

A Study on the Association Between Family Support and High-Risk Sexual Behavior of Elderly Men in Rural China

American Journal of Men's Health
 July-August 1–10
 © The Author(s) 2022
 Article reuse guidelines:
sagepub.com/journals-permissions
 DOI: 10.1177/15579883221107729
journals.sagepub.com/home/jmh


Yuan Li^{*}, Qinxi Liu^{*}, Yi Yang², Shuangfeng Fan³, Yang Liu³, and Na Li⁴

Abstract

Our study aimed to understand the relationship between the status of high-risk sexual behaviors of male ≥ 50 years old (elderly men) and their family support in a rural county-level city in Chengdu. Multi-stage sampling was used to select rural elderly men from six towns to conduct an interview questionnaire survey. Ordinal logistic regression was used to analyze the relationship between high-risk sexual behavior and family factors. A total of 790 samples were included, and the prevalence of high-risk sexual behavior was 16.2%. Two-hundred thirty-nine men (30.3%) had three close family members. More than half of the men ($n = 397$) had never been provided financial support by family members (50.3%). More than half of men ($n = 406$) never communicate deeply with family members (51.4%). Logistic analysis reported that 50–59 years old (odds ratio [OR] = 1.928, 95% confidence interval [CI] = [1.070, 3.477]), unmarried, divorced/widowed, married and separated (OR = 8.232, 95% CI = [2.640, 25.673]; OR = 3.589, 95% CI = [1.713, 7.520]; OR = 3.003, 95% CI = [1.238, 7.280]) elderly men were more likely to be involved in commercial sex. Meanwhile, either never or often family financial support (OR = 0.435, 95% CI = [0.228, 0.830]; OR = 0.288, 95% CI = [0.095, 0.876]) helped elderly men to avoid commercial sex. This study predicts family factors may be affected by loneliness, life satisfaction, disposable economic condition, family responsibilities as the middle path, thus affect high-risk sexual behaviors in elderly men.

Keywords

high-risk sexual behavior, family support, elderly men, rural areas, China

Received March 26, 2022; revised May 26, 2022; accepted May 31, 2022

Introduction

The proportion of the elderly population in China continues to expand, and some scholars predict that the proportion of the elderly aged 65 and above will exceed 25.0% in 2050 (Z. Zhai et al., 2017). With the improvement of modern living standards, the health status of ≥ 50 years old people (elderly men) has been improved, and their life expectancy has been prolonged. Studies have shown that the elderly men still maintained varying degrees of sexual activity and are prone to a variety of high-risk sexual behaviors (Johnson, 2013; Kim et al., 2019; Yun et al., 2017). With the growth of the elderly population and the decline of group immune function, their risk of infection with sexually transmitted diseases is increasing. HIV prevalence in rural areas is higher than in urban areas in China (Huang et al., 2018; Kang et al., 2014; Wei et al.,

2021). Lack of knowledge and risk awareness of AIDS prevention and control, high-risk sexual behaviors including buying commercial services, one-night stands,

¹Chengdu University of Traditional Chinese Medicine, Chengdu, China

²School of Management, Chengdu University of Traditional Chinese Medicine, Chengdu, China

³Chengdu Center for Disease Control and Prevention, Chengdu, China

⁴Pengzhou Center for Disease Control and Prevention, Chengdu, China

*Yuan Li and Qinxi Liu are shared first authors.

Corresponding Author:

Yi Yang, School of Management, Chengdu University of Traditional Chinese Medicine, 1166 Liutai Avenue, Wenjiang District, Chengdu 611137, China.

Emails: yangyi@cduetcm.edu.cn; thehanyang@163.com



homosexual sex, extramarital sex, and having multiple fixed partners has become the main factor of HIV infection in this group (L. Gao et al., 2016; Liu & Cao, 2020; Liu et al., 2019). Survey results in some areas of China reported that HIV/AIDS cases among elderly people were mainly acquired through unprotected commercial sex (Y. Xu & Wang, 2011), especially when commercial sex occurs, few people could insist on using condoms (N. Li et al., 2017). At the same time, with the loss of labor force and income reduction of elderly groups, they tend to choose lower-grade prostitute places when they consume (Q. Yang et al., 2018). These factors all lead to the rural elderly people being relatively more prone to HIV-related high-risk sexual behaviors, which aggravate the transmission of HIV in this population. There are many influencing factors on high-risk sexual behavior of elderly men, including age, disposable income, education level, nationality, marital status, health status, current residence, sexual health awareness, and so on (Y. Gao & Lu, 2020; J. Xu et al., 2021; J. Zhai et al., 2016; Zhao et al., 2020), mostly related to the economic resources and social status and difficult to intervene and change. Under the background of the long-term existence of urban–rural dual structure in China (M. Wang, 2004; Yu et al., 2019), the economic resources and social status of middle-aged and elderly in rural areas tend to converge and solidify (He & Zeng, 2017). It is difficult to predict and intervene other factors affecting the high-risk sexual behavior of elderly men in rural areas. Studies have shown that lack of family support is a risk factor for high-risk sexual behavior in elderly people (Jiang et al., 2018; Lin et al., 2011; J. Zhai et al., 2016), but few studies have explored the relationship between family factors and high-risk sexual behaviors, so this study focuses on family influencing factors. Through a field survey of elderly men in a rural area of Chengdu, this study analyzes the relationship between high-risk sexual behavior and family support, exploring the intermediate path of family factors affecting high-risk sexual behaviors, to supplement new evidence affecting high-risk sexual behavior of elderly men, and put forward targeted prevention suggestions.

