

A micro-level explanation for suicidal intention based on marriage-squeeze and social support among rural men in China

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Abstract

Background.

Higher sex ratio at birth often lead to gender imbalance and a severe squeeze on the marriage market. Currently, no systematic studies have examined the relationship between marriage squeeze and suicidal intention among rural men in a context of marriage squeeze.

Methods.

Using surveys conducted in Chaohu (Anhui Province) and Ankang (Shaanxi Province) in China, this study analyzed the impact of marriage squeeze and social support on suicidal intention among rural men.

Results.

The perceived marriage squeeze significantly and positively affected suicidal intention among married and unmarried rural men and that perceived social support negatively affected suicidal intention among married and unmarried men. Objective social support did not significantly affect suicidal intention among married men; however, it negatively affected suicidal intention among unmarried men.

Conclusions.

Marriage squeeze increased the possibility of suicidal intention among rural men, but perceived social support acted as a protective factor against suicidal intention. These findings agree with the main effect hypothesis of social support. Thus, objective social support is a double-edged sword, which may increase suicidal intention rates among rural men. The article ends with the limitations of this study and future directions for further research.

Background

Beginning the 1980s, due to son preference and the widely used B-ultrasound technology, China began to experience its highest and widest ranges in terms of imbalance in sex ratios at birth. In 2005, it reached the peak of 120.56, before declining slowly. The sex ratio at birth in 2016 was still around 113 (Beijing Morning Post, 2017). Higher sex ratio values at birth often lead to gender imbalance when the affected generation reaches adulthood, thus causing a severe squeeze on the marriage market (Jiang et al., 2014). It has been estimated that, post-2000, about 10% of surplus men in China experienced difficulty in finding marriage partners each year the total surplus men in China will reach 33 million at the end of 2014 (Sina, 2014). Due to the existence of a universal marriage system and hypergamy marriage model, most marriage-squeezed men live in rural and remote areas. Most of them have remained in economic poverty,

face a relative lack of social resources, and face difficulties in finding marriage partners; their situation often exposes them to dual pressures from family and society (Wei et al., 2008).

Noteworthy, though the overall Chinese suicide rate has declined sharply, the suicide rate of rural men has declined less sharply. Consequently, China has the highest suicide rate for rural men. Data from the China Health Statistics Yearbook revealed that, in 2016, the suicide rate among rural men was 9.31/100,000, and that among rural women was 6.87/100,000. The suicide rate among urban women was 4.15/100,000, and that among urban men was 5.62/100,000. The suicide rate among rural men is significantly higher than other groups. Thus, Chinese rural men are now a key group for conducting research and interventions on suicide.

Is a higher suicide rate among rural men in China associated with the marriage squeeze and the resulting pressures this demographic faces? What kind of social support could help them reduce their suicidal intention and get rid of suicidal shadow? Currently, no systematic studies have examined this issue. Therefore, The purpose of this study is to explore the relationship between marriage squeeze and suicidal behaviors of rural men by looking at the micro consequences of marriage squeeze, and to find possible ways to reduce suicidal behaviors of rural men.

Literature Review

Explanations for suicidal behavior

Early studies that sought to explain suicide mainly adopted two approaches: the psychiatric and psychological perspectives. This led to the emergence of neurobiological studies on suicide. It was believed that suicide has a strong neurobiological factor and that this factor is directly affected by the quantity of certain substances in an individual's body. Therefore, with regard to measuring the mental health of people who commit suicide, the difference between physiological indicators and biological factors should be considered (Statham, 1998). Later, psychological studies on suicide broke new ground in psychiatry and advocated the inner activity of suicides as the research object. A hypothesis was proposed that the inner activity of people who commit suicide should be adopted as the research object (Zhou, 2014). Subsequently, people gradually realized social environment's impacts on suicide, and suicide as an issue also attracted an increasing amount of attention from sociologists; the work of the famous 19th-century French sociologist Émile Durkheim (1999) represents one example of sociological studies on suicide.

Chinese sociological scholars attempted to explain Chinese suicidal behavior by using localized concepts and theories. For example, Wu proposed the theory of "living" and argued that, in the process of living, people become vulnerable to experiencing emotional setbacks, grievances, and injustices within the family, and this results in feelings of failure with regard to "living," which eventually lead individuals to commit suicide (Wu, 2007a, 2007b, 2009).

Jing's theory, which examined the association between migration and suicide, suggested some reasons for suicides among rural women in China. He believed that migration helped rural women avoid three previous suicide risks, including the subordinate status of women in the family, family disputes, and certain tools that could assist in suicide (Jing, 2010). Zhangjie and Jing Jun et al. (2011) proposed the "strain theory of suicide" to explain the psychological mechanism that operates before the commission of suicide. They suggested that suicide is a rational choice. When the cost of living exceeds the reward of living, suicide can occur. Liu's research utilized the theory of consanguinity connectivity and degree of rule's maintaining and controlling to analyze the differences of peasant suicidal behavior and its causes. He suggested that "consanguinity connectivity" determines whether a suicide is an "egoism suicide" or an "altruistic suicide" and that the degree of "rule's maintaining and controlling" determines whether a suicide is a "despairing suicide" or a "vengeful suicide" (Liu et al., 2014, Liu, et al., 2014).

