

# A Meta-analysis of The Prevalence of Depression Among Gay in China

Xu Chengtao<sup>1,\*</sup> Chen Weizhi<sup>2</sup> Gao Jinyu<sup>3</sup> Huang Zhe<sup>4</sup>

<sup>1</sup>*Qingdao University of Science and Technology Law School, Qingdao, Shandong, China*

<sup>2</sup>*Qingdao University of Science and Technology Law School, Qingdao, Shandong, China*

<sup>3</sup>*Hunan University of Chinese Medicine, Changsha, Hunan, China*

<sup>4</sup>*Qingdao University of Science and Technology Law School, Qingdao, Shandong, China*

\* *Corresponding author. Email: 873963773@qq.com*

## ABSTRACT

**Purpose:** To understand the prevalence of depression among gay in China through Meta-analysis and to provide a scientific basis for early psychological intervention. **Methods:** Relevant domestic and foreign literature was searched, and the quality of the included scope was evaluated, and meta-analysis, subgroup analysis and sensitivity analysis were applied to stata15.0. **Results:** A total of 11 papers with a total sample size of 2901 were included, and the prevalence of depression among gay in China was 36.8% [95% confidence interval (CI): 33.1% to 40.5%]. In a subgroup analysis of the depression prevalence profile, the prevalence of depression was higher in high-income areas (40.1%) than in low- and middle-income areas (35%); the prevalence of depression after 2015 (40.3%) was higher than the prevalence before 2015 (34.2%). All differences were statistically significant ( $P < 0.05$ ). Sensitivity analyses were conducted to show that the Meta-analysis results for depression prevalence were stable, and the Egger's test and observation of the distribution across studies in the funnel plot indicated a low likelihood of publication bias. **Conclusion:** For the depression situation of gay in China, appropriate intervention methods should be adopted for early intervention to improve the depression situation of gay.

**Keywords:** *Gay community, Depression, Prevalence, Meta-analysis*

## 1. INTRODUCTION

Gay are often discriminated and rejected by society, and experience multiple pressures and discrimination from society, family and marriage, and their mental health is relatively poor, often accompanied by severe depression. At present, most domestic scholars have focused on the mental health of MSM and HIV patients, but less attention has been paid to individual groups of gay, so the mental health problems of gay need urgent attention. Meta-analysis was conducted to explore the prevalence of depression in the Chinese gay population and to provide theoretical support for appropriate interventions to improve mental health.

## 2. METHODS

### 2.1. Literature Search

In this paper, CNKI, Wan fang, PubMed, were systematically searched for the Chinese search terms

"gay", "sexual minorities" from the time of database construction to December 31, 2020. The Chinese search terms were "gay", "sexual minorities", "mental health", and "depression". The foreign language search terms are "psychological health" OR "mental health" AND "gay" AND "China". The literature search was supplemented by the literature tracing method.

### 2.2. Inclusion and exclusion criteria of the literature

Literature inclusion criteria: (1) The literature study reported the prevalence of easy prevalence or depression among gay, and the sample size. (2) The region of the literature study was mainland China. (3) The literature study clarified the diagnostic criteria or the basis for the diagnosis of depression.

Literature exclusion criteria: (1) The literature study was a qualitative study, literature review, etc. (2) Age  $\leq$  14 years for gay men. (3) The statistical methods of the literature study were not applicable. (4) If there was

duplicate literature or duplicate data, the data with the largest sample size and most comprehensive results were extracted by two investigators according to the inclusion and exclusion criteria.

### 2.3. Data Extraction

For all included studies in the literature the following data were extracted: first author, year of investigation, study area, sampling method, number of depressed people, sample size, and diagnostic criteria.

### 2.4. Literature quality evaluation

Quality scoring was performed using the criteria of the STROBE statement for cross-sectional studies. A score of 1 was given for each article that met or conformed to the entry, and a score of 0 was given for not meeting the entry, for a total of 22 entries, out of 22 points. A total score of  $\leq 11$  was considered low quality, and a total score of  $> 11$  was considered high quality.

