

# Smoking behavior of “marriage squeezed” men and its impact on their quality of life: A survey study in China

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## Abstract

From the 1980s, along with the wide application of the “one-child policy” and new technologies for prenatal sex determination, China’s population has experienced a growing male population. China will thus face an increasingly serious male “marriage squeeze,” possibly resulting in decreased psychological and sexual well-being of involuntary bachelors, which, in turn, may result in decreased quality of life (QoL). This study used data from the Social Survey on Gender Role and Family Life, which was conducted from August 2014 to January 2015 in Shaanxi Province ( $N = 1,144$ ; 516 never-married and 628 married rural men). Descriptive analyses, crosstab analyses, and independent sample *t*-tests were used to compare the scores of three dimensions of QoL (physical and psychological health, and social relationships) and the overall QoL of rural men. Using the linear regression analysis method, this study analyzed involuntary bachelors’ smoking behavior and its impact on their QoL. Results indicate that smoking not only fails to alleviate the psychological or sexual problems of involuntary bachelors, it has an independent and negative impact on the physical and psychological health of married and never-married men, which negatively affects their overall QoL. Subjective and objective exposure to marriage squeeze negatively impacts three dimensions of QoL and overall QoL of married and never-married men; however, this influence was moderated by sexual satisfaction. In addition, sexual satisfaction positively affected the three dimensions of QoL and overall QoL of married and never-married men. Since involuntary bachelors may be a high-risk group, further research is warranted.

## Keywords

involuntary bachelors, quality of life, smoking behavior

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## Background

From the 1980s, along with the wide implementation of the “one-child policy” and new technologies for prenatal sex determination and excess female infant and child mortality, China’s population has experienced a growing female deficit in birth cohorts that are now reaching marriage age. Consequently, China will face an increasingly serious male “marriage squeeze.” According to the latest estimates, 33 million Chinese men of marriageable age could not find a female partner (Yang, Luo, & Feldman, 2017). Owing to women’s wishes for an upward social mobility through marriage and the increasing cost of

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marriage for men, men who face difficulties in getting married due to the sex imbalance in the marriage market are mainly distributed in poor and remote rural areas, where social capital and social resources are relatively scarce (Zhang & Meng, 2015).

In a culture that emphasizes marriage, men who face a prolonged or even permanent singlehood (called “involuntary bachelors,” hereafter) can hardly have access to an active sexual life (Attané et al., 2019; Yang, Attané, & Li, 2012), and they face heavy normative pressure from their family and environment (Attané & Yang, 2018; Meng & Li, 2017). Involuntary bachelors’ psychological and sexual well-being are severely damaged, and their sexual life is unsatisfactory (Attané & Yang, 2018; Liu, 2017; Zhang, Attané, & Yang, 2009). Long-term psychological and sexual repression negatively affect involuntary bachelors’ quality of life (QoL; Liu, 2017; Wang, 2016), and they are often considered a group at high risk of adverse outcomes (i.e., illegal behaviors, crime, spread of sexually transmitted diseases, and other risks; Meng & Li, 2017). Moreover, they often live in poverty-stricken areas and are socially marginalized (Meng & Li, 2017). An in-depth study of the QoL of involuntary bachelors is helpful in reducing disadvantages and in understanding and predicting the impact on social public safety.

According to the self-medication hypothesis, individuals may turn to smoking to alleviate their psychological distress and depression (Crone & Reijneveld, 2007). In the context of marriage squeeze, smoking may alleviate psychological distress and depression and moderate the relationship between marriage and QoL. Smoking may release sexual repression to moderate the relationship between sexual well-being and QoL, or smoking may affect the QoL of married and never-married men independently. By comparing this sample to married men in rural areas, this article analyzed the smoking behavior of involuntary bachelors and its impact on their QoL in the context of a male “marriage squeeze.”

## Literature Review and Research Hypotheses

### *The Impact of Marriage Squeeze on QoL*

QoL is a positive state of physical, psychological, and social adaptation that is perceived by individuals or groups (Aaronson, 1990). At present, the consensus is that QoL is a multidimensional structure. There are three main aspects: (a) physical health, which includes illness, chronic symptoms, and self-evaluation; (b) psychological health, which includes anxiety, depression, cognition, happiness, and satisfaction; and (c) social relationships, which includes the size and quality of a social network, frequency of social interaction, and the degree of social

participation (Zhao, Li, Chen, & Zeng, 2001). This article analyzed the effects of smoking behavior on QoL considering these three dimensions.

The World Health Organization QoL (WHOQOL) Assessment Scale is an international scale that was developed by the WHO to measure individuals’ QoL. At present, the developed scales include the WHOQOL-100 and WHOQOL-BREF (Du & Fang, 2000). The WHOQOL-BREF is a simplified version of the WHOQOL-100, and it has been widely used in diverse Chinese populations (Yang et al., 2017) and has good internal consistency, good discriminant validity, and good structural validity (Du & Fang, 2000; Fang, 2000; Yang, Qiu, Lu, & Peng, 2005).

