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The Effect of Community Stress and Problems on Psychopathology: A Structural Equation Modeling Study

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Abstract

This research aimed to estimate the effect of perceived social factors in the community stress and problems on the residents' psychopathology such as depression and suicidal behaviors.

Subjects of this study were the informants (N=1618) in a psychological autopsy (PA) study with a case-control design. We interviewed two informants (a family member and a close friend) for 392 suicides and 416 living controls, which came from 16 rural counties randomly selected from three provinces of China.

Community stress and problems were measured by the WHO SUPRE-MISS scale. Depression was measured by CES-D scale, and suicidal behavior was assessed by NCS-R scale.

Multivariable linear and logistic regression models and the Structural Equation Modeling (SEM) were applied to probe the correlation of the depression and the suicidal behaviors with some major demographic variables as covariates.

It was found that community stress and problems were directly associated with rural Chinese residents' depression (Path coefficient = 0.127, $P < 0.001$). There was no direct correlation between community stress and problem and suicidal behaviors, but community stress and problem can affect suicidal behaviors indirectly through depression. The path coefficient between depression and suicidal behaviors was 0.975. The current study predicts a new research viewpoint, that is, the depression is the intermediate between community stress and problem and suicidal behaviors. It might be an effective route to prevent depression directly and suicidal behaviors indirectly by reducing the community stress and problems.

Keywords

Community Stress and Problems; Psychopathology; Depression; Suicidal Behaviors; Structural Equation Modeling

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1. Introduction

Community has been studied by previous researchers as main factor to relate to people's physical and psychological wellbeing. However, the limited number of studies has been reported with conflicting findings. (2004) Wilson et al. compared four contrasting neighborhoods for their residents' physical health, chronic conditions, and emotional distress in Canada by a cross-sectional study. Wilson found that neighborhoods with lower social economic status reported poorer physical health and more emotional distress (Wilson et al. 2004). In a previous study aimed to investigate the relation between community socio-economic and ethnic characteristics with depressive symptoms in a population based sample in the United States, Henderson et al. found that depression was inversely related to neighborhood score and individual income and education. However, neither neighborhood social-economic characteristics nor ethnic density were consistently related to depressive symptoms once individual socio-economic characteristics were controlled for (Henderson et al. (2005). A longitudinal study by Dalgard and Tambs investigated the relationship between urban environment and mental health in Norway with a 10 year period apart. With the five types of neighborhoods studied, researchers found that parallel with the improvement in social environment there was a significant improvement in mental health among those who continued to live in the same area, implying that the quality of a neighborhood has an impact on mental health (Dalgard and Tambs 1997). Another longitudinal study conducted by Schootman et al. with US census data found that the location attributes studied with this design were not independent contributors to the incidence of depression in middle-aged urban African Americans (Schootman et al. 2007). Similar findings were reported in a cross-sectional study by Thomas et al. (2007). They studied trying to understand whether contextual measures of residential environment quality and geographical accessibility are associated with symptoms of common mental disorder. As a result, there was little evidence to suggest that residential quality or accessibility were associated with symptoms (Thomas et al. 2007).

Inconsistent findings might be resulted from methodological flaws. Ecological fallacy, some false interpretation of aggregate-level data in individual-level terms, is likely to be found in some studies as reviewed (Firebaugh 1978). Connecting the census data on such community characteristics as race, education, and income, etc. to individual incidence of depression may yields inaccurate conclusions, as the individuals sampled for the dependent variables may not represent the community characteristics (Schootman et al. 2007) (Thomas et al. 2007). On the other hand, using a subject's perception of the neighborhood characteristics allows the community variable to be at the same level and comparable to the subject's personal traits (Wilson et al. 2004).

As to the suicide patterns, there are many differences between China and the west countries. The suicide rate in the rural area is higher than the urban areas and the female suicide rate is higher than the male suicide rate in China. There are two suicidal peak age period in China, that is the young and middle-aged period (19~35 year old) and the old period (60 years old). Pesticides method was the first suicide methods in China. With the development of Economic and social, the suicide rate of china has decrease rapidly in recent years. Just because the particular suicide patterns in china, it is more meaningful to research

relationship among community stress and problems, suicide and the residents' psychopathology.