Family stress and suicide

Family stress refers to a certain degree of variation in the family system, which is caused by various life events or situations. Such variations are related to situations where expected norms for system operation are inconsistent (McCubbin et al., 1995). Sources of such stress may include macro-environmental changes outside the family, such as globalization, sociocultural changes, social transformation, and so on. These may also include changes in the internal structures and functions of the family, such as stress events, changes in the family life cycle, and so on (McCubbin et al., 1995; Plunkett, Carolyn, & Kuaub, 1999). Gender imbalances in society can reduce rural men's marriage chances, and they may thus become "squeezed" by the marriage market. Rural men who face difficulties in finding a marriage partner are also often subjected to double discrimination by their society and families, and this situation could generate family stress for these men (Wei et al., 2008).

Family stress can significantly affect the physical and mental health of individuals and the order and harmony of families. Studies have shown that excessive family stress can lead to many problems, including insomnia, induced hypertension, anxiety, depression, and so on. In severe cases, it may even lead to drug abuse, crime, and suicide (Vas J S, 2013). Families that are subjected to excessive stress are vulnerable to marital violence, and even families with higher marital satisfaction may still experience mental violence under conditions that produce family pressures (Yang, 2018). Family stress thus has serious negative effects on individuals and families, which, in turn, may lead to suicidal behavior (Yoder & Hoyt, 2005).

Studies have found that rural men who have experienced gender imbalances and marriage squeezes can become vulnerable to family stress, but no studies have examined the relationship between family stress and suicidal behavior among rural men in further depth. According to existing research, we can infer that, in China, gender imbalances and marriage squeezes can produce stress in rural families, which, in turn, can further affect suicidal behavior among rural men.

Social support and suicide

Experimental studies on human beings and animals have found that social isolation is a risk factor for suicide death (House et al., 1988). The French sociologist Durkheim pointed out that loss of social relations was one of the important factors leading to suicide (Shi et al., 2003). While exploring the relationship between social support and suicide behaviors among rural residents, Lu Changfei et al. (2011) found that the scores for social support were lower among suicidal groups compared to those for the control group. It has been found that, among rural residents, high objective support and social support utilization are protective factors against suicidal behaviors (Lu et al., 2011). Simultaneously, family members and neighbors are the main sources of support for rural people. The factors that influenced social support were marriage, living alone, family economic status, education levels, and health status.

Li (2011) found that social support networks did not significantly influence life satisfaction among forced bachelors in rural areas, but emotional support networks could alleviate their depressive symptoms. At the same time, Li (2015) also found that marital status had one significant effect on the scale of rural men's social support networks. Married men had larger social support networks compared to unmarried men. Thus, lack of marriage led to reduced emotional support among unmarried men. Forced bachelors had weaker social capital, in terms of social support networks, than married men (Li, 2010). Therefore, how do marriage-squeezed men in rural areas who are facing family stress perceive social support? Is it a buffer or a main effect model for reducing suicidal intention? Currently, no research studies have tried to answer this question.

Data

This study's utilized data were taken from two large-scale surveys, which were conducted in July 2014 and January 2015 among rural men.

Step 1: A survey on rural men's family and living conditions in Ankang (Shaanxi Province)

The study research team traveled to the Hanbin District in Ankang (Shaanxi Province) to administer the "Survey on rural men's family and living conditions" in July 2014. Ankang is a city that shares borders with Shaanxi, Sichuan, Hubei, and Anhui Provinces. Therefore, it has the characteristics of all four provinces. Hanbin District could be considered as a "microcosm" of Ankang in terms of its history and administrative areas, which could be said to represent the western regions of China. By the end of 2012, the resident population of Hanbin District had reached 870,000, and the total sex ratio reached 114.

The study's survey adopted a stratified sampling method to extract 7 townships from among 30 townships and streets in Hanbin District based on their economic development level. Next, with the coordination and cooperation of local governments, random sampling method was utilized to sample the target population from each township: Unmarried people aged 20-28 years, unmarried people aged over 28 years, married people aged 20-28 years, and married people aged over 28 years. A total of 1032 questionnaires were distributed as part of this survey; 1017 questionnaires were returned (return rate:

98.55%). After data cleaning procedures such as logic detection and missing value processing were completed, 998 questionnaires were finally deemed valid, and the effective recovery rate was 96.71%. At the same time, in the overall effective sample, there were 104 unmarried samples aged 20-28 years, 77 unmarried samples aged over 28 years, 45 married samples aged 20-28 years, and 772 married samples aged over 28 years.

Step 2: A survey on rural men's family and living conditions in Chaohu (Anhui Province)

Based on previous survey experience in Ankang, the research team conducted their "Survey on rural men's family and living conditions in Chaohu (Anhui Province)" in January 2015. Anhui Province has a large population. Chaohu, which has medium economic development, is located in the central region of Anhui. In 2013, the resident population of Chaohu was 782,000, and the sex ratio was 106.32.

Based on the level of economic development of Chaohu, the survey used a stratified sampling method to divide 18 towns and streets that came under the jurisdiction of Chaohu into four "grades." One township was then selected from each grade, and 6 administrative villages were randomly selected from each township. Based on marital status and an age limit of 28 years, the study team decided to sample 9-12 unmarried/married men aged 20-28 years and 9-12 unmarried/married men aged 28-65 years from each administrative village. Finally, 42-46 surveyed subjects were validated for the final sample. With the cooperation of the local population and the family planning department, the survey gathered the surveyed subjects of each village in their village committees. Before the investigation, the investigators explained the principles of privacy protection to them and obtained their consent. After that, the surveyed subjects filled out questionnaires, which were then collected; furthermore, gifts were provided to them on the spot. This survey study obtained 1053 samples, of which 56.03% were married men, 43.97% were unmarried men, 37.23% were aged under 28 years, and 62.77% were aged 28 years and above.