The QoL of rural involuntary bachelors is significantly lower than the QoL of rural married men, and marriage squeeze significantly reduces the QoL in this population (Wang, 2012; Yang et al., 2017). Since rural involuntary bachelors lack the daily care and health care provided by intimate partners, when they are sick, the cancer cure rate is lower than that of married people, and their life expectancy is shorter than that of married people (Li, Li, & Luo, 2009). Simultaneously, the inability to marry fosters sexual inferiority and repression (Meng & Li, 2017). This, in turn, promotes commercial sexual behavior and homosexual behavior (Yang et al., 2012; Yang, Attané, & Li, 2013), which brings hidden dangers concerning reproductive health and safety including the risk of sexually transmitted diseases (Yang et al., 2012, 2013).

Further, many rural involuntary bachelors are depressed because they are unable to enjoy a normal married life. In addition, Chinese families often put all their efforts into their children’s marriages, which inevitably creates a huge psychological burden for rural involuntary bachelors (Li, Li, & Peng, 2009). Concurrently, rural involuntary bachelors also experience cultural exclusion and social discrimination because of their failure to carry on their family line, which goes against Chinese tradition (Meng & Li, 2017). Consequently, involuntary bachelors often feel inferior and lonely, and because they lack spouses’ psychological comfort, their psychological pressure is difficult to alleviate (Li, Li, & Peng, 2009).

Involuntary bachelors lack the social network that is inevitably expanded by marriage. Involuntary bachelors display lower participation in neighborhood reciprocal gift-giving activities than do married men, which further separates them from possible social networks (Li, Shuai, & Li, 2012). Marital status significantly affects the size of social support networks for rural men, and never-married men receive less social support than married men (Li, Li, Wei, & Jiang, 2010). Some studies have investigated the living conditions of involuntary bachelors—including their family life, social interaction, political participation, and public life—and revealed that this group has become

marginalized (Meng & Li, 2017; Yu, 2011). Previous research has noted that the social self-evaluation of involuntary bachelors was relatively good, and that there was no significant difference between them and married men (Wang, 2012).

### *The Impact of Sexual Well-being on QoL*

Sexual health is vital for QoL (Flynn et al., 2016). People with sexual problems score about 10% below the population average (Ventegodt, 1998), and sexual dysfunctions impair QoL (Bossini et al., 2014). Sexual life satisfaction is a key factor affecting QoL. People with higher (vs. lower) sexual life satisfaction display higher QoL (Taghadosi, Ghanbari, Gilasi, Ghanbari, & Taheri, 2015; Walters & Williamson, 1998), and decreased sexual satisfaction can reduce one's health, life expectancy, and life satisfaction (Borji, Molavi, & Rahimi, 2016).

### *The Impact of Smoking Behavior on QoL*

Many studies have reported that smoking is harmful to health; however, its relationship with QoL is unclear (Strine et al., 2005). There is overwhelming scientific evidence that smoking and secondhand smoke exposure (passive smoking) are seriously harmful to human health: approximately 6 million and 600,000 deaths worldwide every year, respectively (World Health Organization, 2015).

Regarding psychological health, smoking is the leading cause of reduced life expectancy in people with psychological illnesses (Tam, Warner, & Meza, 2016). In the past two decades, many longitudinal studies have evaluated the relationship between smoking and depression and anxiety (Goodwin, 2017). These include the effects of smoking on depression/anxiety, and the effects of depression/anxiety on smoking (Fluharty, Taylor, Grabski, & Munafò, 2017; Goodwin, 2017). In 2017, Fluharty et al. stated that there is substantial—yet somewhat inconsistent—evidence supporting the relationship in both directions while, in contrast, providing relatively little information on possible mechanistic pathways explaining these links (Fluharty et al., 2017). Nearly half of the studies report that depression/anxiety lead to smoking behavior (Weinberger et al., 2016), and these findings support the self-medication hypothesis, suggesting that individual smoking alleviates psychiatric symptoms (Chaiton, Cohen, O'Loughlin, & Rehm, 2009; Crone & Reijneveld, 2007). More than one-third of the studies reported the opposite, supporting an alternative hypothesis that prolonged smoking increases susceptibility to depression and anxiety. Few studies have reported a two-way relationship between smoking and depression and anxiety (Chaiton et al., 2009; Fluharty

et al., 2017; Goodwin, 2017). Considering the above, the association between smoking and depression and anxiety may be bidirectional, with occasional smoking initially assisting in alleviating the symptoms of depression and anxiety but in fact worsening them over time (Munafò & Araya, 2010). Several studies have reported that there is no link between smoking and depression (Goodman & Capitman, 2006; Senol, Donmez, Turkay, & Aktekin, 2006). These may be related to the selected samples, which include only unique samples (such as medical students), or samples from adolescence to adulthood (Duncan & Rees, 2005; O'Loughlin, Karp, Koulis, Paradis, & DiFranza, 2009; Senol et al., 2006). The relationship between smoking and depression/anxiety may differ per life stage (Goodwin, 2017).

