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COVID-19, SARS, and MERS: The Risk Factor Associated with Depression and its Impact on Psychological Well-Being among Sexual Moralities

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Abstract

The current state of depression and mental health of old adults and factors influencing them were examined during the epidemic period. Mental health and factors influencing the SARS, MERS, and COVID-19 epidemic. From a worldwide perspective, this paper concludes: that gender, living in high-risk areas, social capital, and other variables have a substantial impact on the degree of depression. No significant effects were observed in education, age, or age group. However, income, having children, and exercise habits contributed to some epidemic situations. From a global perspective, gender, social capital, and income significantly influence mental health. Older adults' mental health is not affected by high-risk areas. However, their level of education and exercise habits might make a difference when there is an epidemic. Finally, when it comes to depression, Hong Kong and the rest of the world differ mainly in gender and education. Hong Kong and the rest of the world have primarily differences in whether they live in high-risk areas, which is not significant globally. Based on the Hong Kong sample, the mental health level of the sample living in high-risk areas is significantly lower than those living in medium and low-risk areas. This paper explores the differences in the scores of depression and mental health between Hong Kong and the world. For the degree of depression, the differences between Hong Kong and the world are mainly concentrated in the differences of gender and education. Global education level has no significant effect on the depression level of older LGBT adult groups during the three epidemics, but the higher the education level, the lower the depression level in Hong Kong.

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Introduction

Large-scale epidemic disease is an essential enemy of sustainable human development. Throughout the history of human development, the threat of large-scale infectious diseases to humanity has never been far away. The Black Death hit Europe, which was still in the ignorant middle Ages at that time, causing more than two-thirds of the people in Europe to die. The Spanish pandemic once hit the brutal Spanish government. SARS in 2003, MERS in 2010, and COVID-19 in 2020 are new challenges of large-scale infectious diseases faced by humanity since the new century [1].

The prevention and treatment of large-scale infectious diseases has always been a difficult problem in the medical field. For new emerging epidemic viruses, SARS, MERS or COVID-19 viruses are always lacking in understanding, and their transmission routes, pathogenesis and treatment methods need to further explore [2]. In the process of exploration, the virus may also produce mutations, which makes the previous research useless. Large scale infectious diseases are the eternal challenges facing human medicine.

It is in this context that whenever large-scale infectious diseases spread, the psychological construction of human society will face great challenges. The uncertainty of epidemic spread and the pain and helplessness after infection are very easy to become the source of anxiety and depression of ordinary people. According to the epidemic situation of COVID-19 pneumonia in 2020, it first broke out on a large scale in Wuhan, Hubei Province, China. The spread of the epidemic has brought great psychological pressure to Wuhan citizens and all Chinese people. Many citizens have psychological problems such as anxiety and depression to varying degrees, even depression, and people's mental health has been challenged during the epidemic [3,4].

LGBT is an acronym for lesbians, gays, bisexuals and transgenders. In the 1990s, the term "LGBT" came into being and gradually became popular because the term "gay community" could not fully reflect the relevant groups [5]. LGBT group, also known as sexual minorities, has long been marginalized by the mainstream society as a special group, and the mental health of its members is worse than that of ordinary people [6,7]. The theme of this study is to study the related factors that affect the psychological depression of the old LGBT population in the three epidemic periods of SARS, MERS and COVID-19 by regression analysis, and analyze the overall impact of these factors on their mental health [8].

Materials and methods

Study design

This study uses the methods of literature, questionnaire and statistical analysis to measure the variables such as social capital, social network density, scale and physical and mental health of the old adults during the epidemic, and makes an empirical analysis on the relationship between the variables.

Literature method: Before the study, the authors read the related research on the influence of SARS, MERS and COVID-19 epidemic on group depression and mental health. On the basis of literature reading, the questionnaire topics needed to study the related variables such as depression and mental health of the old adults are determined, and the multiple linear regression model is selected as the statistical analysis method of this study. Literature reading lays a theoretical foundation for the follow-up study of this paper.

Second hand data method: Data is not only the basis of constructing index system, but also the basis of statistical analysis. The author constructed the correlation between social capital and physical and mental health of the old adults during the epidemic. In order to ensure the accuracy and detail of data collection, the author collected first-hand data by using the online questionnaire distribution platform.

