-control data obtained from proxies were used to explore the relationship between impulsivity, mental disorder, and suicidal behavior. It was found that the impulsivity personality trait of the community living controls in this study was comparable to the impulsivity prevalence in other populations. The FI mean score and the DI mean obtained in controls were both similar to the mean scores found in several other studies with the same Dickman Impulsivity Inventory (DII) (Chico et al., 2003; Miller, Joseph, & Tudway, 2004). The instrument was valid in China and for the targeted sample of this current study (Gao et al., 2011).

The DI was a risk factor of suicide while FI can be a protective one. The word impulsivity cannot always be a negative trait, and it could be a positive one, as it had been evidenced to be functional as in FI (Gao et al., 2011). High dysfunctional impulsivity engaged people not to consider the results of the coming things, and they just wanted to escape from the situation due to the lack of cognition ability. Studies also indicated that high scores on DI had been associated with maladaptive cognitive attributes (Mobini, Grant, Kass, & Yeomans, 2007; Tous, Vigil-colet, & Morales-vives, 2008). The DI individuals cannot lead behavior with enough knowledge and comprehension and adjust timely behavior according to the changeable goals. In the logistic regression models, it can be seen that DI was a risk factor.

Consistent with other reports (Conwell et al., 1996; NIMH, 2009; WHO, 2002), we found that the mental disorder was another important risk factor for Chinese rural young suicides.

In the West, mental disorder was believed to be the most important risk factor. However, in our current sample there were only about 47.4% of the suicides who had mental disorder, which was in line with other findings in the Chinese populations (Phillips et al., 2002; Qin & Mortensen, 2001). Thus, in China, mental disorder was less important a risk factor for suicide as in the West. Other factors, such as impulsivity, might play a more important role in Chinese suicide than in the Western suicides.

In the logistic regression results, it can be seen that DI was always a risk factor in three models regardless of mental disorder. Mann et al. (1999) argued that impulsive personality characterized individuals at risk for suicide attempts regardless of psychiatric diagnosis as he found among the 347 consecutive patients (Mann et al., 1999). Mental disorder itself was a risk factor in suicide. In the sample with only the suicides with mental disorders, DI remained a risk factor. This supported previous findings that increased impulsive personality raised the suicide risk of mental patients (Corruble et al., 1999; Gil, 2003; Maria A Oquendo et al., 2003). For the samples without mental disorders, DI was also higher for the suicides than the community controls (A. McGirr et al., 2008; Zouk, Tousignant, Seguin, Lesage, & Turecki, 2006).

Limitations

One of the limitations of this study is the methodological concerns in a psychological autopsy study. The proxy data acquisition can be less accurate and reliable than what can be obtained directly from the targeted subjects. Nonetheless, this study contributes to a growing body of literature addressing the links between the impulsivity and suicide. We believe the findings are valid and should inform suicide prevention in rural China as well as the rest of the world.

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Table 1

Comparison of Demographic Characteristics, Impulsivity and Mental Characteristics between the Suicides and Controls

Variable	Suicides (n=392)	Controls (n=416)	t/χ^2	p
Gender, n (%)				
Male	214 (54.6)	202 (48.6)	2.942	0.086
Female	178 (45.4)	214 (51.4)		
Age, mean (SD)	26.84 (6.36)	25.69 (6.16)	2.591	0.010
Education years, mean, (SD)	7.391 (2.75)	9.141 (2.39)	-9.644	<0.001
Family annual income <i>yuan</i> , mean, (SD)	1435.71 (22883.34)	20367 (18719.67)	-4.100	<0.001
Marital status, n (%)			3.010	0.083
Never married	161 (41.1)	144 (34.6)		
Ever married	231 (58.9)	266 (63.9)		
Physical health condition, n (%)			59.400	<0.001
Poor	88 (22.4)	19 (4.6)		
Average	78 (19.9)	79 (19.0)		
Good	226 (57.7)	318 (76.4)		
Status in the family, n (%)			55.911	<0.001
Low	56 (14.3)	7 (1.7)		
Middling	174 (44.4)	161 (38.7)		
High	162 (41.3)	248 (59.6)		
Impulsivity				
Dysfunctional Impulsivity	6.76 (3.62)	3.72 (2.74)	13.627	<0.001
Functional Impulsivity	7.07 (2.83)	7.62 (2.32)	-3.007	0.003
Mental disorders, n (%)			2.081	<0.001
Any Mental Illness	188 (48.0)	16 (3.8)		
No	204 (52.0)	400 (96.2)		

Table 2

Relationship between Impulsivity and Mental Disorder

	Suicides, n=392		Controls, n=416		t_1^a	t_2^b	p_1^a	p_2^b
	Mental Disorder	Without Mental Disorder	Mental Disorder	Without Mental Disorder				
Impulsivity								
Dysfunctional Impulsivity	6.27 (3.64)	7.22 (3.55)	5.15 (3.27)	3.66 (2.71)	1.183	12.576	0.238	<0.001
Functional Impulsivity	6.39 (2.93)	7.70 (2.58)	7.13 (2.85)	7.64 (2.29)	-0.961	0.271	0.388	0.787

Differences tested with two-tailed *t*-test

^aCase (with mental disorder) versus control (with mental disorder)

^bCase (without mental disorder) versus control (without mental disorder)

Table 3
Impulsivity Predicting Suicide with Relevant Variables Controlled For in Different Groups

	Total		Suicides with Mental Disorder		Suicides without Mental Disorder	
	OR	p	OR	p	OR	p
Age	1.071	0.006	1.140	<0.001	1.048	0.075
Education	0.798	<0.001	0.869	0.004	0.770	<0.001
Marital Status	0.313	<0.001			0.341	0.001
Family Annual Income			0.976	0.017		
Physical health condition			0.389	<0.001		
Status in the Family			0.610	0.014		
Dysfunctional Impulsivity	1.412	<0.001	1.403	<0.001	1.451	<0.001
Functional Impulsivity	0.832	<0.001	0.750	<0.001	0.817	<0.001
Mental Disorder	18.333	<0.001				
Constant	5.497	0.07	1.917	0.078	1.758	0.074
R ² >2</sup>	0.588		0.541		0.424	