Regarding social relationships, researchers have mainly focused on the positive or negative effects of social support, social networks, and other factors on smoking and smoking cessation. Studies focusing on the influence of smoking on social relationships are few and inconsistent. Some studies have suggested that tobacco use can help maintain and strengthen social relationships (Johnston & Thomas, 2008); for example, teenagers prefer to choose friends with similar smoking behaviors. Nonsmokers were the most attractive for those smoking less than once a week, whereas those smoking more than one cigarette per week on average preferred friends that smoked (Mercken, Snijders, Steglich, & de Vries, 2009). They form small groups, most of which are homogeneous in smoking behavior (Yang, Chen, Li, & Ke, 2002). Regarding deviant group members, certain substances may be the medium for making friends and maintaining friendship (Suzuki et al., 2010). Simultaneously, the use of tobacco is also affected by many cultural and social environmental factors (Maddox et al., 2014). In China, unique cultural practices have made many smokers "social smokers," whose smoking behavior is strongly influenced by social environmental factors (Kohrman, 2007; Pan & Hu, 2008). Cigarettes are considered essential items in social activities such as weddings and funerals. Giving and sharing cigarettes is not only seen as a kind of etiquette, but also plays a key role in social functioning (Rich & Xiao, 2012).

The public attitude toward tobacco use is changing as the government has increased support for tobacco control and more people have become aware of the health risks associated with tobacco use and secondhand smoke; for example, nearly 92% of the public supports a total smoking ban in indoor workplaces, public places, and in all vehicles (Ma, 2017). In the past 40 years, the prevalence of smoking in the United States has declined from 45% to 21% (Christakis & Fowler, 2008). Groups of interconnected people quit in concert, which suggests that decisions to quit smoking are not made solely by isolated

individuals, but rather reflect choices made by groups of individuals connected to each other both directly and indirectly (Christakis & Fowler, 2008). Individuals appear to act under collective network pressures. As a further reflection of this phenomenon, individuals who remained smokers were observed to move to the periphery of the network (Christakis & Fowler, 2008). Research concerning college students' health behaviors and first-year university students' friendship networks also reported that smoking hinders the formation of friendships (Yang, Wei, & Yang, 2008).

Existing studies have mainly focused on the QoL, psychological welfare, and sexual welfare of involuntary bachelors. Few studies have conducted a comprehensive analysis from the three dimensions of QoL (i.e., physical health, psychological health, and social relationships), and no research studies to date have focused on the impact of smoking on the three dimensions and overall QoL of involuntary bachelors. This study employed Wilson and Cleary's theoretical model, which divides QoL into biological and physiological factors, symptom status, functional status, general health perceptions, and overall QoL (Wilson & Cleary, 1995). Functional status is defined as the ability to perform specific tasks, including physiological, psychological, role, and social functions. Physiological functions include strength, sleep, rest, and appetite. Psychological function refers to happiness, willingness, fairness, and self-fulfillment. Role function refers to the roles of students, parents, and workers. Social function focuses on relationships with friends, family, and neighbors. Overall, QoL refers to the subjective degree of happiness and life satisfaction, which is assumed to represent a stable synthesis of a wide range of experiences and feelings that people have and a total measurement of QoL. According to Wilson and Cleary's theoretical model, personal characteristics will affect QoL by influencing physiological, psychological, and social functions. This study posits that smoking may affect overall QoL by affecting individuals' physiological, psychological, and social functions. Further, the QoL of involuntary bachelors will also be affected by marriage squeeze and sexual well-being. Since smoking may alleviate individuals' psychological stress, it also may play a role in regulating the relationship between marriage squeeze and sexual well-being and QoL (Figure 1).

## Methods

### Survey and Procedure

Study data were collected from the Social Survey on Gender Role and Family Life, which was conducted from August 2014 to January 2015 in Hanbin District,

Xunyang County and Shiquan County, Ankang City, Shaanxi Province. Ankang City is in the southeastern part of Shaanxi Province. Ankang City has a jurisdiction over nine counties and one district. In 2011, the total population of the city was 2.631 million, and the total population sex ratio was 112 to 100 (men to women). In 2012, the total population of Hanbin District was 871,300, and the total population sex ratio was 107.6:100 (men to women). Xunyang County has a total population of 460,000, and a total population sex ratio of 114.2 to 100 (men to women). Shiquan County has a total population of more than 300,000, and the total population sex ratio is 116.59 to 100 (men to women). More than 10 towns and villages were selected according to population size and geographical conditions. From the lists provided by towns and villages, 1,100–1,200 men aged 28 to 60 years were randomly selected from all towns. Overall, 1,144 men participated (518 never-married and 632 married). Owing to the approaching Chinese New Year, most migrant workers had returned to their hometowns, and the list provided by the villages and towns was representative.

The research study was approved by Xi'an Jiaotong University School of Public Policy and Administration Academic Board. The data of this survey were kept strictly confidential. Computer-assisted survey technology (i.e., computer-assisted personal-interviewing on tablet devices) were used to conduct surveys. All participants provided informed written consent prior to participation in the study. Surveys were completed independently; however, participants could seek clarification at any time and were informed that they could withdraw from the investigation at any time.