**Table 1.** Basic information sheet of the literature

First author	Year of survey	Study area	Sampling Method	Sample size	Diagnostic criteria	Quality evaluation
Xie Yan <sup>[1]</sup>	2015	Shanghai	Voluntary Consultation and Testing Clinic	544	CES-D	14
Huang Fengrong <sup>[2]</sup>	2010	Shanghai	Rolling Snowball	33	SDS	14
Jiang Tingting <sup>[3]</sup>	2016	Zhejiang	Voluntary Consultation and Testing Clinic	349	SDS	13
Hu Shan <sup>[4]</sup>	2016	Chongqing Sichuan	Internet Recruiting NGO Recruiting	603	CES-D	14
Zhou Wei <sup>[5]</sup>	2015	Ningbo	Peer driven	67	CES-D	11
Pan Xuemei <sup>[6]</sup>	2016	Guangdong	Rolling Snowball Peer driven	194	CES-D	11
Zheng Yingjun <sup>[7]</sup>	2005	Anhui	Convenient sampling	93	SDS	8
Shi Guozheng <sup>[8]</sup>	2014	Shanghai	Convenient sampling	81	CES-D	12
Chen Fang <sup>[9]</sup>	2015	Guangdong.Chongqing.Chengdu	Rolling Snowball	439	CES-D	8
Luo Xiaomin <sup>[10]</sup>	2010	Foshan	Voluntary Consultation and Testing Clinic	78	SDS	9
Yu Yong <sup>[11]</sup>	2016	Guangzhou	Peer driven	420	SDS	13

## **2.5. Statistical Analysis**

Meta-analysis of the prevalence of depression among gay in China was performed using stata15.0 software, and Q(Significance level  $P < 0.10$ ) test and  $I^2$ (Significance level  $I^2 \geq 50\%$ ) statistics were calculated to measure the homogeneity of the studies. If  $I^2 < 50\%$  and  $P > 0.05$ , it means that there is less heterogeneity among studies and a fixed-effects model is used, and vice versa, a random-effects model is used. Publication bias was assessed by Egger's test. The stability of the combined prevalence was observed by using different effect models and excluding any of the literature, and if the results did not vary significantly, it suggested that the study results were stable. Subgroup analysis was performed according to geographic region, survey year, diagnostic criteria, and sampling method, and statistically significant if  $P < 0.05$ .

## **3. RESULTS**

### **3.1. Basic characteristics of the literature**

Through the literature search, a total of 367 pieces of literature were obtained, and 206 pieces remained after eliminating duplicate literature. 11 pieces of Chinese literature were finally included according to the inclusion and exclusion criteria, and the literature included a total of 2901 study subjects, of which the number of people with depression was 1132. The basic information of the included literature is shown in Table 1.

### **3.2. Depression among gay in China**

A heterogeneity test of the included 11 papers showed some heterogeneity ( $I^2 = 73.6\%$ ,  $P < 0.05$ ), so a random-effects model was used, and Meta-analysis revealed that the prevalence of depression among gay men in China was 36.8% [95% confidence interval (CI): 33.1%-40.5%].

Subgroup analysis: the prevalence of depression was higher in the gay population in high-income areas (40.1%) than in low- and middle-income areas (35%); the prevalence of depression was higher in the post-2015 gay population (40.3%) than in the pre-2015 (34.2%). The prevalence of depression was

higher in the other sampling methods (40.8%) than in the snowball/peer driven (32.3%) gay cohort. All differences were statistically significant ( $P < 0.05$ ). The prevalence of depression using the SDS diagnostic criteria (40.8%) was higher than the prevalence of CES-D (34.1%). There was no statistically significant difference in the prevalence of depression in the gay population by diagnostic criteria ( $P > 0.05$ ), as shown in Table 2.