Variable Measurement

Suicidal intention. Suicidal behavior is difficult to measure, so the research team used suicidal intention rather than actual suicidal behavior to conduct this research. Suicidal intention refers to the mental intention of ending one's own life; this can range from occasionally experiencing suicidal thoughts to, more seriously, planning and preparing for suicide (Rachman, 1980). It is an important indicator for assessing suicide risk (Rachman, 1980). This study used the Self-rating Idea of Suicide Scale (SIOSS) to measure rural men's suicidal intention. The scale used for this study was compiled by Xia Chaoyun in 2001, and it has good reliability and validity. It contains 26 items with the answers "yes" or "no." Some answers are scored with "yes," and some answers are scored with "no." The scale includes four factors: despair factor, optimistic factor, sleep factor, and masking factor. The masking factor is greater than or equal to 4 and the measurement of scale is unreliable. The total scores of the despair factor, optimistic factor, and sleep factor, is the total score of suicidal intention. When the total score of suicidal intention is greater than or equal to 12 points, that intention is proved to be suicidal. A higher score indicates a higher degree of despair, lesser optimism, and the psychological characteristics of sleep disorders. The internal

consistency test showed that the Cronbach's α value of the scale in the survey population was 0.743, thus indicating a good reliability.

Perceived marriage squeeze. Marriage squeeze is a macro-level indicator, so it is difficult to measure at the individual level. The existing theory of social psychology reveals that individuals have different subjective cognitions and perceptions regarding macro-level environments, and this leads to different decisions and behaviors of individuals. Therefore, this study utilized the concept of the perceived marriage squeeze to measure the degree of marriage squeeze perceived at the individual level'. The study found that marriage squeeze not only caused rural men to feel that marriage was difficult, but it also caused rural men to experience various marriage-related pressures. Therefore, based on rural men's personal perceptions, this study used different difficulty levels with regard to getting married and the marital stress scale to measure perceived marriage squeezing at the individual level in rural societies.

Difficulty levels related to getting married. This is measured by asking "Do you think that it will be difficult for you to get married?" This variable adopts a Likert 5-point scale ("1=very easy"; '5=very difficult"). A higher score indicated a higher perceived marriage squeeze.

Marriage stress scale. In accordance with existing research on the characteristics of rural men and the special background of marriage squeeze, this study proposed a marriage stress scale based on Wei's (2008) qualitative interviews with forced bachelors in rural areas. This scale was used to conduct psychometric assessments, and it had good reliability and validity. The scale consists of all 11 items by asking, "Do you worry about the following issues related to marriage?" The options for each question included four choices: 1 = never worry, 2 = occasionally worried, 3 = sometimes worried, and 4 = often worried. The scores for the marriage stress scale were summed based on each score for each item. A higher score indicated greater individual-level marriage stress and a more serious impact on the individual. In order to evaluate the internal consistency of the marriage stress scale, this study conducted a reliability analysis; results showed that the Cronbach's α value of the scale was 0.892, thus indicating that the marriage stress scale had good reliability. This marriage stress scale covers many aspects of family life among rural men, including economic pressures, pressures in daily life, emotional pressures, pressures related to old-age support, pressures related to inheritance, and so on. It is important to note that, because of the differences, in terms of marriage-related stresses, between married and unmarried men, this study utilized different question methodologies for the two groups.

Perceived social support scale. This study used the perceived social support scale (PSSS) to measure subjective social support. The scale was revised by Jiang Ganjin, which was based on Zimet's perceived Social Support Scale, which was introduced by Blumenthal et al. (1987). This study changed "leaders, relatives, and colleagues" to "relatives and neighbors" based on the research object. The scale includes 12 questions, which are divided into three dimensions: family support, friend support, and other support. Each item was measured with a Likert 5-point scale (range: "1 = strongly agree"; "5 = strongly disagree"). The total score for perceived social support was calculated as the sum of the scores for each question. A higher score indicated more perceived social support and a better emotional experience. Internal

consistency testing of the scale showed that the Cronbach's α value for the scale, as tested within the survey population, was 0.912, thus indicating a good reliability.

Objective social support. Using Van der Pul's social support questionnaire and considering the group characteristics of rural males, this study utilized a function perspective to measure three dimensions of social support: instrumental support, emotional support, and interpersonal support.

Instrumental support refers to practical and specific help, including physical, financial, and service-related, and it was measured by asking the following question: "If you want to borrow something (such as money, sugar, pliers, and so on) or ask someone to help you do small things outside the house (such as moving things, buying everyday items, and so on), which of the following persons would you usually ask for help?"

Emotional support involves emotional aspects such as comforting, listening, caring, communicating, and so on. It was measured by asking the following question: "If you are in a bad mood because of some problems, such as quarreling with people or because life is not smooth, who would you often talk to?"

Interpersonal support refers to communication-related aspects, such as providing companionship, meeting the needs of interpersonal communication, and so on. It was measured by asking the following question: "If you want to chat, drink, play cards, watch movies, or do some other activity, who do you usually turn to?"

This study also utilized a structural perspective to measure the different functions of social support. In traditional rural societies, kinship is the most important component of social relations. However, as times have changed, unrelated relationships have become increasingly important, providing different resources to individuals. Therefore, this study explored the impact of unrelated relationships on suicidal intention. First, this study questioned respondents on trusted persons, whom they could approach for help or interaction, in three scenarios: family, relatives, villagers, friends, leaders, colleagues, netizens, and others. Among these, family members and relatives were classed as "relatives," and villagers, friends, leaders, colleagues, netizens, and others were classed as "non-relatives." To facilitate these measurements, this study divided all the actual support dimensions, emotional support dimensions, and interpersonal support dimensions into two categories: "having non-relatives" and "not having non-relatives." These were categorical variables.