This current study aims to further test the relationship between community stress and problems and the residents' psychopathology, using independent (perception of the community stress and problems) and the dependent variable. Because of the social and psychological impact of the community factors to individual health (Durkheim 1951), the hypotheses is that community stress and problems are positively associated with the residents' psychopathology such as depression and suicide behaviors.

2. Methods

2.1 Research Design and Data Collection

Data for the study were obtained from a large scale psychological autopsy (PA) study correlated of suicide in comparison with a group of community living controls. In the current study, the multi-stage random sampling method was used. As we all know, China is a large country and has vast territory, firstly three provinces (Liaoning, Hunan and Shandong provinces) were chosen according to the development level and their location in China, that is in north area of China, in middle area of China and in south area of China. Secondly, 16 rural counties from three provinces were randomly selected (6 from Liaoning, 5 from Hunan, and 5 from Shandong) of China. Liaoning is an industrial province in northeast China, Hunan is an agricultural province in south China, and Shandong is a province with prosperity in both industry and agriculture in middle China. This selection method ensured the selected provinces are representative for the whole Chinese rural people.

The current study is a case-control study. The current study match the case and control by main demographic variables. The case respondent information came from the reported data of CDC (Centers for Disease Control and Prevention) and hospital emergency department of county (Xian). When the case confirmed, the control respondent of case were chosen according to the following match principle: same gender, same location area, similar age (± 3 years). In the end, a total number of 392 suicide cases and 416 community living controls were recruited, and two informants were interviewed for each suicide case and living control person.

For each suicide and each control, we tried to interview two informants. To obtain some parallel data as from the suicide cases, we also used proxy information from the controls. However, we noticed 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). Each carefully selected informant was supposed to report reliable information about the specific characteristic, recognizing that it is likely no one informant has all the pertinent information.

Based on these 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 consent to, in-person interviews. (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. (3) For both suicides and controls, informant #1 was always a parent or spouse, or another important family member, and informant #2 was always a friend, co-worker, or a neighbor. However, we tried to avoid husbands or wives and the in-laws of those married as much as possible if 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. If informant #1 and #2 provided difference information, information integration was necessary. The principle of information integration in current study were as follows: (1) For the general demographic information, such as age, residence location, education level, marital status, etc. the information provide by informant #1 generally be used, because informant #1 was most familiar to the target person. (2) For the variable such as physical health status, mental health status, personality and psychological characteristics, family economic conditions etc. when the two informant did not provide the match information, the poorer information (the information more easy to cause psychopathology) always be applied in the current study. (3) For other variable such as believing in religion, boy or girl friend or not, storage of pesticides, life events etc. the positive information always be selected. namely as long as each informant provide positive information, then we would consider those events were existed. The information synthesis method mentioned above had been verified has good reliability and validity by previous publications (Fang and Zhang 2010).

Because the current study was a multicenter field research, how to control bias and quality control were important. The professional quality controllers came from research institutions and universities were trained by the project director, and then they were dispatched to each research field to control the quality of the research ensuring the surveys can be preceded according to standard procedure.

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 the suicide. 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 a trained interviewer, in a private place of the hospital or the informant's home. We used tape recording whenever accepted by the interviewee. The average time for each interview was about 2.5 hours. The proxy informants not only provided the information of the suicides and controls, but also provided their own information during the face to face interview. In the current study, we only analyzed the data (N=1618) provided by the informants themselves.

2.2 Measures

Socio-demographic factors included age, gender, residence location, education, marital status, number of family member, believing in religion, and economic status of family in village. Marital status was dichotomized as “0= Never married” and “1= Ever married” with the latter including those who were currently married, separated, divorced, and widowed.

Although separated, divorced, and widowed may be the risk factors of the psychopathology, there was few sample of them, so those martial status were included in ever married. Economic status of family in village was measured by “How do you rank your family’s economic situation compared with others”, which was measured by the subject’s self-perception. Table 1 describes the recode method of each demographic variable in this study.