Method

Objects

Men aged ≥ 50 who live in the survey area were selected from six townships of a county-level city in Chengdu. Those who have mental or expression barriers and cannot understand or answer the relevant survey contents were excluded.

The survey time was between June and July 2019. This study was reviewed and approved by the Ethics Committee of the Affiliated Hospital of Chengdu University of Traditional Chinese Medicine (No. 2019KL-008)

Procedures

Two out of six townships were randomly sampled in proportion, and four townships were clustered by village group as a unit. All respondents were organized to the township health center for investigation. Each respondent read and signed a consent form before completing the survey. Face-to-face interview questionnaires were conducted by strictly trained male investigators in village clinics with good privacy protection. After survey completion, each respondent received a ¥10 bucket of detergent for kitchen cleaning such as dishwashing.

Measures

Dependent Variable. Characteristics of high-risk sexual behavior: number of commercial sexual behaviors, number of one-night stands, number of sexual partners and relationship with sexual partners, and condom use. The time period when respondents were involved in high-risk sexual behaviors was from the first occurrence of high-risk sexual behaviors to the time they were investigated. We treated the number of commercial sexual behavior as a categorical variable, named it frequency of commercial sex (times) as the dependent variable, and recoded it as: 1 = never, 2 = 1–5, 3 = 6–10, 4 = 11–20, 5 = 21 or above.

Independent Variable. Combining the influencing factors of high-risk sexual behaviors studied in the literature (Y. Gao & Lu, 2020; J. Zhai et al., 2016) and the content of the questionnaire design of this study, we selected seven variables as independent variables and included them in the ordinal logistic regression model. Independent variables of this study include (a) Demographic characteristics: age, monthly income, and education level; and (b) Family characteristics: marital status, number of close family members, willingness of family members to provide financial support, and frequency of in-depth communication with family members.

We recoded age and education level as categorical variables, where the code for age was 1 = 50–59, 2 = 60 or above, and the code for education level was: 1 = illiteracy, 2 = primary school, 3 = middle school or above. Participants were asked about monthly income and gave responses “1” (no personal income), “2” (1–1,000 yuan), “3” (1,000–1,999 yuan), “4” (2,000–2,999 yuan), “5” (3,000–3,999 yuan), “6” (4,000 or above). The family factors in this study included “marital status,” “number of close family members,” “willingness of family members to provide financial support,” and “frequency of in-depth communication with family members.” The number of close family members was a continuous variable. Participants were asked about marital status and gave

responses “1” (unmarried), “2” (the state of being divorced or widowed without a fixed partner), “3” (the state of being divorced or widowed with a fixed partner), “4” (married but separated), and “5” (normal married). We assessed the willingness of family members to provide financial support via the question “If you are financially strapped, will your family provide you with financial/material support when you need help?” with response “1” (never), “2” (occasionally), “3” (frequently), and “4” (always). The frequency of in-depth communication with family members was mainly reflected by the question “Do you talk about intimate/sensitive topics (such as emotion, sexual life) with your family?” with response “1” (never), “2” (occasionally), “3” (frequently), and “4” (always). For the above two questions, the answers of the closest family members were used as data for analysis. For respondents without close family members, they believed that family members never provided financial support and never had in-depth communication with their families.

A total of 802 questionnaires were distributed and 797 valid questionnaires were collected through face-to-face interview, with an effective rate of 99.40%. Excluding seven respondents who refused to answer or answered “don’t know” in the family support part, a total of 790 people were included as the main participants of this study.

Statistical Analysis

EpiData 3.1 was used to establish the database, and data were double input, SPSS 23.0 was used for statistical analysis, chi-square test was used for univariate analysis, and multivariate logistic regression analysis for multivariate analysis. $p < .05$ is considered statistically significant. Excel 2010 was used to draw 95% confidence interval (CI) tree view of regression odds ratio (OR)-value.

Taking the frequency of commercial sex as the dependent variable and the other seven variables as independent variables, all of them were included in the ordinal logistic regression analysis. The largest group of classified variables was used as the reference. The multicollinearity test was carried out among the variables. The tolerance statistics of all seven variables were close to 1.0, and the variance inflation factor (VIF) values were less than 10 and stable around 1, suggesting that there was no multicollinearity among the study factors of the model. In the parallelism test, $p = .328$, it was considered that the parallel line hypothesis was tenable, and the conditions for using ordered logistic were met.

Results

Basic Information of Respondents

Characteristics of the 790 respondents are presented in Table 1. The respondents were all Han males, with an age

of 64.46 ± 7.91 years. Approximately 348 men (44.1%) were illiterate, 178 men (22.5%) were primary school graduates, and 264 men were middle school graduates or above. Almost half of the men’s ($n = 366$) monthly income was between 1 and 1,000-yuan (46.3%). More than two thirds of men ($n = 644$) were normally married (81.5%).

Family Support

Two-hundred thirty-nine men (30.3%) had three close family members, 230 men (29.1%) had two close family members, 138 men (17.5%) had one close family member, 107 men (13.5%) had four close family members, 62 men (7.9%) had five close family members, and 14 men (1.8%) were without close family members. More than half of the men ($n = 397$) had never been provided financial support by family members (50.3%), 187 (23.7%) men were provided occasionally, 69 men (8.7%) were provided frequently, and 137 men (17.3%) were always provided. More than half of men ($n = 406$) never communicated deeply with family members (51.4%), 290 men (36.7%) had in-depth communication occasionally, and 94 men (11.9%) often communicated deeply with family members (Table 1).