Statistical analysis method: Data collection is for better statistical analysis. On the basis of reading relevant literature, multiple linear regression model is selected as the statistical analysis method of this study.

Setting and participants

The subjects of this study were the depression, general mental health and influencing factors of older LGBT adults in the three epidemic stages of SARS, MERS and COVID-19 in the world. The gender, age, income, family status, psychological depression and overall degree of mental health of older LGBT adults were measured by questionnaire, so as to provide basis for subsequent descriptive statistical analysis to prepare correlation analysis and regression analysis.

After data collection, the author analyzed and tested the data, mainly used spss.25 software to analyze the reliability and validity of the data, and eliminated the singular values in the sample. Finally, the retained and extracted information mainly includes the age, gender and number of family members of old LGBT adult's groups. Finally, this study focuses on the depression and mental health of the old adults group [9].

Study instruments

The questionnaire survey of this study mainly refers to relevant foreign studies. For the measurement of depression in the old adults, the author mainly refers to the GDS scale. Founded by brink TL et al. In 1982, it has become a depression screening scale specially designed for the old adults, which has been widely accepted and applied by various countries and has good reliability and validity [10,11]. Experts from various countries analyzed GDS from various inducing factors of senile depression, and obtained the revised version of GDS suitable for their own countries, which was widely used by researchers from various countries [12,13]. GDS scale contains 30 items, which describes the main manifestations of senile depression, including decreased life satisfaction, decreased interest in activities, emptiness, boredom, loss of hope for the future, worry, decreased energy and so on; Each item is a short sentence, and the subjects choose according to whether they have symptoms or not; Ask the subjects to answer "yes" or "no"; There are 20 items in the scale, and the positive score is adopted. The answer "yes" means depression, and the score is "1", and the answer "no" is "0"; Ten items (1, 5, 7, 9, 15, 19, 21, 27, 29, 30) were scored inversely, that is, the answer "no" means depression, the score is "1", and the answer "yes" means "0"; The main statistical index of GDS is the total score, ranging from 0 to 30; The total score reflects the degree of depressive symptoms; The total score of the scale ≥ 11 points is regarded as having depressive symptoms, including 11 ~ 20 points for mild depression and 21 ~ 30 points for moderate and severe depression [14].

12 item General Health Questionnaire (GHQ-12) is selected as the screening tool of general mental health, which has been widely used in clinical and general groups in many countries.

The screening tool of general mental health questionnaire has been widely used in clinical and general groups in many countries, and has been supported by ideal psychological measurement indicators [15]. The questionnaire includes 12 questions. There are three scoring methods, namely Likert method, C-GHQ method and GHQ standard method. The research shows that Likert method is the most reasonable scoring method [16]. Therefore, Likert method is selected in this paper. In this study, Likert method adopts 4-level scoring from "never", 3 from "rarely", 2 from "sometimes" and 1 from "often". The score range is 12-48. The higher the score, the higher the level of mental health [17].

Statistical analysis

The demographic variables of the collected samples, mainly reports the age, epidemic situation, education level, gender, number of family members, family income and other contents of the samples [18], and focuses on the descriptive statistical analysis of the depression and overall mental health of the samples during the three different epidemic periods. The results are as follows:

Table 1: Descriptive statistics of SARS, MERS and COVID-19.

Type	Variable	Number of Observations	Mean Value	Standard Deviation
Independent variable	SARS	104		
	MERS	104		
	COVID-19	104		
Dependent variable	Depression score of the older adults	312	7.902	2.362
	Mental health	312	5.012	2.117

Table 2: Descriptive statistics of Categorical variable.

		Frequency	Percentage	Effective Percentage
Gender	Male	169	54.2	54.2
	Female	143	45.8	45.8
	Total	312	100.0	100.0
Income	<60000	61	19.6	19.6
	60000<X<120000	60	19.2	19.2
	120000<X<200000	88	28.2	28.2
	200000<X<300000	79	25.3	25.3
	>300000	24	7.7	7.7
	Total	312	100.0	100.0
Children	No children	69	22.1	22.1
	Have a child	230	73.7	73.7
	Having more than two children	13	4.2	4.2
	Total	312	100.0	100.0
Education	Below junior high School	36	11.5	11.5
	High school vocational school	81	26.0	26.0
	College	130	41.7	41.7
	Undergraduate college	40	12.8	12.8
	Graduate and above	25	8.0	8.0
	Total	312	100.0	100.0
Age	60-64	110	35.3	35.3
	65-69	127	40.7	40.7
	70-74	49	15.7	15.7
	>75	26	8.3	8.3
	Total	312	100.0	100.0
Geographical distribution	Hong Kong	107	34.3	34.3
	Rest of the world	205	65.7	65.7
	Total	312	100.0	100.0