Control variable. This study adopted variables such as age, marital status, education level, and income status, as its control variables. Among these, age was measured using the following range: 0=28 years old, 1=28 years old and above; marital status was measured using the following range: 0=married (have marital status), 1=unmarried (not have marital status); education level was measured using the following range: 1 = primary and below, 2 = junior high school and 3 = high school and above"; and income status was measured using the following range: 1 = less than 10,000, 2 = 10000-30000, 3 = more than 30,000.

Furthermore, considering the differences, in terms of economic development, cultural atmosphere, and folk customs, between the central (represented by Chaohu, Anhui) and the western (represented by Ankang, Shaanxi) regions, it can be assumed that these differences will have different effects on rural individuals. Therefore, this study utilized the following range to measure the area: 0 = central region; 1 = western region.

Analysis strategy.

This study utilized Epidata software to enter and clean the survey data.

During descriptive analysis, analysis methods such as cross-tabulation analysis, chi-square test, and independent sample T test were adopted to describe the status of suicidal intention, family stress, and social support. Furthermore, differences, in terms of suicidal intention, family pressure, and social support, were also compared between different groups living in different areas and having different marital statuses.

To analyze the impacts of family stress and social support on rural men's suicidal intention, this study constructed a multi-level linear regression model. The Binary logistic regression analysis was adopted with "suicidal intention" as the dependent variable and "marriage squeeze" and "family stress" as independent variables; next, "perceived social support" was included in the model as an independent variable, and "instrumental support," "emotional support," and "interpersonal support" were included in the model as independent variables. Finally, control variables were included in the model.

Results

Descriptive analysis

Table 1 presents a comparison of suicidal intentions among rural men living in different regions and having different marital statuses. As shown in Table 1, rates of suicidal intention among rural men in the western region (21.2%) were significantly higher than those of rural men from the central region (11%) ($\chi^2=36.175$, $p<0.001$). There was no significant difference, in terms of suicidal intention, between married and unmarried rural men. The rates of suicidal intention among unmarried rural men in the central region (14.4%) were significantly higher than those of married rural men (8.1%) ($\chi^2=9.316$, $p<0.01$). There was no significant difference, in terms of suicidal intention, between married and unmarried men in rural areas in the western region.

Table 1
A comparison of suicidal intention among rural men in different regions and marital status

	Central region (represented by Chaohu, Anhui)		Western Region (represented by Shaanxi, Ankang)	
	Frequency	Percentage	Frequency	Percentage
No suicidal intention	830	89	774	78.8
Having suicidal intention	103	11	208	21.2
χ^2 test	$\chi^2 = 36.175^{***}$			
	Married		Unmarried	
	Frequency	Frequency	Frequency	Frequency
No suicidal intention	1100	84.3	489	82.7
Having suicidal intention	205	15.7	102	17.3
χ^2 test	$\chi^2 = 0.720$			
	Central region (represented by Chaohu, Anhui)		Western Region (represented by Shaanxi, Ankang)	
	married(N=509)	unmarried(N=411)	married(N=796)	unmarried(N=180)
No suicidal intention	468(91.9)	352(85.6)	632(79.4)	137(76.1)
Having suicidal intention	41(8.1)	59(14.4)	164(20.6)	43(23.9)
χ^2 test	$\chi^2 = 9.316^{**}$		$\chi^2 = 0.949$	

Note: ***p<0.001, **p<0.01, *p<0.05, +p<0.1

Table 1 [here](#)

Table 2 presents comparisons, in terms of difficulty levels for getting married and marriage stress, among rural men who live in different regions and have different marital statuses. As shown in Table 2, the scores obtained for difficulty levels for getting married (3.26) and marriage stress (23.72) among rural men in the central region were significantly higher than those in the western region (2.99; 21.38) ($t=3.599$, $p<0.001$; $t=-6.959$, $p<0.001$). The average score obtained for difficulty levels for getting married and marriage stress among unmarried men in the central region (3.58; 23.05) were significantly higher than those among married men in the central region (1.81; 19.95) ($t=11.69$, $p<0.001$; $t=-6.483$; $p<0.001$).

Unmarried men's average score with regard to difficulty levels for getting married in the western region (3.41) was significantly higher than that among married men in the western region (2.92) ($t=-5.74$, $p<0.001$). However, there were no significant differences in the scores obtained for marriage pressure.