Status of High-Risk Sexual Behaviors of Elderly Men

One-hundred twenty-eight men (16.2%) were high-risk sex positive, of which 20 men (15.6%) had two high-risk sexual behaviors at the same time, and two men (1.6%) had three high-risk sexual behaviors at the same time. In the past year, 107 men (13.5%) had high-risk sexual behavior, and 88 men (11.1%) had commercial sex. The prevalence of high-risk sexual behavior in different groups of “age” and “marital status” was found to be statistically different by single factor analysis ($\chi^2 = 19.22$, $p < .001$; $\chi^2 = 29.45$, $p < .001$). The high-risk sexual behaviors of men with different characteristics are presented in Table 1.

Among the 644 men with fixed spouses, 91 men (14.1%) were high-risk sex positive. Among these 91 men, condom use during sex with spouse was as follows: two men (2.2%) used condoms every time, five men (5.5%) used them frequently, six men (5.5%) used them occasionally, and 78 men (85.7%) never used condoms. Most of the elderly men who have never used condoms do not use them because they “don’t know how to use them,” followed by “spouse who looks very healthy,” or “the spouse has passed the childbearing age or birth control.”

Table 1. Differences in the Prevalence of High-Risk Sexual Behaviors Among Elderly Men With Different Characteristics.

Item	Total (N = 790)	High-risk sexual behaviors		χ^2	p value
		Number	Prevalence (%)		
Total	790	128	16.2		
Age (years)				19.22	<.001
50–59	220	56	25.5		
60 or above	570	72	12.6		
Education level				4.50	.105
Illiteracy	348	51	14.7		
Primary school	178	24	13.5		
Middle school or above	264	53	20.1		
Monthly income (yuan)				5.96	.310
No personal income	62	10	16.1		
1–1,000	366	51	13.9		
1,000–1,999	190	30	15.8		
2,000–2,999	78	17	23.1		
3,000–3,999	52	9	17.3		
4,000 or above	42	10	23.8		
Marital status				29.45	<.001
Unmarried	17	6	35.3		
Normal married	644	88	13.7		
Married but separated	44	10	22.7		
The state of being divorced or widowed with a fixed partner	16	9	56.3		
The state of being divorced or widowed without a fixed partner	69	15	21.7		
Number of close family members				5.62	.345
0	14	3	21.4		
1	138	22	15.9		
2	230	45	19.6		
3	239	38	15.9		
4	107	15	14.0		
5	62	5	8.1		
Willingness of family members to provide financial support				2.82	.421
Never	397	58	14.6		
Occasionally	187	32	17.1		
Frequently	69	10	14.5		
Always	137	28	20.4		
Frequency of in-depth communication with family members				2.72	.252
Never	406	59	14.5		
Occasionally	290	49	16.9		
Frequently	94	20	21.3		

Association Between High-Risk Sexual Behavior and Family Support

The results of ordinal logistic regression analysis are presented in Table 2 and Figure 1: Compared with those aged 60 or above, the age of 50–59 years was a risk factor for the increase of the frequency of commercial sex (OR = 1.928, 95% CI = [1.070, 3.477]); compared with those with normal married, unmarried, the state of being divorced/widowed without fixed partners and married but separated were the risk factors for increasing the number of commercial sex (OR = 8.232, 95% CI = [2.640, 25.673]; OR = 3.589, 95% CI = [1.713, 7.520];

OR = 3.003, 95% CI = [1.238, 7.280]); compared with the family always providing financial support, the family never or often providing financial support was the protective factor for the increase of the frequency of commercial sex (OR = 0.435, 95% CI = [0.228, 0.830]; OR = 0.288, 95% CI = [0.095, 0.876]).

Discussion

At present, it is generally believed that aging and sexual dysfunction are inextricably linked. It is believed that the physiological function of the middle-aged and elderly decreases, they do not need sexual life, and even have a

Table 2. Ordinal Logistic Regression Analysis Results.

Independent variables	OR (95% CI)
Age (years)	
50–59	1.928 [1.070, 3.477]*
Education level	
Illiteracy	1.189 [0.647, 2.187]
Primary school	0.615 [0.289, 1.307]
Monthly income (yuan)	
No personal income	0.418 [0.128, 1.368]
1–1,000	0.522 [0.203, 1.344]
1,000–1,999	0.562 [0.217, 1.453]
2,000–2,999	0.590 [0.206, 1.690]
3,000–3,999	0.297 [0.071, 1.245]
Marital status	
Unmarried	8.232 [2.640, 25.673]***
The state of being divorced or widowed without a fixed partner	3.589 [1.713, 7.520]***
The state of being divorced or widowed with a fixed partner	2.253 [0.478, 10.619]
Married but separated	3.003 [1.238, 7.280]*
Willingness of family members to provide financial support	
Never	0.435 [0.228, 0.830]*
Occasionally	0.613 [0.305, 1.232]
Frequently	0.288 [0.095, 0.876]*
Frequency of in-depth communication with family members	
Never	0.606 [0.293, 1.249]
Occasionally	0.702 [0.339, 1.455]
Number of close family members	1.015 [0.813, 1.267]

Note. OR = odds ratio; CI = confidence interval.