From the above table1 and 2, there are 169 men and 143 women, accounting for 54.2% and 45.8% respectively. The gender distribution of men and women is relatively uniform. The sample size of men and women is more than 50, which belongs to a large sample and can be used for statistical analysis. There are 61 samples with an annual household income of less than 60000 yuan, 60 samples with an annual household income of more than 60000 yuan but less than 120000 yuan, 88 samples with an annual household income of more than 120000 yuan but less than 200000 yuan, 79 samples with an annual household income of more than 200000 yuan but less than 300000 yuan, and 24 samples with an annual household income of more than 300000 yuan. The annual income of the five families accounted for 19.6%, 19.2%, 28.2%, 25.3% and 7.7% respectively. The annual income distribution of the sample families is relatively uniform, and the early data collection has laid a solid foundation for the follow-up analysis.

In addition, 69 samples had no children, 230 samples had one child, and 13 samples had more than two children, accounting for 22.1%, 73.7% and 4.2% respectively. 36 people with junior middle school education, 81 people with senior high school and vocational high school education, 130 people with college education, 40 people with undergraduate education and 25 people with graduate education or above. The five education levels account for 11.5%, 26.0%, 41.7%, 12.8% and 8.0% respectively. The education level of the sample is evenly distributed.

The sample is mainly young and old people in age distribution. Among them, there are 110 samples aged 60-64, 127 samples aged 65-69, 49 samples aged 70-74 and 26 samples aged 75 and over, accounting for 35.3%, 40.7%, 15.7% and 8.3% respectively. Another focus of this paper is to compare the differences between the influencing factors in Hong Kong and the rest of the world, so it is necessary to conduct regression analysis specifically for Hong Kong. From the above table, it can be seen that among all 312 samples, there are 107 samples in Hong Kong, accounting for 34.3%, and 205 samples in the rest of the world, accounting for 65.7%.

On the basis of descriptive statistical analysis, the influencing factors of depression and mental health of the world's older LGBT adults in the epidemic period were analyzed by regression to determine the influencing factors.

Table 3: Regression results of psychological depressed of older LGBT adults in Worldwide.

Models and variables	Depressed of LGBT older adults		
	COVID-19 (2020)	SARS (2003)	MERS (2014)
Male	-.107*	.103*	.112*
High risk areas	1.014*	1.019*	1.021*
Income of more than 300000 yuan	-.069	-.174*	-.175*
No children	.098*	.088	.089
Undergraduate college	.054	.053	.054
No exercise habit	-.071*	-.021	-.079*
60-65 years	-.154*	.062	.058
Outreach social capital	-.093*	-.096*	-.093*
Cohesive Social capital	-.173*	.067	.077
R^2	22.7%	24.8%	24.8%
F value	19.77***	21.46***	23.56***

Note 1: * * * P < 0.01, * * P < 0.05, * P < 0.1 (two tailed test).

Table 3 shows the regression model which includes the respondents' gender, family income, whether there are children, education level, physical exercise habits, age and social capital. The model corresponds to the regression results of COVID-19 epidemic. Model two corresponds to the regression results of SARS epidemic, and the regression results of model MERS corresponding to MERS epidemic. The dependent variable of this regression is the degree of depression of the respondents.

The R^2 corresponding to the regression results of model I, that is, for the COVID-19 epidemic situation, is 0.227, indicating that the regression model included in the above independent variables can explain 22.7% of the variation degree of dependent variables, has certain explanatory power, and the corresponding F value is 19.77, which is significant. From the specific observation coefficient table, we can see that among the many independent variables, gender variables play a significant role in the degree of depression of respondents during the period of COVID-19, and the degree of depression of female respondents is significantly higher than that of male respondents worldwide. Respondents living in high-risk areas also tend to have higher levels of depression. Income has an effect on the degree of depression, but it is not significant. Older LGBT adults without children tend to show higher depression scores. Compared with the old adults with exercise habits on weekdays, the old adults without exercise habits tend to score lower in the degree of depression. This may be because people with exercise habits reduce going out and interrupt their exercise habits, which will lead to depression. Having more social capital, that is, friends, can often reduce the psychological depression score of older LGBT adult's groups during the COVID-19 epidemic.