Depression is a major diagnosis among all types of mental disorders that occur before suicide. The Center for Epidemiologic Studies-Depression Scale (CES-D) (Radloff 1991) were used to assess the respondents’ depression level. The CES-D is a self-report scale, and it covers affective, cognitive, behavioral, and somatic symptoms associated with depression. The CES-D was originally developed for assessing depression symptoms and was specifically designed for research use in the general and non-clinical populations. It has 20 items, and for each of them respondents rate their own feeling for the number of days in the past one week: 0=less than one day, 1=1 to 2 days, 2=3 to 4 days, and 3=5 to 7 days. The 4 positively formulated items (items 4, 8, 12, and 16) were reversed recode. The total score consists of 20 items, ranging from 0 to 60. The Chinese version of CES-D has been validated with a number of Chinese samples and proved to be an excellent measure of depression in general Chinese populations (Zhang et al. 2012).

The community stress and problems was assessed with the scale developed by WHO SUPRE-MISS named the Community Stress and Problems (WHO 2002). The scale has 16 items asking respondents about their perception of the social stress and problems in the community. All the 16 items were included in the data collection, and two more questions (gambling and superstition) were added to the scale to reflect something that may be particular to rural China. Respondents were asked to rank each of the 18 stresses or problems from 1 (Not serious at all) to 5 (very serious). The WHO SUPRE-MISS community stress and problems had been translated and back-translated multiple times by bilingual professionals for accuracy and consistency of the instrument. The protocol including all the scales and questions was approved by both the US institutes and these institutes involved in China. All the Chinese version of the scale has been validated before their implication in current study. We used the whole item’s score to describe the effect of the community stress and problems

The suicidal behaviors were measured by the National Comorbidity Survey Replication (NCS-R) (Kessler et al. 1994). Informants was asked the following questions: (1) suicidal ideation: have you ever seriously thought about killing yourself, and (2) if so, have you had the thoughts in the past 12 months; (3) suicidal plans: have you ever made a plan for committing suicide, and (4) if so, have you made such a plan in the past 12 months; (5) suicidal attempts: have you ever attempted suicide, and (6) if so, have you attempted suicide in the past 12 months. Any respondent reported Yes to any of the questions, suicidal behavior was recorded as positive for the respondent.

2.3 Data analysis and certification of the methods

The t test or analysis of various (ANOVA) was used to describe the distribution of CES-D score. When the variances of two groups for numeric demographics variables were not equal, t` test was used to compare the difference. The Kruskal-Wallis test was used when the

variance of five groups were not equal. Chi-square χ^2 or the Fisher's exact test was used to compare the difference of the distribution for suicide behaviors.

The multivariable regression model was operated to investigate what extent the community stress and problems predict depression. In the model, we set the CES-D score as dependent variable, and imported the statistical significant demographic variables and the community stress and problems scale score as the independent variables. The multivariable Logistic regression model was used to investigate what extent the community stresses and problems predict the suicide behaviors. We recoded 1 = Has suicidal behaviors and 0 = No suicidal behaviors.

In order to study what extent the community stress and problems predict the depression and the suicidal behaviors, and probe the correlation of the depression and the suicidal behaviors deeply, the Structural Equation Modeling (SEM) was applied. In the SEM, the depression and the suicidal behaviors were determined as the latent variables.

All analyses were 2 tailed, and with statistical significance determined by $P < 0.05$. The SPSS 17.0, AMOS 18 software were used in the analysis process.

3. Results

3.1 Descriptive analysis

The descriptions of the major demographic variables were showed in Table 1. Table 1 indicated that the CES-D score were significantly different on the variables listed in the Table 1 except gender variable, and there were significant difference on the suicidal behaviors except residence location and number of family members variables under the statistical significance level $P < 0.05$.