* $p < .05$. *** $p < .001$.

biased attitude toward the sexual life of the elderly (Ni Lochlainn & Kenny, 2013). As a result, it leads to the society paying more attention to the sexual health of young groups and ignoring the problems faced by the elderly, which is not conducive to the society to correctly guide and regulate the sexual behavior of the elderly. At the same time, social customs and media negative reports on the sexual life of the elderly have caused them to adopt an evasive attitude due to embarrassing situations when facing sexuality. Therefore, the elderly people with high-risk sexual behavior have great concealment and harmfulness in reality (Zhao et al., 2020), and sexually transmitted diseases gradually spread to the middle-aged and elderly population (Poynten et al., 2013). This study reported that the age span of the respondents was large, and many elderly men still had high-risk sexual behaviors in last year, which indicates that there was still demand for sexual life in the elderly group (S. Yang & Yan, 2016), and the condom use rate of elderly men with high-risk sexual behavior with their spouses was very low. On one hand, it suggests that the sexual needs of the elderly are an objective fact that cannot be ignored. On the other hand, the prevalence of high-risk sexual behavior of elderly men in the survey area is high, so we should

strengthen the intervention and monitoring of high-risk sexual behavior of this population.

In this study, we found that among non-family factors, younger age was a risk factor for commercial sex among elderly men. People aged 50 to 59 years were more likely to have high-risk sexual behaviors, suggesting that publicity and education for AIDS and condom use education should be focused on among the population. With the increase of age, the incidence of high-risk sexual behaviors in elderly men gradually decreases, which may be related to the steady decline of sexual activity and sexual function with the increase of age (Araujo et al., 2004; Lindau et al., 2007).

Some studies have reported that family support has become an important factor affecting the mental health of the elderly in rural China (Bai et al., 2020). Lack of family support not only affects the mental health of the elderly, but also increases the risk of high-risk sexual behavior (Y. Gao & Lu, 2020). It can be seen that family factors are of great significance in affecting the mental and sexual health of the elderly men. Another study identified that under the background of China's urban–rural dual structure, education has no significant impact on the physical and mental health of the elderly

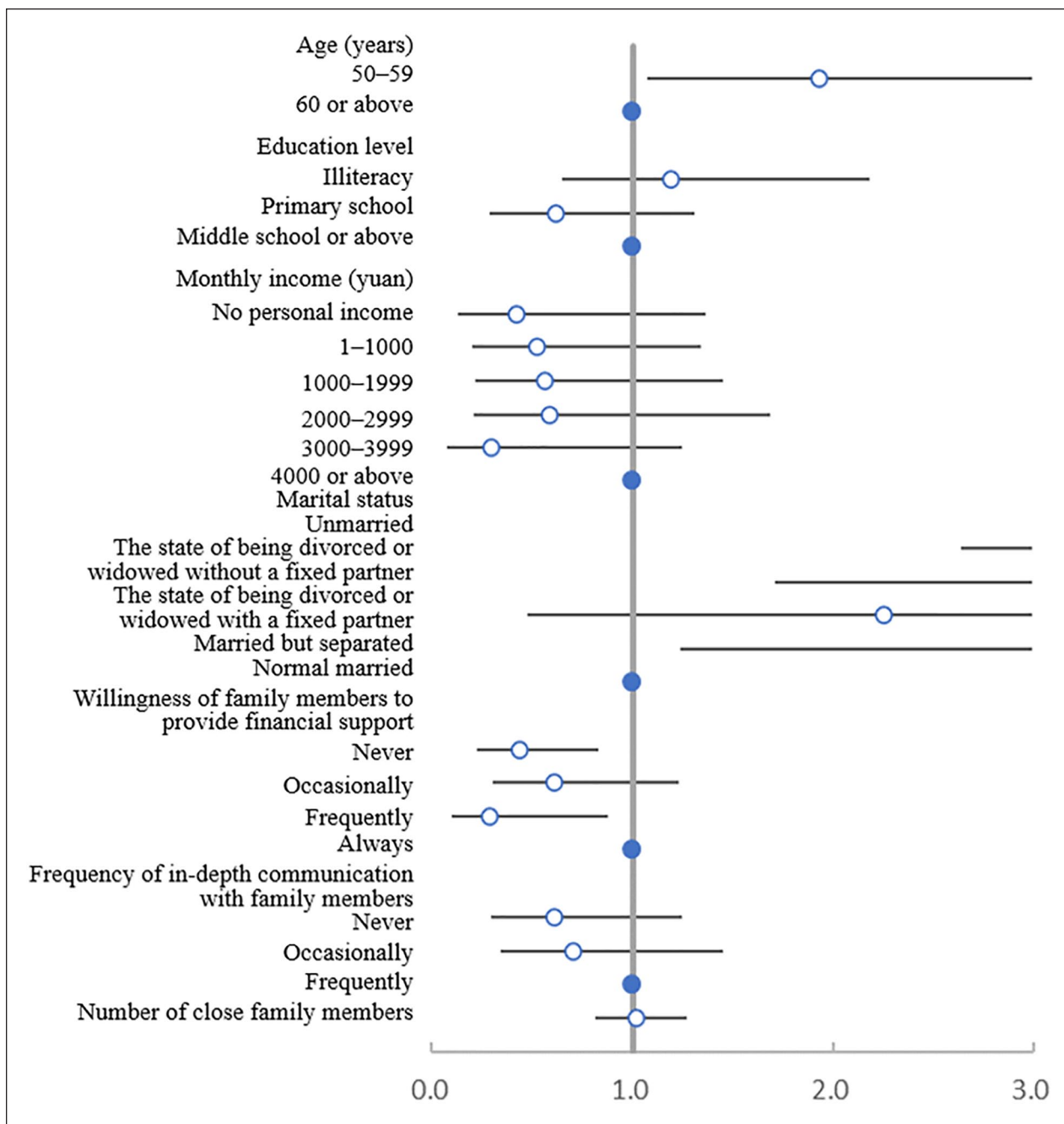


Figure 1. 95% CI Tree View of Regression OR-Value
 Note. OR = odds ratio; CI = confidence interval.