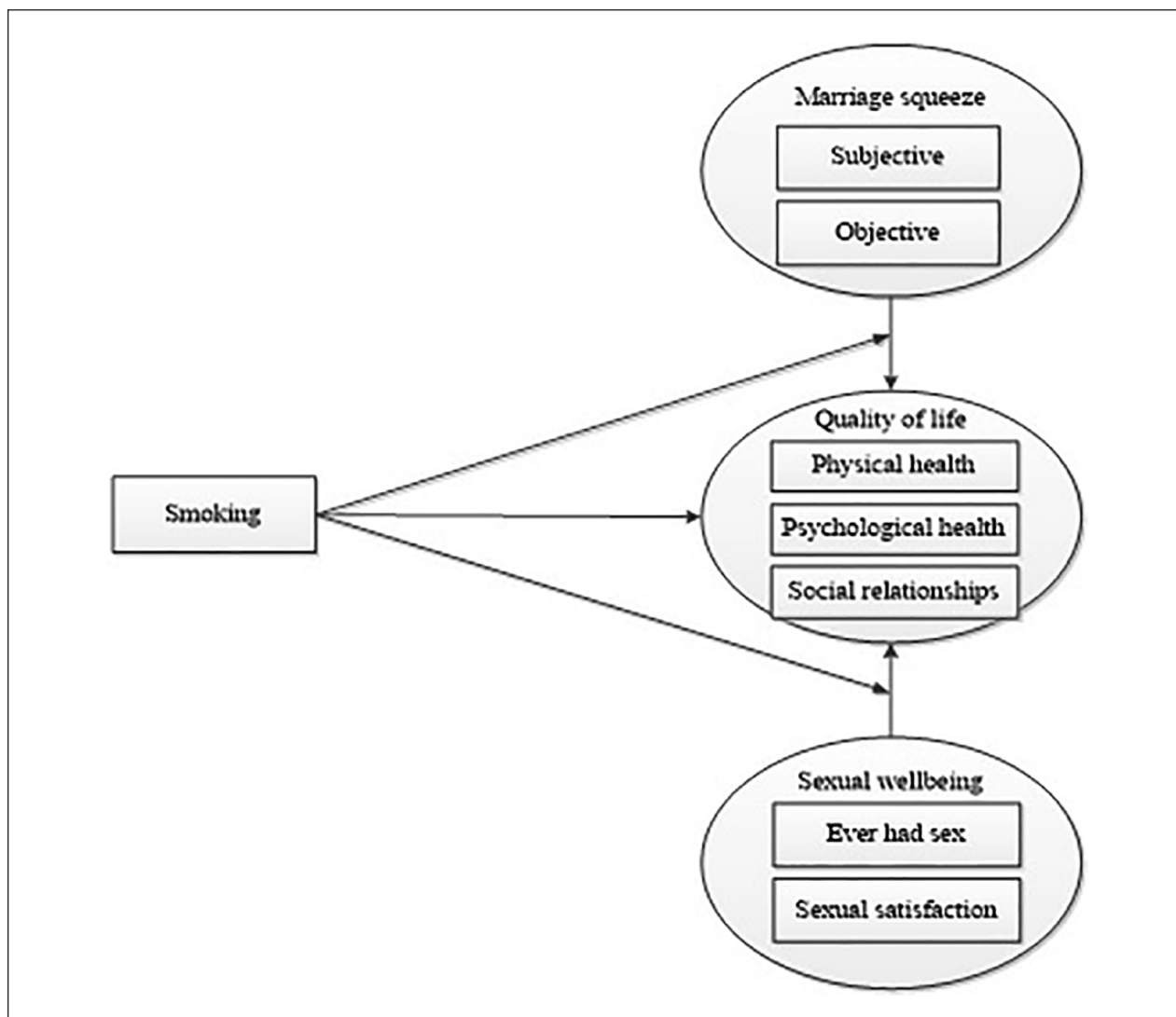
### Measurements

**QoL:** The QoL scale this article employed is described in Table 1.

**Marriage squeeze:** Both objective and subjective marriage squeeze were measured. Objective marriage squeeze was measured by examining participants' marital status (binary variable; 0 = never married and 1 = married or cohabiting) and age (continuous variable, all men aged >28 years; Yang, Luo, & Feldman, 2017). Subjective marriage squeeze was determined by asking participants to answer no (scored as 0) or yes (scored as 1) to the following question: "Do you feel, or have you ever felt, that it is (was) difficult for you to get married?"

### Sexual Well-Being Variables

**Ever had sex:** This was determined by asking participants to answer *no* (scored as 0) or *yes* (scored as 1) to



**Figure 1.** Theoretical analysis framework.

**Table 1.** Structure and Reliability of the Quality of Life Scale.

Scale	Cronbach's $\alpha$ coefficient
Overall scale (six items)	0.82
Physical health (one item)	—
Psychological health (four items)	0.83
Social relationships (one item)	—

Note. Cronbach's  $\alpha$  coefficient for a one-item scale is meaningless.

the following question: "Have you ever had sex in your life?"

**Sexual satisfaction:** Sexual satisfaction was measured by asking participants, "In the past year, were you satisfied with your sexual life (1 = *very unsatisfied*, 2 = *relatively*

*unsatisfied*, 3 = *relatively satisfied*, and 4 = *very satisfied*)?"

### Smoking Variables

**Cigarettes per day:** This was a categorical variable measured as "1 = 0 (non-smoker), 2 = 1–10, 3 = 11–20, and 4 = more than 20" by asking, "How many cigarettes do you smoke per day?"

**Socioeconomic variables:** Educational attainment and annual income—commonly used measures of socioeconomic status—were also included as control variables. Educational attainment was measured as a continuous variable by asking, "How many years have you studied?" Annual income was a categorical variable, measured as

1 = less than ¥5,000, 2 = ¥5,000–¥25,000, and 3 = more than ¥25,000.