### **3.3. Sensitivity Analysis**

The combined prevalence was 38.6% (95% CI: 36.8%-40.3%) using a fixed-effects model and 36.8% (95% CI: 32.7%-40.8%) using a random-effects model, with no significant change in the results; the prevalence of depression did not change significantly after exclusion of any of the included papers. The results of the Meta-analysis of depression prevalence were stable.

### **3.4. Publication bias**

The Egger test method and funnel plot were used to test whether there was publication bias among the studies. Quantitative analysis by the Egger test method showed  $t = -1.51$ ,  $p = 0.166$ , indicating a low possibility of publication bias; observation of the distribution of the studies in the funnel plot also indicated a low possibility of publication bias.

## **4. CONCLUSION**

The prevalence of depression in China's gay male population is currently not given much attention. The present meta-analysis on the prevalence of depression in China's gay male population included 11 papers, through which the analysis showed that the prevalence of depression in China's gay male population is 36.8%, which is significantly higher than the prevalence of heterosexual men in China, which may be related to the discrimination they suffer in different environmental contexts due to their sexual orientation, the This may be related to the discrimination, stigmatization, prejudice and misunderstanding they suffer from in different environmental contexts due to their sexual orientation, which shows that poor psychological status directly affects the quality of life of the gay male population in China.

**Table 2.** Meta-analysis of depression prevalence in various subgroups of gay in China

Analyze the project	Number of literature	Sample size	Number of depressed people	Prevalence ( 95%CI ) ( % )	I <sup>2</sup> ( % )	P-value	H-value	Egger test
Geographical area								
High-income areas	5	1427	579	40.1 ( 35.3-44.9 )	63.60%	< 0.05	1.659	0.718
Middle/low income areas	6	1474	772	35 ( 29.8-40.2 )	80.10%	< 0.05	2.24	0.145
Survey era								
Before 2015	7	1335	484	34.2 ( 29.2-39.2 )	64.70%	< 0.05	1.682	0.374
After 2015	4	1566	648	40.3 ( 34.1-46.4 )	83.90%	< 0.05	2.491	0.121
Diagnostic criteria								
CES-D	6	1928	756	34.1 ( 28.5-39.8 )	83.60%	< 0.05	2.469	0.055
SDS	5	973	406	40.8 ( 35.6-46.0 )	53.80%	0.07	1.472	0.504
Sampling Method								
Snowballing/peer push	5	1153	405	32.3 ( 25.8-38.7 )	77.70%	< 0.05	2.119	0.339
Other	6	1748	727	40.8 ( 36.8-44.8 )	57.90%	< 0.05	1.542	0.401

In the subgroup analysis, the prevalence of depression was lower in low- and middle-income regions than in high-income regions, where life stress, work pressure and lack of human feelings lead to more severe depressive tendencies in sexual minority groups, as the gay male population has difficulty in receiving more social support and is under more psychological pressure. Different regions have different levels of social support and openness, and different levels of social support and openness directly affect people's psychological health [12]. Snowballing or peer-driven surveys limited to a group of people with similar idea attributes can create a significant underrepresentation problem. This is because a group of people with similar views is often identified through the results of mutual referrals. Therefore, different sampling methods may be influenced by the subjective consciousness of the sampled group and have some influence on the analysis

results. This study did not find an effect of different diagnostic criteria on the prevalence of depression in the gay population, which may be the result of large differences in sample size between studies and different levels of control for confounding factors and criteria.

The advantage of the present study is that the Meta method was used to analyze the prevalence of depression in the gay male population in China in a comprehensive manner, to fully understand the mental health status of the gay male population in China, and to provide a basis for reasonable interventions for policy makers. In addition to the shortcomings of the Meta-analysis method itself, this study still has two shortcomings.

(1) China is a vast country, and the prevalence of depression in homosexuals varies across geographic and cultural backgrounds, all of which lead to a high degree of heterogeneity, so the conclusions need to be verified

by more studies.

