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The Relationship between Impulsivity and Suicide Among Rural Youths Aged 15–35 Years: A Case-Control Psychological Autopsy Study¹

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Abstract

In China, the gender ratio of suicide rates did not match the Western patterns, which was higher for females than males. However, the rural men were at relatively high risk of suicide in Liaoning province. Impulsivity was an important factor of suicide behaviors, but there was a lack of studies in China. This research aimed to study the relationship between impulsive personality traits and suicidal behavior among Chinese rural youths. Suicides were consecutively sampled from six randomly selected counties in Liaoning Province in China. Between 2005 and 2007, a total of 162 suicide victims were enrolled in the study along with 162 community controls matched for age, gender, and location. The psychological autopsy method was used to collect data from informants knowledgeable about the selected suicide victims and controls. The results showed the suicide victims in the study were more likely to demonstrate dysfunctional impulsivity and less likely to demonstrate functional impulsivity compared with the controls. Mental disorders, acute negative life events and dysfunctional impulsivity contributed to the risk of suicide; educational and functional impulsivity were protective factors. Suicide prevention efforts in rural China may address impulsivity.

Keywords

Suicide; Impulsivity; Life Events; Mental Disorder; Psychological Autopsy; China

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Introduction

In China, suicide is the leading cause of death among those aged 15–34 years (Wang et al., 2008). However, the prevalence of mental illness among Chinese suicide victims is significantly lower than in Western countries (Hvistendahl, 2012; Phillips et al., 2002). The Western suicide model, which focuses prevention efforts on the identification and treatment of mental disorders, might not be applicable to China. Then, more study is needed to advance our understanding of suicidal youths in China. Impulsivity, as a one of the important risk factors for suicide, has drawn much attention in the literature (Brodsky, Malone, Ellis, Dulit, & Mann, 1997; Nock & Kessler, 2006). This research aims to better study how the effect of impulsivity on suicide in rural China.

As suicide research developed, impulsivity was shown to be highly correlated with suicide. It was argued that two-thirds of suicidal behavior was impulsive in nature (Williams, Sale, & Wignall, 1977). A study documented that individuals who attempted suicide or experienced suicidal ideation had higher scores on impulsive personality assessments than individuals with no suicidal history (Oquendo et al., 2004). Neufeld (2009) clarified that impulsivity was more strongly correlated with suicide than hopelessness. Mann (1999) argued that a significant impulsive personality characterized individuals at risk for suicide attempts regardless of psychiatric diagnosis. These results suggested that impulsivity was highly correlated with suicidal behavior.

There are a number of instruments to measure impulsivity. For example, the BIS-11 Impulsivity Scale measures impulsivity in behavior, cognition and physiology (Barratt & Patton, 1983), and the UPPS Impulsive Behavior scale measures premeditation (lack of), urgency, sensation seeking and perseverance (lack of) (Whiteside & Lynam, 2001). However, Dickman (1990) proposed the existence of functional and dysfunctional forms of impulsivity: 1) functional impulsivity is rapid, inaccurate performance in situations where this response is optimal, and 2) dysfunctional impulsivity is rapid, inaccurate performance in situations where this response is non-optimal. In this study, the Dickman Impulsivity Instrument was used to measure impulsive personality traits among Chinese rural youths.

However, it is difficult to determine the independent contribution of personality traits to suicide (Brezo et al., 2006). First of all, this study considers life events, which are a crucial factor in suicide. Negative life events have a direct association with suicide (Cooper, Appleby, & Amos, 2002). Chinese research indicated that negative life events were most likely to precede a suicide among rural suicide victims (Zhang & Lin, 2013; Zhang & Ma, 2012). In this study, Paykel's Interview for Recent Life Events (Paykel, Prusoff, & Uhlenhuth, 1971) is adopted to measure acute negative life events. Furthermore, lethal pesticides are commonly used as a method for completing suicide. Approximately 166,000 suicides by pesticide ingestion occur each year in China (Yang et al., 2005). Mishara (2007) argued that impulsivity without advance planning was highly correlated with pesticide suicides. Therefore, the informants are asked if there was pesticide stored in the target person's home.

In this study, we investigate the contribution of impulsive personality traits to suicidal behavior in a case-control study, and we provide a theoretical basis for suicide prevention. Based on a case-control sample in rural China, it is hypothesized that impulsivity, acute negative life events, and pesticides play an important role in suicide among rural Chinese individuals.

