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The Association between Depression and Suicide When Hopelessness Is Controlled for 1

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Abstract

Objective—We retested the relationship between major depression and suicide with hopelessness as a control variable, with the hypothesis that the strong relationship between depression and suicide will decrease or disappear when hopelessness is controlled for. Also, hopelessness can be accounted for by psychological strains resulted from social structure coupled with individual characteristics.

Method—This was a case-control psychological autopsy study, in which face-to-face interviews were conducted to collect information from proxy informants for suicide victims and living subjects in rural Chinese 15–34 years of age who died of suicide (n=392) and who served as community living controls (n=416). Major depression was assessed by the Chinese version of the Structured Clinical Interview for DSM-IV (SCID). Hopelessness was measured by Beck Hopelessness Scale.

Results—A strong association between major depression and suicide was observed after adjustment for socio-demographic characteristics. When hopelessness was added to the analysis, the depression-suicide relationship was significantly decreased in all the six regression models.

Conclusions—Although depression as well as other mental illness is a strong risk factor for suicide, depression and suicide are both likely to be related to hopelessness, which in turn could be a consequence of psychological strains resulted from social structure and life events. Future studies may examine the causal relations between psychological strains and hopelessness.

Keywords

Suicide; Depression; Hopelessness; Rural China; Strain Theory of Suicide

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Introduction

Suicide studies in the world focused on the mental disorder as over 90% of the suicide in the West could be diagnosed with a mental illness (1). However, researchers with Chinese suicide data found much lower percentage of mental illness among suicides in that country (2, 3). Other factors beyond mental disorder may play a role equally important in predicting suicide in China, as well as in the rest part of the world.

Earlier studies found that hopelessness, a non-clinical psychological state, was important in predicting suicidal behaviors. For example, in a sample of 87 hospitalized suicide attempters, a hopelessness scale was found to be significantly better than a depression inventory as an indicator of suicidal risk. Hopelessness also correlated better than depression with self-ratings of the attenuation of the desire to go on living (4). In another study of 120 hospital-referred para-suicides, the authors confirmed previous findings that, while both depression and hopelessness correlated with the degree of suicidal intent as measured on a Suicide Intent Scale, the relationship between depression and suicidal intent was dependent on that between hopelessness and suicidal intent (5). Minkoff and colleagues (1973) identified a component of the syndrome of depression -- the cognitive element of negative expectations -- as a stronger indicator of suicidal intent than depression itself. This not only suggested a solution to the puzzling question of why there is a relationship between depression and suicide, but also indicated that approaches specifically designated to alleviate hopelessness may be successful in preventing suicide (6).

In this study we use established psychological autopsy methods and a case-control design to (1) retest the effects of hopelessness on the relationship between depression and suicide, (2) explore the explanations for the hopelessness effects and suggest hypothesis for future research.

Methods

Study design and sampling

Because the suicide rates in China peaked in the age group of 15–34 years and the rural suicide rate was about three times higher than the urban rate (2, 7, 8), we focused on the sample of rural youths for study. A case-control psychological autopsy (PA) design was used in the data collection.

Psychological autopsy is a research method developed earlier by a group of suicidologists in the United States as the means for obtaining comprehensive retrospective information about victims of completed suicide (9–11). A variety of sources of information are used in PA studies, including evidence presented at inquest, medical records, and information from general practitioners, and hospital clinicians. The most important source, however, is interview of relatives and other key informants (12). One of the first applications of the PA method in China was conducted by the research team led by the first author of this current study in rural China among the young populations and yielded excellent reliability and validity of the instruments as well as the data collection methods (13, 14). However, the PA methods do not go without methodological limitations. One major concern of the PA method is its proximity of the data source, which may not be the exact measure of the target's facts (12). Nonetheless, PA may be the only cost-effective way to study completed suicide (15). PA is particularly critical in studying Chinese completed suicide because of two other culture-specific reasons: (1) there is not yet in today's China a sophisticated medical examination system that could help find the causes of a non-criminal death, and (2) there is no established mental health or hospital system, especially in the rural areas, that could let us know the victims' health problems recorded prior to the completed suicide.