### Analysis Strategies

Descriptive analyses, crosstab analyses, and independent sample *t*-tests were used to compare the scores of the three dimensions of QoL and overall QoL. Using the linear regression analysis method, three sets of models were constructed with the three dimensions of QoL and overall QoL as the dependent variables. Models A1, B1, C1, and D1 were benchmark models: Model A1 mainly estimated the influence of marriage squeeze on physical health, with perceived marriage squeeze, marital status, and age as main independent variables and educational attainment and annual income as control variables. Based on Model A1, Model A2 added the sexual well-being variables including “ever had sex” and “sexual satisfaction” to model A1. Model A3 added daily smoking to Model A2 to elucidate the relationship between smoking, marriage squeeze, and sexual well-being. Models B1–B3, C1–C3, and D1–D3 were the same as Models A1–A3, except that their dependent variables were psychological health, social relationships, and overall QoL, respectively.

### Results

A comparison of the independent variables for married and never-married men per perceived marriage squeeze is presented in Table 2. There was no significant difference in the number of cigarettes smoked per day per marital status or marriage squeeze perceptions; however, there were significant differences in sexual life variables. Involuntary bachelors' sexual satisfaction was significantly lower than that of married men, and the sexual satisfaction of the men who perceived marriage squeeze was also significantly lower than that of men who did not perceive marriage squeeze.

The values for the current QoL of rural men per marital status and marriage squeeze perception are presented in Table 3. Involuntary bachelors scored significantly lower than did married men in physical health, psychological health, social relationships, and overall QoL. Men who perceived marriage squeeze also scored significantly lower on the three dimensions above and total QoL than did men who did not perceive marriage squeeze.

The impact of smoking on rural men's QoL within the context of marriage squeeze is presented in Table 4. In Models A1, B1, and C1, marriage squeeze variables and socioeconomic variables had a significant impact on the three dimensions of QoL. Perceived marriage squeeze had a significant negative impact on rural men's physical health, psychological health, and social relationships.

The physical health, psychological health, and social relationships scores of the men who perceived marriage squeeze were significantly lower than those who did not. Objective marriage squeeze variables (age and marital status) also had a significant positive effect on rural men's QoL. The physical health and psychological health score of married men were significantly higher than those of involuntary bachelors. Age had a significant negative impact on the physical health of rural men: the older the age, the lower the physiological health score.

Based on Model A1, Model B1, and Model C1, the sexual well-being variables were added to Model A2, Model B2, and Model C2, respectively. The impact of perceived marriage squeeze and age on physical health, psychological health, and social relationships remained virtually unchanged in terms of the regression coefficient, significance, and direction, whereas marital status became insignificant. The newly added sexual satisfaction had a significant and positive impact on physical health, psychological health, and social relationships. This indicates that an increase in sexual satisfaction increases the scores of the three dimensions.

Adding the smoking variables to Model A3, Model B3, and Model C3 had no significant impact on the significance, direction, and coefficient of perceived marriage squeeze and sexual satisfaction on physical health, psychological health, and social relationships.

Considering the impact of smoking on the physical and psychological health of rural men, it is not clear whether smoking impacts psychological health or whether the impact is in the opposite direction. As mentioned before, there are very few studies that provide information concerning the possible mechanistic pathways that could explain these relationships (Fluharty et al., 2017). However, in this study, the number of cigarettes per day had a significant negative impact on the physical and psychological health of rural men, especially among those who smoked more than 20 cigarettes per day. The physical health and psychological health scores of these men were significantly lower than those of non-smoking rural men.

Annual income had significant positive effects on the physical health, psychological health, and social relationships of rural men. The higher the annual income, the higher the score of all three dimensions. Educational attainment also had significant positive effects on the physical health of rural men: the higher the educational attainment, the higher the physiological health score. The impact of annual income and educational attainment on physical health, psychological health, and social relationships remained almost unchanged in terms of the regression coefficient, significance, and direction after the addition of the sexual well-being and smoking variables.

**Table 2.** Comparison of Independent Variables Among Married and Never-Married Men Per Perceived Marriage Squeeze.

		Never married		Married		Perceived marriage squeeze			
						No		Yes	
		Men (n)	%	Men (n)	%	Men (n)	%	Men (n)	%
Perceived marriage squeeze	No	80	15.4	430	68.0	–	–	–	–
	Yes	438	84.6	202	32.0	–	–	–	–
$\chi^2$ test		$\chi^2 = 319.06^{***}$				–			
Marital status	Never married	–	–	–	–	80	15.7	438	68.4
	Married	–	–	–	–	430	84.3	202	31.6
$\chi^2$ test		–				$\chi^2 = 319.06^{***}$			
Cigarettes per day	0	211	40.1	274	43.6	244	46.0	285	40.0
	1–10	133	25.6	139	22.1	119	22.5	172	24.2
	11–20	138	26.8	167	26.6	134	25.3	199	28.0
	> 20	34	7.5	48	7.7	33	6.2	56	7.8
$\chi^2$ test		$\chi^2 = 2.36$				$\chi^2 = 4.90$			
Ever had sex	No	260	50.3	0	0.0	31	5.8	229	32.0
	Yes	257	49.7	632	100.0	501	94.2	487	68.0
$\chi^2$ test		$\chi^2 = 410.79^{***}$				$\chi^2 = 126.61^{***}$			
Annual income	less than ¥5,000	211	40.7	183	29.0	153	28.7	273	38.1
	¥5,000–¥25,000	224	43.2	236	37.3	192	36.0	313	43.7
	> ¥25,000	83	16.1	213	33.7	188	35.3	130	18.2
$\chi^2$ test		$\chi^2 = 48.57^{***}$				$\chi^2 = 47.58^{***}$			