in rural areas, while family size has a significant positive effect on the mental health of rural elderly (Fang, 2020). Therefore, other influencing factors of high-risk sexual behavior of elderly men in rural areas are difficult to predict and intervene due to solidification and convergence limited by economic resources and social status. Family factors highlight their unique research and application value. Combined with the results of this

study and relevant literature (Kiene et al., 2019; H. Li et al., 2013; von Soest et al., 2020; L. Wang et al., 2020; Wu et al., 2019), we predicted that family support factors may affect the occurrence of high-risk sexual behavior of the sample through three intermediate paths: loneliness and life satisfaction, disposable economic conditions, and family responsibility and health belief (Figure 2).

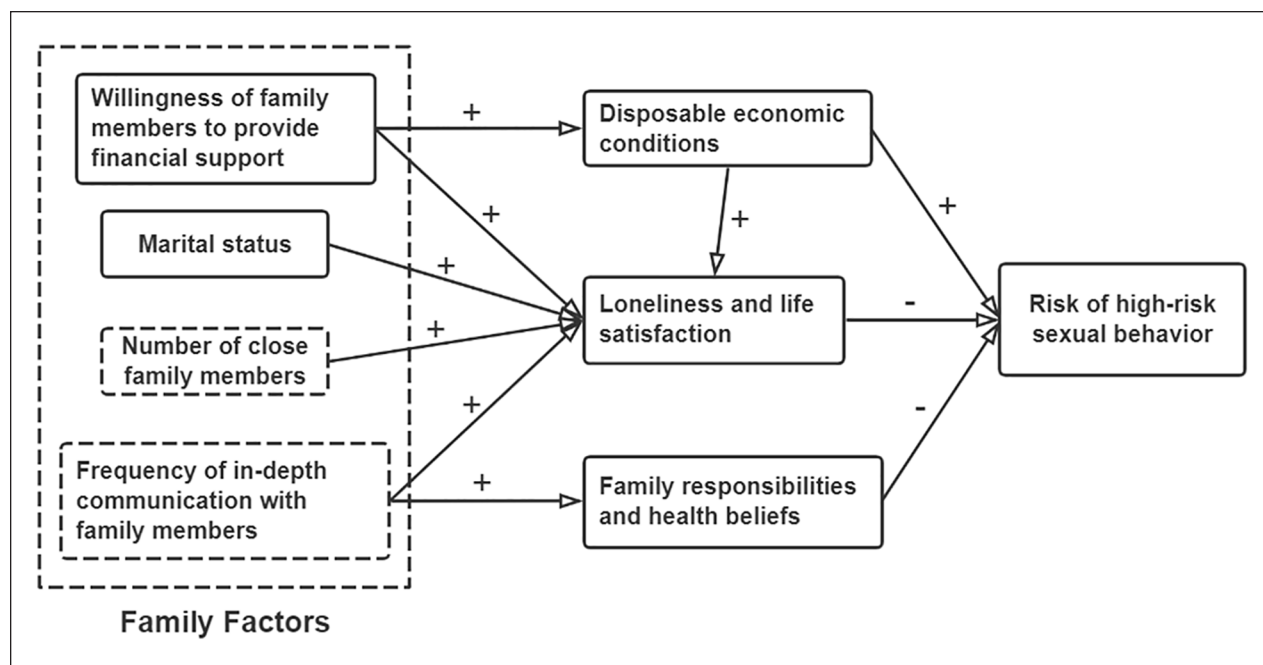


Figure 2. The Influence Path of Family Factors

This study reported that unmarried, divorced/widowed without fixed sexual partners, and married but separated were the risk factors for the increase of commercial sex among rural elderly men. Depression, loneliness, shame, and other negative emotions have been proved to be related to the occurrence of high-risk sexual behaviors in the elderly (Golub et al., 2010; Lovejoy et al., 2015), and with the improvement of negative emotion level, the incidence of high-risk sexual behaviors in the elderly increases (Lovejoy et al., 2015). Discordant couple relationship will make the elderly man feel lonely (von Soest et al., 2020). Emotional communication with family members has a positive impact on the mental health of the elderly (Bai et al., 2020), which can alleviate the loneliness to a certain extent. Studies have found that elderly's sexual satisfaction, daily care of children, families' emotional support, and decision support are all related to the elderly's life satisfaction (Luo et al., 2017; Skąłacka & Gerymski, 2019; L. Wang et al., 2020). When the family is unable to maintain the elderly's life satisfaction, they probably turn to seek emotional support outside their families, leading to an increase in being involved in high-risk sexual behaviors. Combined with logistic regression results of this study and the related literature, this study speculated that "number of close family members," "frequency of in-deep communication with family" and "marital status" can reflect and influence the degree of family support variables, and thus affect the occurrence of poor decision-making and high-risk sexual behaviors

of elderly men in rural areas by influencing loneliness and life satisfaction.