In this study we explored the effect of hopelessness on the relationship between depression and suicide. We examined suicides and controls 15–34 years of age in rural China. The community living controls were selected at the same location (villages and communities) as the suicides.

Sixteen rural counties from three provinces in China were involved in this study: Liaoning, an industrial province in the Northeast China; Hunan, an agriculture province in the Central South China; Shandong, an economic prosperity in both industry and agriculture in the mid-way between Liaoning and Hunan. From October 2005 through June 2008, and a total of 392 suicide cases and 416 controls were entered for study.

Instruments and measurements

Measures regarding to this study include socio-demographic information, Dickman Impulsivity Inventory (DII) (16), Beck Hopelessness Scale (BHS) (17), Coping Response Inventory (CRI) (18) and the Chinese version of the Structured Clinical Interview for DSM-IV (SCID) (19).

Socio-demographic information includes gender (male=1, female=0), age, education, status in the family (low=1, average=2, high=3), and physical health condition (poor=1, OK=2, good=3). The personal annual income in *yuan* (renminbi) was categorized into three groups: 5,000 *yuan*, 5001–10,000 *yuan*, 10,001 *yuan* (During the study period, the exchange rate was approximately seven *yuan* to one US dollar). Religion was categorized to “yes” (Muslim, Christian, Catholic Buddhism, Daoism) and “no” (atheist). Marital status was categorized into “currently married” (married, remarried, cohabitation) and “not currently married” (single and not dating, divorced, widowed).

The 23-item DII was designed to assess the personality trait of impulsiveness which includes two sub-scales: Dysfunctional Impulsivity Scales and Functional Impulsivity Scales. The former is the tendency to act with relatively little forethought when this causes problems and the latter is the tendency to act with relatively little forethought when this is optimal.

The 48-item scale Coping Response Inventory (CRI) (18) was used to measure the coping skill of the suicides or the controls which includes two sub-scales: Approach Coping Scales and Avoidance Coping Scales.

We used DSM-IV axis I to diagnose the prevalence the major depressive disorder of suicides and controls. Beck hopelessness scale is a 20-item self-report inventory and including three major aspects of hopelessness: feelings about the future, loss of motivation, and expectations.

Interviewers training and interviewing procedures

All interviewers were mental health or public health professionals. All interviewers received training for at least two weeks on psychological autopsy methods and administration of the study instruments before beginning of the data collection.

We also trained the village doctors and the village treasurers who collect fees for each burial or cremation. The training included the study procedure, judging cause of death, and reporting suicidal deaths to local Centers for Disease Control and Prevention (CDCs). Whenever necessary, an investigation was conducted to ensure that no cases of suicide were missed or erroneously reported with the help from the village board or villagers. All suicide information gathered at the county CDCs were forwarded to the provincial CDC monthly.

After a personal visit by the local health agency staff or the village administration, the agreement on the written informed consent was signed by the informants, and the interview was scheduled between two and six months after the suicide incident. We did not plan to interview the suicide informants within two months after the incident because there should be enough grievance period allowed for the survivors. We did not want to do the interview six months or longer after the suicide because the informants' memories about the incident may not be accurate as time elapses. We interviewed two informants for each suicide victim or control. The first informant was always a parent, spouse, or another important family member, and the second informant was always a friend, coworker, or neighbor. Interviewing two informants for each target person (suicide or control) allows reducing the amount of missing data and the possibility of biased information. Each informant was interviewed separately in a private place such as in the hospital/clinic, the informant's home or the village committee office. Each interview average time was 2.5 hours.

Information integrating

Since information came from two informants for each suicide case and each living control, the response for the one target person would be same or little different. If there is a discrepancy between the two forms, we integrated the different responses by the following two guidelines: (1) For demographic information (i.e. gender, age, education, status in the family, physical health condition, personal annual average income, marital status), we basically relied on the answers by the informant who had the best access to the information. (2) With regard to mental disorders or the psychological characteristics, we selected the response representing a positive symptom since the other informant may not have had an opportunity to observe the specific characteristic or behavior.