Table 2

Comparison on perceived marriage squeezes among rural men in different regions and marital status

	Central region (represented by Chaohu, Anhui)		Western Region (represented by Shaanxi, Ankang)	
	Mean	Standard deviation	Mean	Standard deviation
The level of difficulties for getting married	3.26	1.10	2.99	0.96
t test	t=3.599***			
Marriage pressure	21.38	7.74	23.72	7.57
t test	t=-6.959***			
	Married		Unmarried	
	Mean	Standard deviation	Mean	Standard deviation
The level of difficulties for getting married	2.87	0.94	3.54	1.11
t test	t=13.544***			
Marriage pressure	22.21	7.3312	23.21	8.5241
t test	t=-2.598**			
	Central region (represented by Chaohu, Anhui)		Western Region (represented by Shaanxi, Ankang)	
	Married	Unmarried	Married	Unmarried
The level of difficulties for getting married	1.81(0.95)	3.58(1.13)	2.92(0.93)	3.41(1.04)
t test	t=11.69***		t=5.74***	
Marriage pressure	19.95(6.49)	23.05(8.69)	23.76(7.48)	23.62(8.06)
t test	t=-6.483 ***		t=0.231	

Note: ***p<0.001, **p<0.01, *p<0.05, +p<0.1

Table 2 here

Table 3 presents the comparison results regarding perceived social support among rural men living in different regions and having different marital statuses. As shown in Table 3, overall perceived social support among rural men in the western region was better than that in the central region, and their average scores for support from friends, families, relatives, and neighbors were significantly higher than those in the central region. Married men's scores for perceived social support were better than those among unmarried men, and their average scores for support from friends, families, relatives and neighbors were also significantly higher than those among unmarried men.

Table 3

Comparison of perceived social support among rural men in different regions and marital status

	Central region		Western Region	
	Mean	Standard deviation	Mean	Standard deviation
Perceived social support	45.9171	7.53623	47.3214	7.10004
t test	t=-4.361***			
	Central region		Western Region	
	Mean	Standard deviation	Mean	Standard deviation
Friends' support	15.0279	2.79947	15.2799	2.83739
t test	t=-2.034*			
Families' support	15.7621	2.81705	16.1404	2.59045
t test	t=-3.177**			
Relatives and neighbors' support	15.1270	2.73442	15.9010	2.53994
t test	t=-6.667***			
	Married		Unmarried	
	Mean	Standard deviation	Mean	Standard deviation
Perceived social support	47.1357	7.14150	45.5136	7.73568
t test	t=4.666***			
	Married		Unmarried	
	Mean	Standard deviation	Mean	Standard deviation
Friends' support	15.2823	2.77986	14.8960	2.89592
t test	t=2.851**			
Families support	16.1108	2.59934	15.6046	2.92734
t test	t=3.944***			
Relatives and neighbors' support	15.7427	2.60573	15.0130	2.75812

Note: ***p<0.001, **p<0.01, *p<0.05, +p<0.1

	Central region		Western Region	
	Mean	Standard deviation	Mean	Standard deviation
t test				t=5.681***
Note: ***p<0.001, **p<0.01, *p<0.05, +p<0.1				

Table 3 here

Table 4 presents a comparison of objective social supports among rural men living in different regions and having different marital statuses. As shown in Table 4, objective social support rates for rural men in the western region were better than those in the central region. Simultaneously, the rate of non-relatives who provided instrumental support, emotional support, and interpersonal support in the western region was significantly higher than that in the central region. Furthermore, objective social support rates for married men were slightly better than those for unmarried men, and the rates of support that married men received from non-relatives were significantly higher than those provided to unmarried men.

Table 4
Comparison of objective social support of rural men in different regions and marital status

		Central Region		Western Region		
		Frequency	Frequency	Frequency	Frequency	
Tool support	No non-relatives	199	19.4	99	10.1	
	Having non-relatives	826	80.6	883	89.9	
	χ^2 test	$\chi^2 = 34.553^{***}$				
Emotional support	No non-relatives	306	30	131	13.3	
	Having non-relatives	715	70	851	86.7	
	χ^2 test	$\chi^2 = 81.162^{***}$				
Social interaction	No non-relatives	132	12.9	99	10.1	
	Having non-relatives	889	87.1	883	89.9	
	χ^2 test	$\chi^2 = 3.977^*$				
			`Married		Unmarried	
			Frequency	Frequency	Frequency	Frequency
Instrumental support	No non-relatives		181	13.4	115	18
	Having non-relatives		1165	86.6	525	82
	χ^2 test		$\chi^2 = 6.992^{**}$			
Emotional support	No non-relatives		295	22	139	21.8
	Having non-relatives		1048	78	500	78.2
	χ^2 test		$\chi^2 = 0.011$			
Interpersonal support	No non-relatives		153	11.4	75	11.8

Note: ***p<0.001, **p<0.01, *p<0.05, +p<0.1

	Having non-relatives	1192	88.6	562	88.2
	χ^2 test	$\chi^2 = 0.067$			

Note: ***p<0.001, **p<0.01, *p<0.05, +p<0.1

Table 4 here

Regression analysis results

Table 5 presents the results of the regression analysis on perceived marriage squeeze and social support on married rural man suicidal intention. As shown in Table 5, difficulty levels related to getting married and marriage stress had a significant positive effect on suicidal intention among rural men (1.563, $p<0.001$; 1.079, $p<0.001$) in Model 1. This shows that higher difficulty levels for getting married were associated with greater marriage stress and, consequently, higher suicidal intention among married rural men.