3.2 The Correlation between Community Stress and Problems and Depression and Suicide Behaviors

Histograms indicated that community stress and problems scale score was positive-skewed distribution. The Spearman correlation method was used to assess the correlation between the CES-D score and the Community Stress and Problems scale score. The result indicated that the Spearman correlation coefficient was 0.209 and the correlation was significant at the 0.01 level ($P < 0.01$). The univariate logistic regression was used to evaluate the correlation between the suicidal behaviors and the Community Stress and Problems scale score. The analysis showed that the regression coefficient $\beta = 0.025$, Wald $\chi^2 = 9.627$, and $P = 0.002$, which was significant at the 0.05 level ($P < 0.05$).

3.3 The Effect of Community Stress and Problems on Depression and Suicide Behaviors

The screened variables in Table 1 with statistical significance determined by $P < 0.05$ and the Community Stress and Problems scale score were imported to the multivariable liner or logistic regression model. Table 2 showed the results of the multivariable regression model. In Table 2, we can see community stress and problems put effect on not only depression but also the suicidal behaviors with statistical significance determined by $P < 0.05$.

The multiple linear regression indicates that the community stress and problems are predictors of individual depression, even with several other demographic variables controlled for in the same model. The unstandardized regression coefficients is 0.139 (OR=1.149), which indicates that if the community stress and problems score increase one score then the CES-D scale score will increase 0.139 score. It is also noted that older age, believing in religion, relative poverty in village are also the risk factors of depression.

The multiple logistic regression model indicates that the community stress and problems are still a predictor of individual suicidal behaviors, even with other demographic variables controlled. The OR=1.027, which indicates that if the individuals community stress and problems score increase one score then the incidence rate of suicidal behaviors will increase 1.027 times. The logistic regression still notes that female, older age, few years of education, believing in religion, and relative poverty in village are the risk factors of suicidal behaviors.

3.4 The Effect of Community Stress and Problems on Depression and Suicide Behaviors — Base on the Structural Equation Modeling

In order to study what extent the community stress and problems predict the depression and the suicide behaviors, and even probe the correlation of the depression and the suicide behaviors deeply, the Structural Equation Modeling (SEM) method was applied. Because the depression status and suicidal behaviors are different to be measured, so they were determined as the latent variables in the model.

First: Initial model setting. The initial theoretical model was set basing on the professional knowledge. Suicidal behavior, as latent variable, was assessed by 6 items, which are lifetime suicidal ideation, lifetime plan, lifetime attempt, and suicidal ideation, plan, attempt in the past 12 months. Exogenous variables included gender, age, religious belief, the community stress and problems scale score etc. Depression was another latent variable with 20 indicators of the CES-D scale and other demographics variables. The Initial model was showed in Figure 1. Maximum likelihood estimation was employed as a global test of models. Model fit and comparison were ascertained using the following indices: Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), Normed Fit Index (NFI), Incremental Fit Index (IFI), Akaike Information Criterion (AIC), and Expected Cross-validation Index (ECVI). According to the previous literatures, the hypothesis is that depression could result in suicidal behaviors. The fit indices of the initial theoretical model are as following: CFI=0.867, NFI=0.844, IFI=0.868, RMSEA=0.055, AIC=3194.868, ECVI=2.118.

Second: Model modification. The fit of initial model was relatively good. But the parameter estimate result showed that standard path coefficient between depression and religion was the smallest one, the standard path coefficient was 0.001 ($P=0.994>0.05$), which reminded that the path should be deleted. Next, we deleted the path between depression and religion to modify the initial model, then RMSEA changed to 0.054 and ECVI changed to 2.117. According to the above model modification ideas and professional knowledge, the smaller paths were deleted to modify the models step by step and only retaining the paths which were statistically significant. In the end, we built the final fixed model showed in Figure 2. The overall fit indices of final fixed model are as following: CFI=0.958, NFI=0.903,

IFI=0.915, RMSEA=0.050, AIC=2938.367, ECVI=1.817, which indicated that the goodness of fit of the final fixed model was adequate.