Quality control

The interviews were scheduled two to six months after the suicide incident. This time frame was short enough to minimize recall bias and long enough to reduce the impact of acute grief on the interview.

We selected the informant that were most familiar with the subject's life and circumstances and were available and consented to participate in our study. Characteristics of the informant were noted in a standardized fashion: most recent contact, frequency of contacts in the last month and last year, number of years informant has known the target, the informant's relationship with the target, and the informant's impression of their familiarity with target persons. Although target persons could be as young as 15 years of age, the proxy informant had to be 18 or older. And if marital infidelity or family oppression were possible causes of suicide, we tried to avoid recruiting proxy interview associated with family disputes to reduce the biased reports.

Ethics

This study was approved by the IRBs of all the universities involved in this study, from both United States and China. The research nature of the interview and the background of the research project were explicitly explained to each interviewee. Before each face-to-face interview informed consent and that details the rights of the interviewee was read and signed. If distress was present during the interview and the participant wished to stop or discontinued, the interview would be ended, and another replacement informant was chosen.

Statistical Analysis and Hypothesis Testing

Descriptive analyses, Pearson Chi-square test, Paired t-test were carried out to describe and compare the socio-demographic and psychological characteristics of suicides and controls

by gender. Six unconditional logistic regression models were employed to test the effects of hopelessness on the relationship between depression and suicide. All statistical analyses were carried out using SPSS, version 16.0.

It was hypothesized that major depression is strongly associated with suicide with the adjustment for socio-demographic characteristics, but when hopelessness is controlled for, the depression-suicide relationship is significantly decreased or disappeared. Past research papers published by the authors of this study as well as of all other participants of the project with the NIMH R01 PA data have not reported the association between hopelessness and mental disorders, or between hopelessness and suicide, although they have studied and published the association between depression and suicide with the data.

Results

Socio-demographic and psychological characteristics

Over the study period, we interviewed proxy informants of 392 suicide victims (214 males and 178 females) and 416 living controls (202 males and 214 females). We compared suicides and controls separately for males and females by gender on their socio-demographic and psychological characteristics. See Table 1.

Compared to the control group, both male and female suicide victims were less educated, had lower family status, lower income, and worse physical health condition. However, relative to comparison subjects, male suicide victims were about one year older and more likely to be religious.

The suicides scored higher on dysfunctional impulsivity but lower on approach coping than the controls. However, the male victims had lower scores on functional impulsivity but higher scores on avoidance coping than the male controls. Suicide victims were more likely with depression diagnosis and had higher scores on hopelessness compared with the controls.

Effect of hopelessness on the relationship between depression and suicide

All the independent variables listed in Table 1 but “currently married” were taken into six different multiple unconditional logistic regression models (See Table 2) to test the effects of hopelessness on the relationship between depression and suicide. Marital status did not distinguish suicides from controls for both males and females among the Chinese rural young people as shown in the bivariate analysis in Table 1. In other words, being married in rural China is not necessarily a protecting factor for suicide (20). Therefore the variable “currently married” is taken out of the regression models.

Models 1 and 2 show the regression results for all the suicides (n=392) and controls (n=416) with all the risk and protecting factors, and with and without the variable of hopelessness. As shown in the Model 1, better education, high status in the family, good physical health condition, high income, and higher scores on functional impulsivity and approach coping were the protecting factors of suicide. While high scores on dysfunctional impulsivity, avoidance coping, and depression diagnosis were the risk factors for suicide.

When hopelessness was added in the Model 2, some variables became insignificant or simply out of the regression. The suicides were 1.140 times more likely than the controls in suffering hopelessness, and the odds ratio for depression was sharply dropped from 6.177 to 3.677, although depression was still a notable risk factor for suicide.