Table 5

Impacts of perceived marriage squeeze and social support on suicidal intention among married men in rural areas

Dependent variable	Model 1	Model 2	Model 3	Model 4	Model 5
Suicidal intention (reference: none)					
Independent variable					
The level of difficulties for getting married	1.563***	1.542***	1.574**	1.523***	1.547***
Marriage pressure	1.079***	1.082***	1.081***	1.078***	1.075***
perceived social support		0.968+	0.969+	0.959*	
Families' support					1.029
Friends' support					1.026
Relatives' and neighbors' support					0.819**
Objective social support					
Instrumental support (reference: no non-relatives)					
Having non-relatives			1.078	1.068	1.022
Emotional support (reference: no non-relatives)					
Having non-relatives			1.235	1.249	1.319
interpersonal support (reference: no non-relatives)					
Having non-relatives			0.670	0.812	0.795
Control variables					

Note: ***p<0.001, **p<0.01, *p<0.05, +p<0.1

Dependent variable	Model 1	Model 2	Model 3	Model 4	Model 5
Suicidal intention (reference: none)					
Age (reference: Under 28 years old)					
28 years old and above				0.711	0.740
Education (reference: primary school and below)					
Junior high school				0.710	0.690
Senior High school and above				0.469*	0.437*
Annual income (reference: less than 10,000)					
10000-30000				0.902	0.932
More than 30,000				0.697	0.719
region(reference:Central region)					
Western region				1.544	1.705
-2 Log Likelihood	460.692***	457.198***	445.657***	411.609***	406.571***
Cox & Snell R²	0.101	0.106	0.111	0.135	0.142
Nagelkerke R²	0.177	0.185	0.194	0.237	0.250
Note: ***p<0.001, **p<0.01, *p<0.05, +p<0.1					

When perceived social support was included as a variable in Model 2 (based on Model 1), the impacts of perceived marriage squeeze variables on suicidal intention remained unchanged in terms of direction, coefficient size, and significance, as compared with that of Model 1; furthermore, perceived social support variables had a negative impact on suicidal intention with a significance level of 0.01 (0.968, p<0.1). This indicated that a higher level of perceived social support helped to reduce suicidal intention among married men in rural areas.

When the three objective social support-related variables were included in Model 3 (based on Model 2), the previous impacts on suicidal intention from variables such as perceived marriage squeeze and perceived social support remained unchanged in terms of direction coefficient size, and significance, while the three objective social support-related variables had no significant impacts on suicidal intention.

When the control variables were included in Model 4 (based on Model 3), the impacts of perceived marriage squeeze, perceived social support, and objective social-related support variables on suicidal intention remained unchanged in terms of direction, coefficient size, and significance, as compared to that in Model 3. Among the newly added control variables, only education level had a significant negative impact on suicidal intention: the scores for suicidal intention among married men with senior high school-level education qualifications and above were significantly lower than those for unmarried men with primary school-level education qualifications and below (0.469, $p < 0.5$).

Model 5 is based on Model 4 by subdividing the total score of the social support variables into three dimensions. The impacts of variables such as perceived marriage squeeze, objective social support, and control variables on suicidal intention were almost unchanged in terms of directions, coefficient size, and significance, as compared to those in Model 4. It was found that, among the three dimensions of perceived social support, only relatives' and neighbors' support could significantly reduce suicidal intention among married men (0.819, $p < 0.05$).

Table 5 Impacts of perceived marriage squeeze and social support on suicidal intention among married men in rural areas

Dependent variable	Model 1	Model 2	Model 3	Model 4	Model 5
Suicidal intention (reference: none)					
Independent variable					
The level of difficulties for getting married	1.563***	1.542***	1.574**	1.523***	1.547***
Marriage pressure	1.079***	1.082***	1.081***	1.078***	1.075***
perceived social support		0.968+	0.969+	0.959*	
Families' support					1.029
Friends' support					1.026
Relatives' and neighbors' support					0.819**
Objective social support					
Instrumental support (reference: no non-relatives)					
Having non-relatives			1.078	1.068	1.022
Emotional support (reference: no non-relatives)					
Having non-relatives			1.235	1.249	1.319
interpersonal support (reference: no non-relatives)					
Having non-relatives			0.670	0.812	0.795
Control variables					
Age (reference: Under 28 years old)					
28 years old and above				0.711	0.740
Education (reference: primary school and below)					
Junior high school				0.710	0.690
Senior High school and above				0.469*	0.437*

Annual income (reference: less than 10,000)					
10000-30000				0.902	0.932
More than 30,000				0.697	0.719
region(reference:Central region)					
Western region				1.544	1.705
-2 Log Likelihood	460.692***	457.198***	445.657***	411.609***	406.571***
Cox & Snell R²	0.101	0.106	0.111	0.135	0.142
Nagelkerke R²	0.177	0.185	0.194	0.237	0.250

Note: ***p<0.001 **p<0.01 *p<0.05 +p<0.1

Table 5 here

Table 6 presents regression analysis results for perceived marriage squeeze and social support with regard to suicidal intention among unmarried men in rural areas. As shown in Table 6, the difficulty levels for getting married (OR=1.870, p<0.001) and marriage stress (OR=1.059, p<0.001) had a significant positive impact on suicidal intention. This indicated that unmarried men with higher difficulty levels for getting married and higher marriage stress had higher suicidal intention.

The perceived social support variables were included in Model 7 (based on Model 6). The impacts of the perceived marriage squeeze variables on suicidal intention remained unchanged in terms of direction, coefficient size, and significance. The newly added perceived social support variables had a significant negative impact on suicidal intention (OR=0.962, p<0.05). This indicated that perceived social support could effectively reduce suicidal intention among unmarried men.

The objective social support variable was included in Model 8 (based on Model 7). The impacts of the marriage squeeze and objective social support variables on suicidal intention remained unchanged in terms of direction, coefficient size, and significance. Among the newly added objective social support variables, only interpersonal support had a significantly positive impact on suicidal intention (OR=2.284, p<0.1).

The control variables were included in Model 9 (based on Model 8). The impacts of the marriage squeeze, perceived social support, and objective social support variables on suicidal intention remained almost unchanged in terms of direction, coefficient size, and significance. Among the newly added control variables, only region had a significantly positive effect on suicidal intention (OR=3.957, p<0.001).