The income of elderly people in rural China mainly comes from the economic support provided by their children and relatives (J. Li & Wang, 2018). One of the variables in this study is "the willingness of family members to provide financial support," and there is no collinearity among the variables, which can better reflect the disposable economic conditions of elderly men after excluding confounding factors such as education level. Studies have reported that compared with low-income groups, middle- and high-income groups have a higher risk of high-risk sexual behaviors. When men's disposable cash is limited, they will reduce the opportunity to buy commercial services (Kiene et al., 2019; J. Zhai et al., 2016). This study speculated that if elderly men have already initiated the bad decision of trying commercial sex, with the increase of the willingness of their families to provide financial support, the daily disposable money will increase, and the opportunity and risk of buying commercial services will increase. Other studies have shown that compared with the elderly with better economic status, the elderly with lower economic income have lower life satisfaction (H. Li et al., 2013), and the elderly with lower income have higher loneliness (Cohen-Mansfield et al., 2016), indicating that the economic level can also affect the occurrence of high-risk sexual behavior through the path of loneliness and life satisfaction.

Family responsibility is an unconditional commitment to the best interests and welfare of other family members in China (Zhang et al., 2013), and in-depth communication and interaction among family members is one of the important channels to cultivate each other's sense of family responsibility (Finch & Mason, 1992). "Frequency of in-depth communication with family (gender and emotional topics)" can reflect the degree of participation in family interaction, and affect the occurrence of high-risk sexual behaviors by affecting the sample's sense of family responsibility to a certain extent. Health belief theory believes that the motivation of behavior and cognition of behavior outcome are important factors to form long-term or short-term health behaviors, and family responsibility is undoubtedly a sufficient motivation to drive each family member to form good health behaviors to maintain the health and stability of the family. Studies have identified that people living with HIV (PLHIV) have a strong sense of responsibility and protection for families (Chakrapani et al., 2010; Wu, 2015; Wu et al., 2019; Zhang et al., 2013). They usually do not have sex with their spouses when facing sexual needs, so as to prevent their spouses from being infected, especially for couples with active relationships, they will engage in less risky sex (Vamos et al., 2013), suggesting the influence of family responsibility and health beliefs on people's attitudes and behaviors.

This study has limitations. First, although probability sampling is adopted in this survey, due to the principle of voluntarism and the survey time from June to July 2019, some elderly men (especially 50–59 years old) who are migrant workers did not participate in this survey, and the incidence of high-risk behaviors of migrant workers is high, which may lead to low-impact results of family factors. Second, the survey data are cross-sectional data, which cannot determine the causal relationship or trend between family support and high-risk sexual behavior of elderly men in rural areas. Therefore, this study is limited to examining the association between variables.

Conclusion

All sectors of society need to pay attention to the sexual health of the elderly men. First of all, the media sector should correctly guide the public opinions, shape a view that sexual activities of the middle-aged and elderly are normal physiological needs among the public, and actively guide the elderly to establish a correct sexual concept, normalize the sexual health problems of the elderly, and lay a foundation for the relevant work of the health department. The elderly men in rural areas are still the focus of HIV/AIDS prevention and health education.

To reduce the risk of HIV infection in the elderly men, health departments should adopt easy-to-understand and targeted publicity and education methods to continuously and effectively improve the awareness rate of health knowledge and AIDS knowledge in rural areas, and strengthen the promotion of condom use.

In the future work, we should strengthen the health education for the families of elderly men, and daily care (including material and emotional support) for middle-aged and elderly families should be actively encouraged. Family education can be included in the health management of the elderly, while providing medical and health services to the elderly men, it should also help strengthen the sense of family responsibility of the elderly and their families. And we should educate and persuade the families of elderly men in the name of reducing loneliness, so as to improve the current situation of target family support; it is suggested that family should give more companionship and emotional communication to elderly men, so as to alleviate their inner depression and loneliness. In addition, the government should vigorously promote the construction of activity centers for the elderly, enrich the cultural and recreational activities of the elderly, reduce their dependence on family support, and transfer their sexual energy, which can reduce the occurrence of high-risk sexual behavior of the elderly men.

Acknowledgments

The authors would like to thank all the members who participated in the investigation, as well as the local center of disease control and prevention and the township health center.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethics Approval and Informed Consent Statements

This study was reviewed and approved by the Ethics Committee of the Affiliated Hospital of Chengdu University of Traditional Chinese Medicine (No. 2019KL-008), and all respondents were informed of the research content and signed informed consent before the survey.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This work was supported by the Humanities and Social Sciences Fund of Ministry of Education of China (No. 18YJA840018).