The final fixed model indicated that the factors directly associated with suicidal behaviors included age, education year, marital status, religion, economic status in the village, depression status, lifetime suicidal ideation, lifetime suicidal plan, suicidal ideation over the past 12 months, and suicidal plan over the past 12 months. The community stress and problem scale score was related to depression significantly (Path coefficient =0.127, $P<0.001$), but not related to suicidal behaviors directly. There was strong correlation between depression and suicidal behaviors (Path coefficient =0.975, $P<0.001$). Lifetime suicidal ideation, lifetime suicidal plan, suicidal ideation over the past 12 months, and suicidal plan over the past 12 months effect depression indirectly.

4. Discussion

Psychopathology such as depression and suicidal behaviors can be resulted from many factors, such as personal characteristics, individual life events, environments, and culture, etc. Structural sociologists and social psychologists postulate that the social structure, external social facts, and the environment play an important role in a person's behaviors and psychological functioning. Durkheim (1951) and Ross & Nisbett (1991) all indicated that external social environment were a strong predictor of suicidal behaviors. Therefore, sociologists who study psychopathology usually spend more efforts on the environment and social structure in order to identify more correlates of psychopathology and find other prevention measures. However, there are few studies reported the connection between the community social environment and residents' psychopathology risks. It is an understudied area, and the limited number of studies has reported inconsistent findings.

In current study, it was found that age, religion, economic status, and community stress and problems are predictors of depression. Older age, believing in religion, relatively low economic status, and higher community stress and problems were the risk factor of depression. The unstandardized path coefficients between depression and community stress and problems is 0.139, meaning that the community stress and problems scale score increase 1 score then the CES-D scale score will increase 0.139 score.

As showed in Table 2, gender, age, education year, religion, economic status, and community stress and problems are good predictors of suicidal behaviors. Being female, older age, few year educations, relatively low economic status, and higher community stress and problems were the risk factors of suicidal behaviors. If the individuals' community stress and problems scale score increase 1 score, then the exposed ratio of them will increase 1.027 times.

However, when the depression and suicidal behaviors were determined as the latent variables in SEM, the relationships among the variables changed showed in Figure 2. Variables such as age, education years, marital status not only have effects on depression but also on suicidal behaviors directly. Economic status, religion variables have effects on depression indirectly. Lifetime suicidal ideation, lifetime suicidal plan, suicidal ideation over

the past 12 months, and suicidal plan over the past 12 months still put effects on depression indirectly via suicidal behaviors. Marital status variable has effect on suicidal behaviors indirectly by depression.

The Lifetime suicidal attempt and suicidal attempt over the past 12 months items had been removed from the initial model, which may because the objects of this current study are the informants not the suicidal cases. Most of informants did not experience the suicidal attempt, so the items were not statistical significant in current study.

In the SEM, the community stress and problem scale score was related to depression significantly (Path coefficient =0.127, $P<0.001$), but were not related to suicidal behaviors directly. Meanwhile, there are strong correlation between depression and suicide behaviors (Path coefficient =0.975, $P<0.001$). The results of current study predict a new research viewpoint to study the relationship between community stress and problem and suicidal behaviors in the future. The depression is the intermediate between community stress and problem and suicidal behaviors. There may be no direct correlation between community stress and problem and suicidal behaviors, but the community stress and problem have effect on suicidal behaviors indirectly through depression.

Findings of the study have certain preventive implications. A village in rural China is a small community that consists of a large number of families. With the Chinese rural and traditional culture, the family and village are intimately connected, in which culture values are shared, social support is taken for granted, and personal information can be public. Therefore, the community stress and problems, positive or negative, big or small, put much stronger impact on the individuals in Chinese community than the West.

To improve the living conditions by solving the problems that have existed in the villages, it is the local governments' responsibility. Local residents together with the infrastructural support from the government should strive to improve the local transportation situation, increase the coverage of health care, and enhance the social security system to protect individuals so as to decrease their life stress. On the other hand, alcohol consumption can be regulated for certain members of the community, and superstitious activities of villagers may have to be confined to certain degree. It might be an effective route to reduce depression directly and suicidal behaviors indirectly by reducing the community stress and problems.

Limitations: Data of the research were obtained from psychological autopsy (PA) study and the information bias could not be avoided absolutely. Additionally, the samples of current study were selected from three provinces (including 16 rural counties) in China and surveyed in different period. There may have another variables not mentioned in current study still contribute to the total variance of the data. The limitations may reduce the generalizability of the research results. Future research should use the multilevel model and Hausman test to deal the clustering data to reduce the likelihood of bias.