Methods

Subjects and Data Collection

Rural young women and men aged 15 to 35 years were sampled for the study. We examined various risk factors in rural young women and men who died by suicide in comparison with controls from the same specific population. We used established psychological autopsy methods and a case-control design to investigate the environmental factors and other factors associated with young, rural suicide victims. The psychological autopsy had been proven as a reliable and valid method in Chinese social and cultural environments, and the results of previous work have shown that psychological autopsy methods have high reliability and validity (Zhang et al., 2003).

Liaoning is an industrial province in northeast China. Six rural counties in Liaoning province were selected for this study. A consecutive list of suicide victims aged 15–35 from 2005 to 2007 was compiled at the town Centers for Disease Control and Prevention (CDC), and reported to the principal investigator. Community-dwelling controls were recruited in the same areas about the same time. Within 2–6 months after the suicide incident, proxy informants were interviewed for each suicide victim. Each informant was interviewed separately by a trained interviewer in a different place without interruption. Successful interviews were conducted with informants for 162 suicide victims in the study. Among the 162 suicides 71 were female and 91 male.

The community living control group was a random sample stratified by age range and county. In Liaoning province, the 2005 census database of the counties was used in the study. As to gender, the random selection of controls aged 15 to 35 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. 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 to 35).

Data collection

For each suicide victim and each control, we interviewed two informants. To obtain the parallel data as from the suicides, proxy information from the controls was used. We selected a family member and a close friend who knew the deceased person well. The first informant was generally the next of kin of the suicide victim, such as a parent or a spouse, and the second informant was a good friend, colleague or neighbor. For each living control, we also interviewed two informants with the same selection criteria. Upon receiving each informant's written consent, a face-to-face interview with a semi-structured questionnaire was conducted with our interviewers in a private room of the informant's home or in the

hospital, without the presence of a third person. The average time for each interview was 2–3 hours. The interviewers were mental health, public health, or psychology professionals who had received professional training in interviewing prior to the data collection.

Instruments and measurements

The case-control status was the dependent variable. The predictor variables included age, education, gender, mental illness, pesticide availability, acute negative life events, and impulsivity.

Impulsivity was measured with the Dickman Impulsivity Inventory (DII) (Dickman, 1990), a 23-item scale that measures functional impulsivity and dysfunctional impulsivity as two separate components. Dickman proposed that functional impulsivity was rapid, inaccurate performance in situations where this response was optimal and that dysfunctional impulsivity was rapid, inaccurate performance in situations where this response was non-optimal. The two impulsivity traits had a low correlation with each other. Functional impulsivity was connected with enthusiasm, high activity levels, and adventure. Individuals with functional impulsivity like to do adventurous things; they might fail, but they probably experience unexpected results. Dysfunctional impulsivity was connected with mental illness or health problems: people with dysfunctional impulsivity make decisions without considering reality and aggravate problems with their actions. In China, the Cronbach's alpha values were approximately 0.863 and 0.779 for dysfunctional impulsivity and functional impulsivity, respectively, among the suicide victims and 0.746 and 0.680, respectively, among the normal individuals (Gao, Zhang, & Jia, 2011).

Paykel's Interview for Recent Life Events (Paykel et al., 1971) was designed by Paykel et al. in 1971. There were 44 items on Paykel's Interview for Recent Life Events, and an additional 19 items were added in this study after considering the physical and psychological characteristics of 15 to 35-year-old people in rural China. The modified life event questionnaire had high reliability and validity in the pilot study (Zhang et al., 2003). The respondents were also asked if each life event was a positive or negative one. For this current study, we included only the events that were regarded as negative life events by the respondents and occurred in the last month.

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 suicide victims and the controls. A Chinese version of the SCID (Gu & Chen, 1993) that was based on samples from Taiwan and Hong Kong (Zhang et al., 2003) was used. The diagnoses were made by psychiatrists on each team in a consensus meeting at which all of the responses from the informants were presented by the interviewers. All of the interviewers were trained mental health professionals, and experienced psychiatrists were employed to make the psychiatric diagnoses for both the suicide victims and the controls, based on two independent interviews from two different informants, supplemented, on occasion, by a meeting with the interviewer.