References

- Araujo, A. B., Mohr, B. A., & McKinlay, J. B. (2004). Changes in sexual function in middle-aged and older men: Longitudinal data from the Massachusetts Male Aging Study. *Journal of the American Geriatrics Society*, 52(9), 1502–1509. <https://doi.org/10.1111/j.0002-8614.2004.52413.x>
- Bai, Y., Bian, F., Zhang, L., & Cao, Y. (2020). The impact of social support on the health of the rural elderly in China. *International Journal of Environmental Research and Public Health*, 17(6), Article 2004. <https://doi.org/10.3390/ijerph17062004>
- Chakrapani, V., Newman, P. A., Shunmugam, M., & Dubrow, R. (2010). Prevalence and contexts of inconsistent condom use among heterosexual men and women living with HIV in India: Implications for prevention. *AIDS Patient Care and STDs*, 24(1), 49–58. <https://doi.org/10.1089/apc.2009.0214>
- Cohen-Mansfield, J., Hazan, H., Lerman, Y., & Shalom, V. (2016). Correlates and predictors of loneliness in older adults: A review of quantitative results informed by qualitative insights. *International Psychogeriatrics*, 28(4), 557–576. <https://doi.org/10.1017/S1041610215001532>
- Fang, H. (2020). Empirical study on the impact of social capital on the health of urban and rural elderly: Based on CGSS mixed cross-sectional data. *Journal of Huazhong Agricultural University (Social Sciences Edition)*, 2, 88–97+166.
- Finch, J., & Mason, J. (1992). *Negotiating family responsibilities*. Routledge.
- Gao, L., Fu, J., Li, S., Li, S., Chen, L., & Zhang, J. (2016). Systematic analysis of HIV prevalence characteristics and associated risk factors in people over 50 years. *Journal of Dermatology and Venereology*, 38(10), 36–42.
- Gao, Y., & Lu, H. (2020). Review of influencing factors of high-risk sexual behaviors among elderly people. *Chinese Journal of AIDS & STD*, 26(4), 452–454+354.
- Golub, S. A., Tomassilli, J. C., Pantalone, D. W., Brennan, M., Karpiak, S. E., & Parsons, J. T. (2010). Prevalence and correlates of sexual behavior and risk management among HIV-positive adults over 50. *Sexually Transmitted Diseases*, 37(10), 615–620.
- He, Y., & Zeng, L. (2017). Urbanization of agricultural transfer population focuses on resolving urban-rural solidification. *Journal of Shenzhen University (Humanities & Social Sciences)*, 34(5), 79–85.
- Huang, Y., Qiu, Z., Li, Z., Liang, G., Yang, J., Lu, W., & Jiang, J. (2018). Analysis of HIV-related behavior and its influencing factors among the elderly people in rural area of Guangxi. *Chinese Journal of AIDS & STD*, 24(11), 1106–1109.
- Jiang, G., Guo, W., Pei, Y., Cai, C., Wu, G., Zhou, C., Lu, R., & Chen, Z. (2018). Survey on extramarital sexual behaviors and HIV infection in middle-aged and elderly people aged 50 and above in selected areas of Chongqing. *Chinese Journal of Epidemiology*, 39(3), 1438–1442.
- Johnson, B. K. (2013). Sexually transmitted infections and older adults. *Journal of Gerontological Nursing*, 39(11), 53–60. <https://doi.org/10.3928/00989134-20130918-01>
- Kang, J., Liu, L., Zhang, Y., Zhao, Y., Liao, Q., & Lin, X. (2014). Survey on the HIV/AIDS high risk behavior and status of elderly men in rural Chongqing. *Medicine and Society*, 27(3), 1–3.
- Kiene, S. M., Ediau, M., Schmarje, K. A., Kintu, M., & Tumwesigye, N. M. (2019). Exploring the potential of savings-led economic strengthening HIV interventions among high-risk economically vulnerable fishing communities in Uganda: Associations between use of commitment savings, sexual risk behavior, and problematic alcohol use. *AIDS and Behavior*, 23(9), 2347–2360. <https://doi.org/10.1007/s10461-019-02475-y>
- Kim, H. Y., Choe, H. S., Lee, D. S., Yoo, J. M., & Lee, S. J. (2019). Sexual behavior and sexually transmitted infection in the elderly population of South Korea. *Investigative and Clinical Urology*, 60(3), 202–209. <https://doi.org/10.4111/icu.2019.60.3.202>
- Li, H., Chi, I., & Xu, L. (2013). Life satisfaction of older Chinese adults living in rural communities. *Journal of Cross-Cultural Gerontology*, 28(2), 153–165. <https://doi.org/10.1007/s10823-013-9189-2>
- Li, J., & Wang, L. (2018). Study on income conditions of the elderly in China—Analysis based on data from the fourth sample survey on the living conditions of China's urban and rural older persons. *Scientific Research on Aging*, 6(6), 3–17.
- Li, N., Li, H., Ma, Y., Fan, P., Yang, W., & Zhu, Q. (2017). A qualitative study on high risk behaviors and related factors of reported HIV/AIDS cases aged 60 years and above in some areas of Henan province. *Chinese Journal of Epidemiology*, 38(9), 1161–1164.
- Lindau, S. T., Schumm, L. P., Laumann, E. O., Levinson, W., O'Muirheartaigh, C. A., & Waite, L. J. (2007). A study of sexuality and health among older adults in the United States. *The New England Journal of Medicine*, 357(8), 762–774. <https://doi.org/10.1056/NEJMoa067423>
- Liu, D., & Cao, X. (2020). Research progress on risk factors of HIV/AIDS infection in men aged 50 years and above in China. *Chinese Journal of AIDS & STD*, 26(3), 325–326330.
- Liu, D., Li, H., Lu, X., Shou, B., Lei, M., Wang, C., Xue, H., & Cao, X. (2019). HIV high-risk sexual behavior and the influencing factors among males aged 50 and over in Hangzhou. *Chinese Journal of AIDS & STD*, 25(5), 459–463.
- Lin, Q., Yang, Y., Sun, X., & Zhu, H. (2011). Investigation on high-risk behavior factors of elderly HIV-infected persons in Zhangjiajie. *Practical Preventive Medicine*, 18(5), 941–943.
- Lovejoy, T. I., Heckman, T. G., Sikkema, K. J., Hansen, N. B., & Kochman, A. (2015). Changes in sexual behavior of HIV-infected older adults enrolled in a clinical trial of standalone group psychotherapies targeting depression. *AIDS and Behavior*, 19(1), 1–8. <https://doi.org/10.1007/s10461-014-0746-7>
- Luo, H., Wu, K., Qian, J., Cao, P., & Ren, X. (2017). Urban-rural differences in the role of family support in the physical and mental health of elderly people in China. *Journal of Sichuan University (Medical Science Edition)*, 48(02), 263–267.
- Ni Lochlainn, M., & Kenny, R. A. (2013). Sexual activity and aging. *Journal of the American Medical Directors*