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References

- Dalgard OS, Tambs K. Urban environment and mental health. A longitudinal study. *The British Journal of Psychiatry*. 1997; 171(6):530–536. [PubMed: 9519091]
- Durkheim, Emile. *Suicide: A Study in Sociology*. New York: Free Press; 1951. (Original work published in 1897).
- Fang, Le; Zhang, Jie. Validity of Proxy Data Obtained by Different Psychological Autopsy Information Reconstruction Techniques. *The Journal of International Medical Research*. 2010; 38(3):833–843. [PubMed: 20819420]
- Firebaugh G. A Rule for Inferring Individual-Level Relationships from Aggregate Data. *American Sociological Review*. 1978; 43:557–572.
- Henderson, Claire; Diez Roux, Ana V.; Jacobs, David R.; Kiefe, Catarina I.; West, Delia; Williams, David R. Neighbourhood characteristics, individual level socioeconomic factors, and depressive symptoms in young adults: the CARDIA study. *Journal of Epidemiology and Community Health*. 2005; 59(4):322–328. [PubMed: 15767387]
- Kessler RC, McGonagle KA, Zhao S, Nelson CB, Hughes M, Eshleman S, Wittchen HU, Kendler KS. Lifetime and 12-month prevalence of DSM-III-R psychiatric disorders in the United States, Results from the National Comorbidity Survey. *Archives of General Psychiatry*. 1994; 51(1):8–19. [PubMed: 8279933]
- Kraemer HC, Measelle JR, Ablow JC, Essex MJ, Boyce WT, Kupfer DJ. A new approach to integrating data from multiple informants in psychiatric assessment and research: Mixing and matching contexts and perspectives. *American Journal of Psychiatry*. 2003; 160:1566–1577. [PubMed: 12944328]
- Radloff, Sawyer Lenore. The use of the Center for Epidemiologic Studies Depression Scale in adolescents and young adults. *Journal of Youth and Adolescence*. 1991; 20(2):149–166. [PubMed: 24265004]
- Ross, L.; Nisbett, RE. *The Person and the Situation: Perspectives of Social Psychology*. New York: McGraw-Hill; 1991.
- Schootman, Mario; Andresen, Elena M.; Wolinsky, Fredric D.; Malmstrom, Theodore K.; Miller, J Philip; Miller, Douglas K. Neighbourhood environment and the incidence of depressive symptoms among middle-aged African Americans. *Journal of Epidemiology and Community Health*. 2007; 61(6):527–532. [PubMed: 17496262]
- Thomas, Hollie; Weaver, Nikki; Patterson, Joanne; Jones, Phil; Bell, Truda; Playle, Rebecca; Dunstan, Frank; Palmer, Stephen; Lewis, Glyn; Araya, Ricardo. Mental health and quality of residential environment. *The British Journal of Psychiatry*. 2007; 191(6):500–505. [PubMed: 18055953]
- WHO (World Health Organization). Geneva: World Health Organization; 2002. Multisite Intervention Study on Suicidal Behaviours SUPRE-MISS: Protocol of SUPRE-MISS.
- Wilson K, Elliott S, Law M, Eyles J, Jerrett M, Keller-Olaman S. Linking perceptions of neighbourhood to health in Hamilton, Canada. *Journal of Epidemiology and Community Health*. 2004; 58(3):192–198. [PubMed: 14966230]
- Zhang, Jie; Sun, Weiwei; Kong, Yuanyuan; Wang, Cuntong. Reliability and validity of the Center for Epidemiological Studies Depression Scale in 2 special adult samples from rural China. *Comprehensive Psychiatry*. 2012; 53(8):1243–1251. [PubMed: 22520090]

Fig. 1.
The initial theoretical structural equation model examining relationships between depression and suicidal behaviors.

Fig. 2.
The final fixed structural equation model of Community Stress and Problems on Psychopathology.