Models 3 and 4 show the regression results for male suicides (n=214) and controls (n=202) with and without the variable of hopelessness as well as other risk and protection factors. As it is shown in Model 3, a high score on dysfunctional impulsivity and avoidance coping with a depression diagnosis were the risk factors for male suicide. To be older, to be better educated, to have a higher income, to have a higher status in the family, and to have a high score on functional impulsivity and approach coping were the protection factors for male suicides. When hopelessness was added in Model 4, variables including avoidance coping and depression were out of the regression. The male suicides were 1.124 times more likely than the male controls in suffering hopelessness.

Models 5 and 6 show the regression for females suicides (n=178) and controls (n=214) with and without the variable of hopelessness as well as other risk and protection factors. As it is shown in Model 5, a high income and high score on approach coping were the protection factors while high dysfunctional impulsivity score and with depression diagnosis were the risk factors for the female suicides. When hopelessness was added in the Model 6, with a similar result as model 4 for males, depression was out of the regression. The female suicides were 1.161 times more likely to commit suicide than the female controls in suffering hopelessness.

Discussion

Depression is a well-known and major risk factor for suicide (21). However, most of the individuals with major depression do not commit suicide (22). Hopelessness is another psychological factor which plays an important role in suicide (23, 24). A number of previous studies found that hopelessness is a better indicator than depression of suicide. They also found that depression is no longer a significant predictor of suicidal intent when hopelessness is statistically controlled for (4–6).

Numerous studies have found that the prevalence of mental illness in Chinese suicides was lower than that found in the West (25, 26). In China, mental disorder is not as an extreme important risk factor as in the West (3, 27, 28). Some other important factors beyond that of psychiatry or major depression should be fully investigated for suicide in China.

In this study, a strong association between major depression and suicide was observed even after adjustment for socio-demographic characteristics. When hopelessness was added to the analysis for the relationship between depression and suicide, consistent with the previous studies, the strong depression-suicide connection disappeared for both males and females. Depression and suicide are likely to be co-morbidities related to hopelessness, and some social structure and certain life events should precede the hopelessness. We propose the Strain Theory of Suicide to account for what have happened prior to hopelessness, depression, and suicide.

The Strain Theory of Suicide postulates that psychological strain precedes a suicidal behavior (29). Different from simple life stress, a strain is made up by at least two contradictory variables, resulting from conflicting and competing pressures in an individual's life (27). The four sources of strains are (1) differential value conflicts, (2) discrepancies between aspiration and reality, (3) relative deprivation, and (4) lack of coping skills (30). The theory has been tested in a number of suicide samples, such as the sample of suicide notes in the United States (31), the sample of 155 suicides in Hunan, China (32), and the sample of 105 rural suicides in Shandong, China (33). Strain is a psychological frustration resulting from any of the above four sources. Previous studies also indicate that negative life events are likely to bring about psychological strains. When a strain or frustration feeling is too strong to handle for an individual, hopelessness may occur.

It is well known that life stress leads to hopelessness, depression, or suicide (26, 34). In this study, both male and female suicides are more likely than their counterparts in the control sample to be less educated, of a lower status in the family, having a lower personal annual income and worse physical health condition. These findings imply that the suicides were experiencing higher level of stress than the non-suicidal populations.

Marriage status is a protective factor in the West for suicide, but not in rural China. This phenomenon was observed in other studies with the Chinese rural suicide data (20). It is also noted in this study that religion is not a protective factor in Chinese rural young suicide. Instead, it can be a risk factor the male population in rural China. Religion best serves as a protective factor where there is a large "moral community" - where the community at large supports religious practices and beliefs of individual religious adherents. To the extent that religious people in China are a small group, a minority, we might expect them to be at risk for suicide. Without a large religious community to reinforce the religious beliefs of a small group, religion would not be expected to be a strong protective factor (35). Similar findings that are different from those from Western societies have been documented with the Chinese data (36, 37).