		Never married		Married		Perceived marriage squeeze			
						No		Yes	
		Mean (SD)		Mean (SD)		Mean (SD)		Mean (SD)	
Sexual satisfaction		2.23 (1.10)		3.18 (0.76)		3.11 (0.80)		2.47 (1.11)	
t-test		$t = -17.26^{***}$				$t = 11.23^{***}$			
Age		41.08 (8.58)		41.42 (8.39)		41.13 (8.67)		41.90 (8.15)	
t-test		$t = -0.67$				$t = -1.61$			
Educational attainment		5.45		9.63		9.59		6.19	
t-test		$t = -19.38^{***}$				$t = 15.54^{***}$			

Note. +*p* < .10. \**p* < .05. \*\**p* < .01. \*\*\**p* < .001.

The impact of marriage squeeze and smoking behavior on rural men’s overall QoL is presented in Table 5. In model D1, marriage squeeze variables and socioeconomic variables had significant effects on overall QoL. Perceived marriage squeeze had significant negative impact on the rural men’s overall QoL, and the men who perceived marriage squeeze scored significantly lower in the overall QoL than those who did not. Marital status had a significant positive effect on the rural men’s overall QoL, and married men’s overall QoL was significantly higher than that of involuntary bachelors.

Based on Model D1, the sexual well-being variables were added to Model D2. The impact of perceived marriage squeeze on the overall QoL of rural men remained virtually unchanged in terms of the regression coefficient, significance, and direction, whereas marital status became

insignificant. The newly added sexual satisfaction variable had a significant positive impact on the overall QoL. The higher the sexual satisfaction, the higher their overall QoL.

Based on Model D2, smoking variables were added to Model D3. After smoking variables were added, there was no significant change in the significance, direction, and coefficient of perceived marriage squeeze and sexual satisfaction on overall QoL. The number of cigarettes per day had a significant negative impact on the overall QoL of rural men, especially smoking more than 20 per day, significantly reducing the overall QoL scores of rural men.

Annual income and educational attainment had significant positive effects on overall QoL. The higher the annual income and educational attainment, the higher the

**Table 3.** Comparison of Quality of Life Among Men Per Marriage Squeeze Variable.

	Never married		Married		Perceived marriage squeeze	
					No	Yes
	Mean (SD)		Mean (SD)		Mean (SD)	Mean (SD)
Physical health	1.78 (0.70)		2.07 (0.63)		2.08 (0.63)	1.79 (0.70)
		$t = 7.36^{***}$				$t = 7.71^{***}$
Psychological health	10.90 (3.55)		12.49 (2.93)		12.82 (2.77)	10.84 (3.49)
		$t = 8.30^{***}$				$t = 10.82^{***}$
Social relationships	3.27 (0.92)		3.50 (0.71)		3.56 (0.67)	3.24 (0.91)
		$t = 4.76^{***}$				$t = 6.84^{***}$
Overall quality of life	15.95 (4.28)		18.05 (3.54)		18.47 (3.33)	15.87 (4.25)
		$t = 9.13^{***}$				$t = 11.68^{***}$

Note. Overall quality of life is calculated by adding physical health, psychological health, and social relationships.  $+p < .10$ .  $*p < .05$ .  $**p < .01$ .  $***p < .001$ .