Table 1
The CES-D Depression and NCS Suicidal Behaviors Distributions on the Major Demographics Variables (N=1618)

Major Demographic Variables	CES-D Score		Suicidal Behavior			χ^2	P
	($\bar{x} \pm SD$)	t / t' / F	P	Yes	No		
Gender		-1.692	0.091			17.950	<0.001
Male (0)	9.50 $\pm$ 11.82			69 (34.5%)	716 (50.5%)		
Female (1)	10.53 $\pm$ 12.45			131 (65.5%)	702 (49.5%)		
Age (year)		-9.684	<0.001*			29.695	<0.001
34 (0)	6.77 $\pm$ 8.16			41 (20.5%)	574 (40.5%)		
>34 (1)	12.04 $\pm$ 13.68			159 (79.5%)	844(59.5%)		
Residence Location		0.027*				0.212	
Urban (0)	7.64 $\pm$ 9.44			6 (3.0%)	71 (5.0%)		
Rural (1)	10.15 $\pm$ 12.26			194 (97.0%)	1347 (95.0%)		
Education		5.827	<0.001*			18.349	<0.001
Under or equal middle school (0)	10.73 $\pm$ 12.69			184 (92.0%)	1124 (79.3%)		
Above middle school (1)	7.10 $\pm$ 9.03			16 (8.0%)	294 (20.7%)		
Marital Status		-2.343	0.020*			6.132	0.013
Never married (0)	8.46 $\pm$ 10.44			16 (8.0%)	204 (14.4%)		
Ever married (1)	10.29 $\pm$ 12.40			184 (92.0%)	1211 (85.6%)		
Number of Family Members		2.427	<0.015*			3.869	0.054*
3 (0)	10.95 $\pm$ 13.34			94 (47.0%)	563 (39.7%)		
>3 (1)	9.40 $\pm$ 11.24			106 (53.0%)	855 (60.3%)		
Religion		-3.582	<0.001*			20.677	<0.001
No (0)	9.47 $\pm$ 11.90			138 (69.0%)	1166 (82.5%)		
Yes (1)	12.25 $\pm$ 12.90			62 (31.0%)	247 (17.5%)		
Economic Status of Family in Village		161.292	<0.001#			62.355	<0.001
Very poor (1)	23.87 $\pm$ 16.27			20 (10.0%)	40 (2.8%)		
Poor (2)	18.09 $\pm$ 15.53			52 (26.0%)	172 (12.1%)		
Ok (3)	8.64 $\pm$ 10.42			106 (53.0%)	918 (64.7%)		

Major Demographic Variables	CES-D Score		Suicidal Behavior		
	(x±SD)	P t / t' / F	Freq. (%)		P χ ²
			Yes	No	
Good (4)	6.13±8.70		16 (8.0%)	249 (17.6%)	
Very good (5)	6.20±11.55		6 (3.0%)	39 (2.8%)	

Note:

- * indicates that the t' test is used, where the variance of the two samples is not considered equal.
- # indicates that the Kruskal-Wallis test is used, where the variance of the five samples are not considered equal.
- ^a indicates Fisher's Exact Test.

Table 2

Multivariable Linear and Logistic Regression of Community Stress and Problems on Depression and Suicidal Behaviors with Major Demographic Variables as Covariates

Demographic variables	Depression			Suicidal behaviors		
	β	t	P	β	Wald χ^2	P
Constant	16.521	7.401	<0.001	-2.330	20.697	<0.001
Gender				0.645	14.857	<0.001
Age (year)	4.582	7.442	<0.001	0.864	18.662	<0.001
Residence Location	1.059	0.785	0.433			
Education	-1.358	-1.822	0.069	-0.801	8.223	0.004
Marital Status	-1.021	-1.172	0.241	-0.026	0.008	0.930
No. of Family Members	-0.605	-1.054	0.292			
Religion	2.535	-11.659	<0.001	0.592	10.896	0.001
Economic status of family in village	-4.507	3.571	<0.001	-0.498	21.929	<0.001
Community Stress and Problems score	0.139	4.718	<0.001	0.027	10.110	0.001