Both male and female suicide victims had a higher score on dysfunctional impulsivity than the controls. Compared to the female victims, the male victims had significantly lower functional impulsivity score than the controls. These different characteristic between male suicides and female suicides or between suicide and controls on impulsivity may be moderated or controlled for by the social experience, culture, educational background, or the heritability (38, 39). Impulsivity is a coping characteristic. A deficiency in coping skills is a source of strain. We found that compared to the controls, both male and female victims scored lower on approach coping but higher on avoidance coping though the avoidance coping was not significant for females. A lack of coping skills is one of the four sources of strains. Different from simple life stress, a strain is made up by at least two contradictory variables, resulting from conflicting and competing pressures in an individual's life (31).

Previous research on the relationship between hopelessness and suicide were mostly with suicidal attempt data. Instead, we were able to use a sample of suicides in our investigation to study the hopelessness, depression and suicide hopelessness. Our findings support the view that alleviation of hopelessness may be successful in preventing suicide (4–6).

This study has some limitations. Our data collection with the psychological autopsy method did not include hospital or medical doctors' information about the suicidal patients due to the lack of the infrastructure in rural China. With the fast growing economy in China, future studies in China may be able to engage in better facilities and collect the psychological autopsy case control studies with more multiple sources.

In sum, we propose that psychological strains lead to hopelessness, depression, and suicide. We also argue that hopelessness can be a direct consequence of psychological strains resulted from social structure and life events. With the low prevalence of mental disorders among Chinese suicides, hopelessness, a non-clinical personal trait, may play a more important role in suicide in Chinese societies than elsewhere of the world. Future studies should address the causal relations from psychological strains resulted from social structure and life events to hopelessness.

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Table 1
Comparison of socio-demographic and psychological characteristics between suicides and controls separately for males and females ($N=808$)

Variables	Male				Female			
	Suicides ($n=214$)	Controls ($n=202$)	t	p	Suicides ($n=178$)	Controls ($n=214$)	t	p
Age, years, mean (S.D.)	26.9 (6.603)	25.5 (6.132)	2.362	0.019	26.7 (6.086)	25.9 (6.193)	1.277	0.203
Education years, mean (S.D.)	7.4 (2.625)	9.4 (2.394)	-7.910	<0.001	7.4 (2.940)	8.9 (2.392)	-5.842	<0.001
Status in the family, n (%)			41.597	<0.001			16.153	<0.001
Low	36 (16.8)	3 (1.5)	28.771	<0.001	20 (11.2)	4 (1.9)	14.833	<0.001
Average	99 (46.3)	74 (36.6)	3.965	0.046	75 (42.1)	87 (40.7)	0.088	0.767
High	79 (36.9)	125 (61.9)	25.916	<0.001	83 (46.6)	123 (57.5)	4.586	0.032
Physical health condition, n (%)			42.245	<0.001			18.211	<0.001
Poor	56 (26.2)	7 (3.5)	41.678	<0.001	32 (18.0)	12 (5.6)	14.922	<0.001
Average	36 (16.8)	38 (18.8)	0.281	0.596	42 (23.6)	41 (19.2)	1.146	0.284
Good	122 (57.0)	157 (77.7)	20.185	<0.001	104 (58.4)	161 (75.5)	12.532	<0.001
Personal annual income, n (%)			98.970	<0.001			41.743	<0.001
Poor	199 (93.0)	99 (49.0)	98.920	<0.001	173 (97.2)	157 (73.4)	41.432	<0.001
Average	5 (2.3)	30 (14.9)	21.122	<0.001	3 (1.7)	21 (9.8)	11.690	0.001
Good	10 (4.7)	73 (36.1)	64.419	<0.001	2 (1.1)	36 (16.8)	27.357	<0.001
Religion, n (%)								
Currently married, n (%)	16 (7.5)	6 (3.0)	4.213	0.040	15 (8.4)	18 (8.4)	0.000	0.996
Impulsivity, mean (S.D.)	146 (68.2)	126 (62.4)	1.570	0.210	131 (73.6)	157 (73.4)	0.003	0.959
Functional impulsivity	7.0 (2.886)	7.9 (2.244)	-3.501	0.001	7.3 (2.827)	7.4 (2.378)	-0.392	0.695
Dysfunctional impulsivity	6.7 (3.730)	3.7 (2.868)	9.177	<0.001	6.8 (3.599)	3.7 (2.594)	9.872	<0.001
Coping, mean (S.D.)								
Approach coping	20.4 (12.896)	39.6 (10.316)	-16.012	<0.001	20.1 (11.998)	38.4 (9.797)	-15.923	<0.001
Avoidance coping	38.3 (8.996)	35.2 (8.996)	3.335	0.001	37.4 (9.443)	36.4 (9.020)	1.043	0.298
Depression, n (%)	61 (28.5)	4 (2.0)	55.454	<0.001	33 (18.5)	2 (0.9)	37.038	<0.001
Hopelessness, mean (S.D.)	71.1 (13.668)	46.6 (8.489)	21.719	<0.001	67.6 (12.730)	47.1 (7.543)	19.611	<0.001