(2) Different ages, family histories, and life experiences have a great impact on the mental health of gay men, which could not be further analyzed and tested in this paper.

## ACKNOWLEDGMENTS

Mid-term Achievements of "Exploration and Practice of "Four-dimensional One" Talent Cultivation Model for Social Work Majors for the Construction of New Liberal Arts", Cultivation Project of Teaching Achievement Award of Qingdao University of Science and Technology in 2020

## REFERENCES

- [1] XIE Yan; LIU Ying; YANG Yong-mei, Analysis on depressive symptoms and related factors of men who have sex with men attending HIV voluntary counseling and testing clinics in Shang hai [J], Chinese Journal of Disease Control & Prevention, 2018,22(12):1248-1251.
- [2] Huang Feng-rong, HUANG Hong, ZHUANG Ming-hua, FANG Hui, LI Sheng-hui, YE Xiu-xia, WANG Jun-li, CHEN Tao, Investigations on social psychology and sexual behavior of 52 male homosexual adolescents in Shanghai[J], Journal of Shanghai Jiaotong University (Medical Science), 2010, 30(05): 581-584.
- [3] Jiang Tingting; Pan Xiaohong; Wang Hui; Zhou Xin; Ma Qiaoqin, Depressive, anxiety symptoms and related influential factors among man who have sex with man in Zhejiang[J], Chinese Journal of AIDS & STD,2016,22(05):357-360+368.
- [4] HU Shan; ZHONG Xiao-Ni; WEN Xiao-Yan; HAN Ming-Ming; TAN Ming-Tian; HUANG Ai-Long; PENG Bin, Characteristics of anxiety and depression symptoms among gays and bisexual men with HIV negative[J], Chinese Mental Health Journal, 2016, 30(03): 213-219.
- [5] ZHOU Wei; WU Feng; GONG Jing, A study on the status of depressive symptoms and its influencing factors among men who have sex with men[J], Zhejiang Journal of Preventive Medicine, 2015, 27(07): 657-660.
- [6] PAN Xue-mei; CHEN Zhen-bo; ZHENG Wen-Juan; HUANG Jin-Mei; DENG You-liang; CHEN Zhuo-tong, Investigation of current status of depression, quality of life and influencing factors among men who have sex with men in Lianzhou [J], Jiangsu Journal of Preventive Medicine, 2016, 27(01): 44-47.
- [7] ZHENG Ying-Jun; XU Juan; ZHANG Hong-Bo, Anxiety, Depression and High-risk Behaviors among Men Who Have Sex with Men[J], Chinese Mental Health Journal,2005(10):57-59.
- [8] SHI Guo-zheng; YIN Fang-lan; ZHANG Yong, Study on Depression Status and Related Factors among Men who have Sex with Men in Jiading District[J], Chinese Primary Health Care, 2014, 28 (04):65-67.
- [9] CHEN Fang; DING Fan; LIN Xiao-Jie; WANG Xiao-Dong; HE Huan; HUANG Wen; DONGYan-Yan; YANG Qiao-Hong; ZHANG Hong-Bo, Prevalence rates of depression and anxiety in HIV -infected men who have sex with men[J], Chinese Mental Health Journal, 2015,29 (04):251-257.
- [10] LUO Xiaomin; LIU Jun; LIANG Zimian; LI Yan; LI Jing; TAN Zhimin; YANG Yi, Depressive symptoms and related factors among men who have sex with men in Foshan[J], Journal of Guangdong Pharmaceutical University, 2018, 34(01): 115-118+123.
- [11] Yu Yong; Wu Ting; Li Ya, Gay Men's Gender Roles and Mental Health in Guangzhou, China Journal of Health Psychology[J], [11]2016, 24(11): 1618-1622.
- [12] S.attler FA, Ulrich W, Hanna C. Effects of Minority Stress, Group Level Coping, and Social Support on Mental Health of German Gay Men[J]. PLoS One, 2016,11(3): e0150562.