- Association*, 14(8), 565–572. <https://doi.org/10.1016/j.jamda.2013.01.022>
- Poynten, I. M., Grulich, A. E., & Templeton, D. J. (2013). Sexually transmitted infections in older populations. *Current Opinion in Infectious Diseases*, 26(1), 80–85. <https://doi.org/10.1097/QCO.0b013e32835c2173>
- Skalacka, K., & Gerymski, R. (2019). Sexual activity and life satisfaction in older adults. *Psychogeriatrics: The Official Journal of the Japanese Psychogeriatric Society*, 19(3), 195–201. <https://doi.org/10.1111/psyg.12381>
- Vamos, S., Cook, R., Chitalu, N., Mumbi, M., Weiss, S. M., & Jones, D. (2013). Quality of relationship and sexual risk behaviors among HIV couples in Lusaka, Zambia. *AIDS Care*, 25(9), 1102–1108. <https://doi.org/10.1080/09540121.2012.749339>
- von Soest, T., Luhmann, M., Hansen, T., & Gerstorf, D. (2020). Development of loneliness in midlife and old age: Its nature and correlates. *Journal of Personality and Social Psychology*, 118(2), 388–406. <https://doi.org/10.1037/pspp0000219>
- Wang, L., Yang, L., Di, X., & Dai, X. (2020). Family support, multidimensional health, and living satisfaction among the elderly: A case from Shaanxi province, China. *International Journal of Environmental Research and Public Health*, 17(22), Article 8434. <https://doi.org/10.3390/ijerph17228434>
- Wang, M. (2004). Two greatest difficult problem in the modernization of China: The difference between town and country, and the difference between regions. *Issues in Agricultural Economy*, 5, 4–12.
- Wei, H., Li, B., & Lan, G. (2021). Research progress on the characteristics of HIV/AIDS epidemic among the elderly in China. *Journal of Applied Preventive Medicine*, 27(2), 189–193.
- Wu, P. (2015). *Study on sexual risk behaviors of HIV-positive clients of female sex workers and their associated factors* [Doctoral dissertation]. Anhui Medical University.
- Wu, P., Dong, W. M., Rou, K., Dong, W., Zhou, C., Chen, X., Zheng, J., Scott, S. R., & Wu, Z. (2019). HIV-positive clients of female sex workers in Hunan province, China: A mixed methods study assessing sexual relationships and risk behavior by type of partner. *BMC Public Health*, 19(1), Article 1129. <https://doi.org/10.1186/s12889-019-7446-1>
- Xu, J., Xiao, J., Yang, Y., Li, Y., Fan, S., Wu, X., Li, N., Liao, R., Xi, j, Xiao, W., Bai, Y., Luo, G., Leng, F., Wang, X., Wan, Y., & Wang, R. (2021). Sexual risk behavior of middle-aged and elderly men in rural areas of Chengdu and influencing factors. *Chinese Journal of AIDS & STD*, 27(1), 29–32.
- Xu, Y., & Wang, L. (2011). The prevalence characteristics and risk factors of AIDS among people fifty years or older, at home and abroad. *Chinese Journal of Epidemiology*, 32(11), 1166–1169.
- Yang, Q., Liao, Q., Gong, Z., & Hu, Q. (2018). High risk behaviors of the elderly male HIV/AIDS before and after diagnosis in Jiangxi province. *Chinese Journal of Epidemiology*, 24(9), 1161–1164.
- Yang, S., & Yan, E. (2016). Demographic and psychosocial correlates of sexual activity in older Chinese people. *Journal of Clinical Nursing*, 25(5–6), 672–681. <https://doi.org/10.1111/jocn.12998>
- Yu, H., Zhou, Z., & Wu, B. (2019). Urban-rural gap, agricultural productivity evolution and agricultural subsidies: An analysis from the perspective of new structural economics. *Chinese Rural Economy*, 10, 40–59.
- Yun, L., Zhang, Z., Wang, F., He, J., Gao, W., Lv, Y., Li, S., Zhang, X., & Wang, X. (2017). Epidemiological analysis of sexually transmitted diseases among the elderly in Tangshan City from 2012–2015. *Occupation and Health*, 33(8), 1097–1101.
- Zhai, J., Niu, J., Song, L., Mei, J., Xiao, M., Luo, H., Ma, Y., Zhang, J., Li, W., Yang, Q., & Jia, M. (2016). Prevalence of high-risk behaviors in HIV infected persons aged ≥ 50 years in selected counties of Yunnan province. *Chinese Journal of Epidemiology*, 37(3), 371–374.
- Zhai, Z., Chen, J., & Li, L. (2017). Future trends of China's population and aging: 2015–2100. *Population Research*, 41(4), 60–71.
- Zhang, S., Wei, C., Lu, D., Li, X., Shao, L., Li, Y., & Ruan, W. (2013). The sense of familial responsibility of PLHIVs in the rural areas of western China. *AIDS Care*, 25(10), 1317–1320. <https://doi.org/10.1080/09540121.2013.766301>
- Zhao, F., Gong, Y., Peng, B., Xiao, G., Hu, Y., Zhong, X., Jia, Y., Zhou, W., Lei, S., & Yi, H. (2020). Study on basic characteristics influencing high-risk sexual behavior in elderly males. *Journal of Modern Medicine & Health*, 36(17), 2697–2703.