Logistic Multiple Regression Models testing the effects of Hopelessness on the relationship between depression and suicide

Table 2

Independent variable	All suicides and controls (N=808)				Male suicides and controls (n=416)				Female suicides and controls (n=392)			
	Model 1 Without hopelessness	Model 2 With hopelessness	Model 3 Without hopelessness	Model 4 With hopelessness	Model 5 Without hopelessness	Model 6 With hopelessness	OR	95%CI	P	OR	95%CI	P
Age	1.038	0.999–1.080	0.057		1.100	1.033–1.171	0.003	1.075	1.004–1.151	0.038		
Education years	0.901	0.815–0.996	0.042	0.868	0.777–0.971	0.013	0.829	0.706–0.973	0.022	0.666–0.943	0.009	
Status in the family												
Low	1.0			1.0			1.0					
Average	0.205	0.053–0.788	0.021	0.253	0.052–1.234	0.089	0.064	0.008–0.533	0.011	0.005–0.758	0.029	
High	0.225	0.059–0.857	0.029	0.441	0.091–2.137	0.309	0.061	0.008–0.491	0.009	0.006–0.906	0.042	
Physical health condition												
Poor	1.0		0.045									
Average	0.317	0.126–0.794	0.014									
Good	0.429	0.195–0.945	0.036									
Personal annual income												
Low	1.0			1.0			1.0			1.0		
Average	0.123	0.029–0.516	0.004	0.209	0.041–1.062	0.059	0.019	0.002–0.150	<0.001	0.034	0.003–0.342	0.004
High	0.125	0.050–0.315	<0.001	0.142	0.049–0.414	<0.001	0.063	0.019–0.215	<0.001	0.073	0.019–0.275	<0.001
Religion							5.237	0.903–30.376	0.065			
Functional impulsivity	0.821	0.735–0.917	<0.001	0.872	0.767–0.991	0.036	0.730	0.612–0.872	0.001	0.791	0.649–0.963	0.019
Dysfunctional impulsivity	1.217	1.115–1.330	<0.001	1.230	1.115–1.357	<0.001	1.281	1.119–1.467	<0.001	1.307	1.128–1.515	<0.001
Approach coping	0.896	0.874–0.919	<0.001	0.944	0.918–0.971	<0.001	0.903	0.872–0.934	<0.001	0.945	0.908–0.984	0.006
Avoidance coping	1.051	1.019–1.084	0.002				1.078	1.026–1.133	0.003			
Depression	6.177	2.283–16.714	<0.001	3.667	1.151–11.687	0.028	4.239	1.179–15.242	0.027	18.110	3.303–99.299	0.001
Hopelessness				1.140	1.107–1.174	<0.001				1.124	1.080–1.170	<0.001
Constant	8.061		0.001	0.032		0.016	36.357		0.046	0.280		0.569
Nagelkerke R ²	0.689			0.774			0.766			0.818		
Hosmer and Lemeshow Test	$\chi^2=7.524$, p=0.481			$\chi^2=23.990$, p=0.002			$\chi^2=2.897$, p=0.941			$\chi^2=13.371$, p=0.100		
										$\chi^2=7.041$, p=0.532		
										$\chi^2=15.445$, p=0.051		