The scores obtained for the three dimensions of perceived social support were included separately in Model 10 (based on Model 9) instead of the total scores. The impacts of the marriage squeeze and marriage stress variables on suicidal intention remained almost unchanged in terms of direction,

coefficient size, and significance. The impacts of difficulty levels for getting married on suicidal intention remained almost unchanged in terms of direction and significance, but the coefficient size increased (OR=2.038, $p<0.001$). Among the perceived social support-related variables, only family support had a significant negative impact on suicidal intention (OR=0.854, $p<0.1$). Among objective social support variables, the impact of interpersonal support on suicidal intention remained unchanged in terms of direction, but both the coefficient size and significance increased (OR=3.124, $p<0.05$). Among the control variables, the impacts of region on suicidal intention remained unchanged in terms of direction and significance, but the coefficient size increased (OR=4.203, $p<0.01$).

Table 6 here

Table 6

Impacts of perceived marriage squeeze and social support on suicidal intention among unmarried men in rural areas

Dependent variable	Model 6	Model 7	Model 8	Model 9	Model 10
Suicidal intention (reference: none)					
Independent variable					
The level of difficulties for getting married	1.870***	1.821**	1.905***	1.992***	2.038***
Marriage pressure	1.059***	1.059***	1.057**	1.058**	1.059**
perceived social support		0.962*	0.959*	0.948**	
Families' support					0.854+
Friends' support					1.132
Relatives' and neighbors' support					0.879
Objective social support					
Instrumental support (reference: no non-relatives)					
Having non-relatives			0.712	0.569	0.580
Emotional support (reference: no non-relatives)					
Having non-relatives			1.205	0.865	0.775
interpersonal support (reference: no non-relatives)					
Having non-relatives			2.284+	2.957+	3.124*
Control variables					
Age (reference: Under 28 years old)					
28 years old and above				1.657	1.742
Education (reference: primary school and below)					
☒: ***p<0.001, **p<0.01, *p<0.05, +p<0.1					

Dependent variable	Model 6	Model 7	Model 8	Model 9	Model 10
Suicidal intention (reference: none)					
Junior high school				1.580	1.531
Senior High school and above				1.162	1.040
Annual income (reference: less than 10,000)					
10000-30000				0.809	0.898
More than 30,000				0.732	0.697
region(reference:Central region)					
Western region				3.957***	4.203***
-2 Log Likelihood	325.769***	320.428***	311.019***	272.156***	266.783***
Cox & Snell R²	0.128	0.142	0.155	0.203	0.216
Nagelkerke R²	0.195	0.216	0.234	0.310	0.330
☒: ***p<0.001, **p<0.01, *p<0.05, +p<0.1					

Discussions

The descriptive results showed that there were significant regional differences, in terms of suicidal intention, between the western region, which had a higher suicidal intention rate, and the central region. There was no significant difference, in terms of suicidal intention, between rural men with different marital statuses. In the central region, unmarried men had a higher suicidal intention rate than married men. Among all the sampled groups, unmarried men from the western region had the highest suicidal intention; married men from the western region had the second highest rate in this respect, and married men in the central region had the lowest suicidal intention.

In terms of perceived marriage squeeze, rural men from the western region faced more difficulties in finding marriage partners compared to rural males from the central region; however, they had lower marriage stress levels than rural men in the central region. The difficulty levels for getting married and marriage stress were higher among unmarried men compared to those among married men. Perceived social support and objective social support variables were generally better among rural men in the western region compared to those in the central region. Perceived social support and objective social support variables were generally better among married men than those among unmarried men. Among all the sampled individuals, unmarried men in the central region had the highest degree of marriage-related

difficulties; unmarried men in the western region were ranked second in this regard; and married men in the central region had the lowest degree of marriage difficulties. Married and unmarried men from the western region, and unmarried men from the central region had the same marriage stress, while married men from the central region had the lowest levels of marriage stress.

The regression analysis results suggested that perceived marriage squeeze variables had a significant positive impact on suicidal intention among married and unmarried men wherever they were from; that is, among rural men, a greater level of perceived marriage squeeze and marriage stress was associated with a higher probability of having suicidal intentions. When other variables were added into models, the impact of marriage squeeze on suicidal intention did not undergo any significant changes in terms of direction, coefficient size, and significance. This result showed that the marriage squeeze variable had a net impact on suicidal intention; this result is consistent with previous inferences and existing research findings. In his book “Le Suicide,” the French sociologist Durkheim confirmed the relationship between marriage and suicide and found that the suicide rate was significantly lower among married people compared to unmarried people; his findings indicated the protective effect of marriage against suicidal behavior (Durkheim, 1999; Feng, 2015). This finding also helped to explain that the difficulty level **related to** getting married and marriage pressure, which are reflected by perceived marriage squeeze, may lead to higher suicidal intention from another perspective.

Perceived social support had a negative impact on suicidal intention among married and unmarried men; this effect was independent from the impacts of the marriage squeeze variables on suicidal intention. This indicates that perceived social support among married and unmarried men was consistent with the main effect model and that it was also consistent with some of the findings (Liu, 2010; Yu et al., 2018). However, the buffer effect in other studies was not verified (Han et al., 2014; Liu et al., 2015).

The possible explanation for the unverified buffer effect is that difficulty levels for getting married and marriage stress are considered as states of life. They are not regarded as negative life events by the respondents, and this makes it difficult to reflect the buffering and regulating effect of perceived social support on feelings of marriage squeeze.