Statistical analysis

To decrease recall bias about the case in the data collection process, we used two informants for each suicide victim and each control. If one informant did not know the answers, the answers were provided by another informant. If the two informants' answers to a dichotomous question about the same target person did not match, the positive response (such as mental illness, life events and pesticides) was selected. For continuous variables, the average value of two informants' responses was entered into the database. The level of impulsivity was determined by averaging the scores from the two informants.

T tests and chi-square tests were carried out to describe and compare the demographic characteristics, mental disorders, the number of individuals who had pesticides available and the number of negative life events. The impulsivity of the suicide victims and the controls was statistically compared using an independent-samples t-test. A multiple logistic regression model was used to determine the factors that predict suicide.

Both age and education were measured in years. Male gender was coded as 1, and female gender was coded as 0. If the individuals had any kind of mental diagnoses, the variable was coded as yes (1); otherwise, it was no (0). Pesticide availability was assessed with a single item asking if any type of farming chemicals was stored at home. The responses were coded as yes (1) or no (0). Acute negative life events were measured by counting the number of events. Impulsivity was categorized into three levels based on the 33rd and 66rd percentiles. All of the statistical analyses were carried out using SPSS version 19.0.

Ethics

This study was approved by the institutional review boards of the State University of New York Buffalo State, Shandong University, Central South University, and Dalian Medical University. 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.

Role of the funding source

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

Results

The demographic characteristics of the suicide victims and the controls are presented in Table 1. Proxy informants for 162 suicide victims and 162 controls were interviewed for this study. There were no age differences or gender differences between the suicide victims and the controls. The suicide victims had fewer years of education ($p<0.001$). A significantly greater proportion of the suicide victims than the controls suffered from mental illness (45.1% vs. 6.1%) and stored pesticides at home (59.3% vs. 40.1%). Compared with the controls, the suicide victims had more acute negative life events ($p<0.001$).

Table 2 compares impulsivity (dysfunctional impulsivity and functional impulsivity) between the suicide victims and the controls. It shows that the suicide victims scored higher than the controls on dysfunctional impulsivity ($p<0.001$) but scored lower than the controls on functional impulsivity ($t=-3.247, p=0.001$).

A multiple logistic regression was conducted to explore whether impulsivity and other relevant factors predict suicide. As Table 3 shows, the strongest predictor of suicide was a high level of dysfunctional impulsivity, followed by mental illness and acute negative life events. Education and functional impulsivity were protective factors. If a person had high dysfunctional impulsivity, his/her suicide risk was approximately 14.046 times greater than a person who had low dysfunctional impulsivity. Although the suicide victims stored more pesticides at home, the effect of keeping these poisons at home was not significant in the logistic regression model.

Discussion

In this psychological autopsy study, 162 suicide victims and 162 controls were identified. The results showed that the suicide victims were more likely than the controls to have less education, to have a mental disorder, to store pesticides at home, and to have experienced acute negative life events.

Although 90% of suicide victims have mental illnesses in Western countries, most patients with mental disorders do not attempt suicide. A mental disorder is a sufficient condition for suicide but not a necessary condition. In the current study, the rate of mental illness was only 45.1%, which was lower than the 90% reported in Western countries (NIMH, 2009). Therefore, studying factors other than mental illness is crucial.

The results clarified that the dysfunctional impulsivity score among suicide victims was significantly higher than among the controls, and dysfunctional impulsive personality was a risk factor for suicide. In the logistic model, it can be seen that the risk increased as dysfunctional impulsivity increased. This result demonstrated that higher impulsivity was more dangerous in rural young people. The results were similar to the results of previous studies, which have indicated that impulsivity is a negative trait and an independent risk factor for suicide (Zouk, Tousignant, Seguin, Lesage, & Turecki, 2006). Individuals with high dysfunctional impulsivity scores cannot manage their behavior and make appropriate decisions. Studies in Western countries have indicated that strong impulsivity and deficient decision-making are common tendencies (Mann et al., 1999).

The logistic model indicated that acute negative life events were also risk factors. The model showed that suicide did not have only one risk factor; various risk factors together caused suicide. Impulsivity increased the risk of suicide in the presence of negative life events. It is difficult for individuals with dysfunctional impulsivity to deal with acute negative events. It is possible that impulsive young individuals wanted to escape, and they selected suicide. Everyone faces negative events at some point, but not all individuals attempt suicide. This fact suggests that dysfunctional impulsivity increases the risk of suicide when individuals experience acute negative life events.