**Table 4.** The Impact of Marriage Squeeze and Smoking Behavior on Rural Men's Quality of Life.

	A1	A2	A3	B1	B2	B3	C1	C2	C3
	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.
	(SE)	(SE)	(SE)	(SE)	(SE)	(SE)	(SE)	(SE)	(SE)
<b>Marriage squeeze variables</b>									
Perceived marriage squeeze (reference: no)									
Yes	-0.14**	-0.12**	-0.11*	-1.45***	-1.36***	-1.35***	-0.23***	-0.22***	-0.22***
	(0.05)	(0.05)	(0.05)	(0.23)	(0.23)	(0.23)	(0.06)	(0.06)	(0.06)
Marital status (reference: never married)									
Married	0.13**	0.07	0.07	0.58*	0.27	0.27	0.07	0.05	0.05
	(0.05)	(0.06)	(0.06)	(0.24)	(0.26)	(0.27)	(0.06)	(0.07)	(0.07)
Age	-0.01***	-0.01***	-0.01***	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)
<b>Sexual well-being variables</b>									
Ever had sex (reference: no)									
Yes		-0.04	-0.03		-0.27	-0.22		-0.06	-0.05
		(0.06)	(0.06)		(0.30)	(0.30)		(0.08)	(0.08)
Sexual satisfaction		0.10**	0.10**		0.53**	0.51**		0.05 <sup>+</sup>	0.05 <sup>+</sup>
		(0.02)	(0.02)		(0.10)	(0.10)		(0.03)	(0.03)
<b>Smoking variable</b>									
Cigarettes per day (reference: 0)									
1-10			-0.07			0.22			-0.04
			(0.05)			(0.24)			(0.06)
11-20			-0.09*			0.05			-0.03
			(0.05)			(0.23)			(0.06)
>20			-0.20*			-0.71 <sup>+</sup>			0.01
			(0.08)			(0.38)			(0.10)
<b>Socioeconomic variables</b>									
Annual income (reference: less than ¥5,000)									
¥5,000-¥25,000	0.09*	0.07 <sup>+</sup>	0.07	0.67**	0.63**	0.67**	0.18**	0.18**	0.18**
	(0.04)	(0.04)	(0.04)	(0.22)	(0.22)	(0.22)	(0.06)	(0.06)	(0.06)
>¥25,000	0.13*	0.11*	0.11*	0.67**	0.63*	0.68**	0.13*	0.13*	0.13*
	(0.05)	(0.05)	(0.05)	(0.25)	(0.25)	(0.25)	(0.06)	(0.06)	(0.06)
Educational attainment	0.02**	0.02**	0.01*	0.04	0.03	0.03	0.01	0.01	0.01
	(0.01)	(0.01)	(0.01)	(0.03)	(0.03)	(0.03)	(0.01)	(0.01)	(0.01)
N	1144	1140	1137	1144	1140	1137	1144	1140	1137
R <sup>2</sup>	0.10	0.12	0.12	0.11	0.13	0.13	0.05	0.05	0.05
Adjusted R <sup>2</sup>	0.09	0.11	0.11	0.10	0.12	0.12	0.04	0.04	0.04
F	20.09***	18.45***	14.24***	23.24***	21.01***	15.72***	9.15***	7.18***	5.23***

Note.  $+p < .10$ .  $*p < .05$ .  $**p < .01$ .  $***p < .001$ . A = physical, B = psychological, C = social relationships.



**Table 5.** The Impact of Marriage Squeeze and Smoking Behavior on Rural Men's Overall Quality of Life.

	Overall QoL Model D1 Coef. (SE)	Overall QoL Model D2 Coef. (SE)	Overall QoL Model D3 Coef. (SE)
<b>Marriage squeeze variables</b>			
Perceived marriage squeeze (reference: no)			
Yes	-1.83*** (0.27)	-1.71*** (0.27)	-1.68*** (0.27)
Marital status (reference: never married)			
Married	0.78** (0.29)	0.40 (0.33)	0.40 (0.33)
Age	-0.02 (0.01)	-0.02 (0.01)	-0.02 (0.01)
<b>Sexual well-being</b>			
Ever had sex (reference: no)			
Yes		-0.36 (0.36)	-0.30 (0.36)
Sexual satisfaction		0.68*** (0.12)	0.66*** (0.12)
<b>Smoking variable</b>			
Cigarettes per day (reference: 0)			
1-10			0.11 (0.29)
11-20			-0.07 (0.28)
>20			-0.90* (0.45)
<b>Socioeconomic variables</b>			
Annual income (reference: less than ¥5,000)			
¥5,000-¥25,000	0.94*** (0.26)	0.89*** (0.26)	0.93*** (0.26)
>¥25,000	0.92** (0.30)	0.87** (0.30)	0.92** (0.30)
Educational attainment	0.06+ (0.03)	0.06 (0.04)	0.05 (0.04)
N	1144	1140	1137
R <sup>2</sup>	0.13	0.15	0.16
Adjusted R <sup>2</sup>	0.13	0.15	0.15
F	28.63***	25.64***	19.00***

Note. + $p < .10$ . \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

overall QoL score. There was no significant change in the impact of annual income on overall QoL after the addition of sexual well-being variables. However, educational attainment was no longer significant. The addition of the smoking variables did not change the impact of annual income on rural men's overall QoL significantly.

## Discussion

The descriptive analyses demonstrated that involuntary bachelors aged older than 28 years scored lower than did married men regarding physical health, psychological

health, social relationships, and overall QoL. Further, men who perceived marriage squeeze scored lower in physical health, psychological health, social relationships, and overall QoL than did those who did not perceive marriage squeeze. The preliminary results illustrated that both subjective and objective marriage squeeze variables had negative effects on the three dimensions of QoL and overall QoL of rural men.

Regression analyses results reported that marriage squeeze had a significant negative impact on rural men's physical health, psychological health, social relationships, and overall QoL. This is consistent with existing studies. Both domestic and foreign studies have reported that married people have better physical and psychological health than do unmarried people, and marriage is vital for individuals' psychological welfare (Horwitz, White, & Howell-white, 1996). As a special social relationship, marriage can not only connect more abundant social resources, but also enables married people to effectively control their psychological stress (Cotten, 1999). Many involuntary bachelors state that having no wife at home can have a big impact on their lives: "Clothing, washing, cooking ... all aspects are not taken care of. If I am tired after a day, I have to do it myself. If I am not hungry or lazy, I will not cook, and I will skip the meal. If I am sick, no one was around me to take care of me" (Wei, Jin, & Li, 2008, p.8). Because involuntary bachelors differ from social norms, they are likely to raise the eyebrows of mainstream people, and their perceptions of their relationships with others is worse than those of married men (Li et al., 2012). "Having no wife had bowed my head. It makes me embarrassed to go to the home of the person who got married. Wherever a bachelor is, people are not at ease and are discriminated against him" (Wei et al., 2008, p. 8).