Perceived social support provided by relatives and neighbors can help married men reduce their suicidal intention, and families’ support can help unmarried men reduce their suicidal intention; these findings agree with the research team’s expectations and are consistent with existing research results (Chen et al., 2008; Zhao et al., 2011). While objective social support did not have any significant impact on suicidal intention among married men, interpersonal support had a significant positive impact on suicidal intention among unmarried men—namely, that, for this group, increased interpersonal support was associated with a higher suicidal intention rate. This seems to be illogical. However, studies have pointed out that interpersonal support is actually a double-edged sword, which can improve people’s psychological welfare but also expose individuals to interpersonal pressures, which, in turn, can have a negative impact on psychological welfare (Costanza & Derlega, 1988; Hagihara, Tarumi, & Nobutomo, 2003).

Rural unmarried men are facing a pressure imposed by marriage squeeze, which is significantly higher than that faced by rural married men. In this case, interpersonal support may impose greater interpersonal pressure on unmarried men, thus leading to lower psychological welfare and increased suicidal intention (Wang, Yang & Attane, 2018). Perceived social support often reflects the quality of received social support, while objective social support often reflects the quantity of received social support. These results show that the quality of social support is obviously more important than its quantity (Rock, Green & Wise et al., 2010). This finding provides an important insight for the design of interventions directed at rural men's suicidal behavior.

Among control variables, education level had a significant negative impact on suicidal intention among married men—namely, married men with senior high school-level education qualifications and above showed a significantly lower rate of suicidal intention compared to married men with primary school-level education qualifications and below. This finding agrees with findings from previous studies. A possible explanation for this finding is that a higher education level can help married men cope better with marriage stress, thereby improving their psychological welfare and reducing the possibility of suicidal intention (Li et al., 2009; Yao et al., 2010). The regions where the men lived significantly and positively affected rural unmarried men—namely, unmarried men in the western region showed a higher rate of suicidal intention compared to unmarried men from the central region; this finding agrees with existing research findings (Yang Gonghuan et al., 2004; Wang Dajiang, 2010). It also indicates that men from the western region experienced a more severe level of marriage squeeze; these men also faced higher difficulty levels for getting married and greater marriage stress, which, in turn, led to a higher rate of suicidal intention.

Conclusions

Based on these discussions, the study drew the following conclusions:

Conclusion 1: Marriage squeeze caused by sex imbalance increases the suicidal intention rate among married and unmarried men in rural areas, which, in turn, further leads to suicidal behavior. This may partly explain why the suicide rate for rural men did not show an obvious decline despite the general decline in suicide rates in China.

Conclusion 2: Perceived social support had a significant positive impact on suicidal intention among married and unmarried men in rural areas; furthermore, this impact existed independently from the impact of marriage squeeze. This shows that perceived social support's impact on rural men's suicidal intention was in accordance with the main effect model hypothesis. Support provided by relatives and neighbors, as part of perceived social support, could help reduce suicidal intention among married men, while family support helped to reduce suicidal intention among unmarried men.

Conclusion 3: Objective social support had no significant effect on suicidal intention among married men, but social interaction support increased suicidal intention among unmarried men. Thus, the impacts of social support quantity on psychological welfare and suicidal intention were uncertain; such support may

even have the negative effect in certain situations. The quality of social support is a protective factor against suicidal behavior and thus holds greater significance in this regard than social support quantity.

Conclusion 4: Education levels had a negative impact on suicidal intention among married men: those with a higher education level had lower suicidal intention rates. Region significantly affected unmarried men—namely, unmarried men in the western region had a higher suicidal intention rate than unmarried men in the central region.

However, this study had some limitations, including data limitations. This study aimed to determine whether marriage squeeze could lead to suicidal behavior among rural men, but because the data for suicidal behavior were difficult to obtain, this study utilized data for suicidal intention instead; therefore, the accuracy of the conclusion could be affected to some extent. Furthermore, the data covered representative areas from the central and western regions of China; however, it may not be possible to fully reflect the situation in the whole country through this approach. Follow-up studies should use national statistics to resolve this generalizability issue.

The second limitation was related to content. This study focused on the impact of marriage squeeze and social support on suicidal intention among rural men; however, it did not consider some other factors that could affect suicidal intention. Macro statistics show that, among all populations across all regions, rural people aged over 65 years had the highest suicide rate (Deng, 2014), but this population was not covered by the sample selected for this study. Thus, this study did not address some other important factors that could lead to suicide among rural elderly men. Follow-up future studies should be based on survey data in order to supplement such factors that better reflect social change and cultural context.

Declarations

Ethics approval and consent to participate. Written ethics approval was obtained from School of Public Policy and Management, Xi'an Jiaotong University (Protocol Number: 140701; approved on July 1, 2014). Participant Information Sheets and Consent forms were approved by the committee and in line with the standardized documents for the University. All participants were approached as healthy volunteers participating in different groups. All were deemed to have capacity to consent to participation and due to the fact that the study only included adults above 18, and all participants provided written informed consent for all aspects of the study. All methods from availability of data and material section to ethics approval and consent to participate section were carried out in accordance with human guidelines and regulations.

Consent for publication. Not Applicable..

Availability of data and material. All methods for collecting and analyzing data were carried out in accordance with human guidelines and regulations and all data used in this article are available. All data generated or analysed during this study are included in this published article (and its supplementary information file).

Competing interests. The authors (one of the authors named Xueyan Yang is a member of the editorial board of this journal) all declare that they have no competing interests.

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