Access to pesticides created an environment that was harmful and fatal. Of the 162 suicide victims in this study, 96 persons stored pesticides at home, and 101 persons died by ingesting pesticide. In actuality, 92 individuals had no plan to attempt suicide, 137 did not write a suicide note or write about suicide in a diary and 109 individuals never experienced suicidal ideation. Although relying on informants to identify suicidal ideation was a little dubious and the sample was small, maybe it can be inferred that most rural young people with high impulsivity might only attempt suicide, and the access to pesticides exacerbated the lethality of their actions.

However, functional impulsivity is a positive trait associated with enthusiasm, high activity levels and adventure. Functional impulsive individuals can consider the possibilities of various actions when they make decisions, which is a protective factor against suicidal behavior. Furthermore, education was a protectable factor against suicide. Education had a positive correlation with functional impulsivity ($r=0.176$, $p=0.025$).

The suicide prevention strategy should address dysfunctional impulsivity in rural China. Rural youths can be checked for impulsivity and mental health. Those youths with high dysfunctional impulsivity will be screened out for care. In suicide prevention, we need to provide training in dealing with negative life event, making right decision in an emergency, and looking for professional help which would minimize the risk of dysfunctional impulsivity. In Chinese traditions, suicide is an acceptable method especially for rural women when they deal with negative life events. Changing the prevailing attitudes towards suicide should be the second focus in educational activities.

The limitations of this study are related to the methodological concerns in a psychological autopsy study. Acquiring the data from proxies can be less accurate and reliable than obtaining information directly from the targeted subjects. The samples was small and often highly selected. Nonetheless, this study contributes to a growing body of literature addressing the links between 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 and it can lead young people to engage impulsivity in suicide behavior.

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Table 1

Comparing the Independent Variables between the Suicides and the Controls

Socio-demographic Characteristics	Suicides (n=162)	Controls (n=162)	<i>t</i> / χ^2	<i>p</i>
Age, years, mean (S.D.)	26.19 (6.00)	25.20 (6.12)	1.467	0.143
Education, year, mean (S.D.)	7.41 (2.56)	8.74 (2.14)	-5.073	<0.001
Gender, <i>n</i> (%)				
Male	91 (56.1%)	83 (51.2%)	0.794	0.373
Female	71 (43.9%)	79 (48.8%)		
Mental disorders, <i>n</i> (%)				
Any Mental Illness	73 (45.1%)	10 (6.1%)	67.280	<0.001
No	89 (54.9%)	152 (93.8%)		
Pesticide availability, <i>n</i> (%)				
Any pesticide stored at home	96 (59.3%)	65 (40.1%)	11.865	0.001
No	66 (40.7%)	97 (59.9%)		
Negative and Acute Life Events	1.012 (1.30)	0.154 (0.48)	7.865	<0.001

Table 2

Comparing two Categories of Impulsivity between the Suicides and the Controls

	Suicides (n=162)	Controls (n=162)	<i>t</i>	<i>p</i>
Dysfunctional Impulsivity	5.07 (2.45)	2.29 (1.90)	11.446	<0.001
Functional Impulsivity	5.65 (2.33)	6.38 (1.64)	−3.247	0.001

Table 3
Multiple logistic regressions predicting suicide by impulsivity with other relevant variables controlled for

Variables	β	S.E.	Wald	OR	95%CI	<i>p</i>
Education	-0.170	0.07	5.855	0.844	0.735–0.968	0.016
Mental Disorder	2.025	0.417	23.608	7.575	3.347–17.145	<0.001
Negative and Acute Life events	1.882	0.361	27.105	6.564	3.232–13.329	<0.001
Dysfunctional Impulsivity						
Low				1.000		
Middle	1.419	0.392	13.119	4.131	1.917–8.902	<0.001
High	2.642	0.423	39.085	14.046	6.135–32.159	<0.001
Functional Impulsivity						
Low				1.000		
Middle	-0.952	0.393	5.876	0.386	0.179–0.833	0.015
High	-0.974	0.418	5.431	0.378	0.167–0.857	0.02
Constant	-0.292	0.674	0.187	0.747		0.665
Nagelkerke R ²				0.593		