With the addition of sexual variables, perceived marriage squeeze was reduced, and marital status was no longer significant, indicating that the influence of subjective and objective marriage squeeze on rural men's physical health, psychological health, and overall QoL is moderated by sexual satisfaction. Concurrently, sexual satisfaction had a significant positive impact on the three dimensions of rural men's QoL and their overall QoL. Over half of the involuntary bachelors had never had sex. Long-term sexual deficiencies significantly reduce involuntary bachelors' physical and psychological health (Liu, 2017), and some studies have reported that, involuntary bachelors choose self-indulgence to offset their loneliness (Liu, 2017), this group's strong desire for a sexual life and the status quo of their own extreme sexual insufficiency negatively impact their QoL.

The addition of smoking variables did not significantly change the direction or significance of marriage squeeze variables and sexual well-being variables,

indicating that smoking has an independent negative impact on the physical and psychological health of rural men. The health risks of smoking are well known, and recent research suggests that smoking 20 cigarettes per day vastly increases men's risk of coronary heart disease and stroke (Hackshaw, Morris, Boniface, Tang, & Milenković, 2018). Smoking did not alleviate the psychological distress of rural men; however, it had a significant negative impact on their psychological health. This may be because, through effects on individuals' neurocircuitry, smoking increases susceptibility to environmental stressors, and may lead to depression or anxiety (Fluharty et al., 2017). Smoking had no significant effect on social relationships, and the Chinese "social smoking" culture was not verified in this survey. In this study, nearly half the men did not smoke, regardless of marital status of perceive marriage squeeze. This may be due to the increased awareness of tobacco hazards among rural men. Smoking did not play a role in improving social relationships, nor did it negatively impact social relationships.

In addition, annual income also had a significant positive effect on rural men's QoL; that is, the higher their annual income, the higher rural men's QoL. This is consistent with the findings of previous studies (Yang et al., 2017; Zhou, Ji, & Chen, 2011), which reported that low-income people have more health problems than high-income people, and low-income individuals have higher rates of chronic disease compared to high-income people (Zhou et al., 2011).

## Conclusions

This study presents a comprehensive analysis of involuntary bachelors' QoL from the perspective of the three dimensions of QoL (i.e., physical health, psychological health, and social relationships) and analyzes the impact of involuntary bachelors' smoking behavior on the three dimensions of QoL separately and on overall QoL. This analysis and its findings enrich the current knowledge in related fields. This study stated that—within the context of the marriage squeeze—smoking not only fails to alleviate the psychological or sexual repression of involuntary bachelors but also has an independent and negative impact on the physical and psychological health of both married and never-married men. This, in turn, negatively impacts their overall QoL. Whether smoking moderates the effects of marriage squeeze and sexual repression on QoL had not been verified. Furthermore, both subjective and objective marriage squeeze had a negative impact on physical health, psychological health, social relationships, and the overall QoL of both married and never-married men. However, this influence was moderated by sexual

satisfaction. Additionally, sexual satisfaction positively affected the physical health, psychological health, social relationships, and overall QoL of both married and never-married men.

This study illustrates the disadvantaged social and family status of men who face a prolonged or permanent singlehood in rural China. Although the sex imbalance in the marriage market is partly responsible for such a situation, poverty is also a major determinant of male singlehood (Meng & Li, 2017; Shuzhuo, Qunlin, Xueyan, & Attané, 2010) that significantly affects their QoL (Attané & Yang, 2018). Therefore, policies aiming at alleviating poverty could be an efficient way of providing assistance to involuntary bachelors and their families both during marriage search process and also in later stages of their life. Another factor of poorer living conditions is the normative pressure faced by the men who fail to get married (Attané & Yang, 2018; Attané et al., 2019). Less rigid marriage, family, and sexual norms might contribute to alleviating normative pressure on involuntary bachelors. Moreover, modern marriage values should be encouraged to attenuate the pressure of high bride prices on involuntary bachelors. Lastly, improving social security system in particular for middle-aged and elderly unmarried men in rural poverty-stricken areas would contribute to an improvement in their QoL by partly addressing the issue of aging and social support among men who face prolonged or permanent singlehood.

## Limitations

There are certain limitations to this study. The data were collected in rural Ankang, Shaanxi Province, and are not necessarily generalizable to other sex-imbalanced areas. As such, the data—and therefore the findings of the study—may not reflect the situation in the rest of China accurately. Another limitation is that although this study used three QoL variables and has good reliability, it failed to capture all QoL items covered by the WHOQOL-BREF. This is because the survey used is not specifically aimed at measuring QoL and the measurement items are therefore limited. Further analyses are needed to: (a) compare the results of smoking behavior of involuntary bachelors and its impact on their QoL by using data collected in other parts of the country; (b) employ the WHOQOL-100 or WHOQOL-BREF scale to explore the relationship between involuntary bachelors' smoking behavior and their QoL more thoroughly.

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The research study was approved by Xi'an Jiaotong University School of Public Policy and Administration Academic Board. All participants provided informed written consent prior to participation in the study.

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