Furthermore, the corresponding R^2 of model two, which is the result of the SARS epidemic, is 0.248. It is explained that the regression model with the above independent variables can explain 24.8% of the variation of the dependent variable, and has a certain explanatory power. The specific observation coefficient table shows that among the many independent variables, the gender variables play a significant role in the depression level of the respondents during the SARS epidemic. Worldwide, the degree of depression of female respondents is significantly higher than that of male respondents [19]. Respondents living

in high-risk areas also tend to have higher levels of depression. Income has a significant impact on the degree of depression. Worldwide, the higher the income, the lower the degree of depression. Whether there is a child has no significant effect on the degree of depression among respondents during SARS. The significant negative effect of social capital on psychological depression during the epidemic still exists. Whether there is physical exercise habitat ordinary times has no significant impact on the degree of depression of older LGBT adults' groups during the epidemic [20].

From the table 3 that the R^2 corresponding to the regression result of model III, that is, for the MERS epidemic, is 0.241, indicating that the regression model included in the above independent variables can explain 24.1% of the variation degree of dependent variables, which has a certain explanatory power. The specific observation coefficient table can see that among many independent variables, gender variables play a significant role in the depression degree of respondents during the MERS epidemic, Worldwide, the degree of depression of female respondents is significantly higher than that of male respondents [21]. Respondents living in high-risk areas also tend to have higher levels of depression. Income has a significant impact on the degree of depression. Worldwide, the higher the income, the lower the degree of depression. Whether there are children or not has no significant effect on the degree of depression of the respondents during MERS. The significant negative effect of social capital on psychological depression during the epidemic still exists. Whether they have the habit of physical exercise at ordinary times has a significant impact on the depression degree of older LGBT adults' groups during the epidemic. Respondents who have the habit of physical exercise at ordinary times tend to have higher depression scores during the MERS epidemic, because the epidemic makes them unable to go out and maintain their exercise habits, so they fall into deeper depression [22].

By observing the difference of the three coefficient tables, it can be found that different factors play different roles in three epidemic situations, such as COVID-19, SARS and MERS. The similarities of the three epidemic situations are as follows: First, from a worldwide perspective, gender has a significant impact on the degree of depression of the surveyed old adults' groups, and the average degree of depression of women is significantly higher than that of men; second, whether living in high-risk areas also has a significant impact on the degree of depression of the surveyed old adults. The degree of depression of residents in high-risk areas is significantly higher than that in low-risk areas. Third, the level of education did not show significant effect on the degree of depression in the three epidemic situations; fourth, in the three epidemic situations, social capital has a significant negative impact on the degree of depression of the respondents. The difference is: First, the income shows a strong significance in the epidemic situation of SARS and MERS, that is, the lower the income is, the higher the score of depression is, but it does not show significant in the COVID-19 epidemic. Second, whether there are children is significant in the covid-19 epidemic, but not in the other two epidemics; third, whether there is exercise habit is significant in COVID-19 epidemic and MERS epidemic. People with exercise habit tend to fall into deeper depression in the epidemic. However, there was no significant difference in the SARS epidemic.

Table 4: Regression results of mental health of older LGBT adults.

Models and variables	Mental health of older LGBT adults		
	COVID-19 (2020)	SARS (2003)	MERS (2014)
Male	-.211*	-.198*	-.173*
High risk areas	-.014	-.019	-.021
Income of more than 300000 yuan	-.269*	-.274*	-.175*
No children	.017	.020	.009
Undergraduate college	-.169*	-.143*	-.174*
No exercise habit	131*	-.021	.129*
60-65 years	.054	.062	.058
Outreach social capital	.107*	.193*	.196*
Cohesive social capital	.105*	.103*	.147*
R^2	23.8%	29.7%	28.2%
F value	21.17***	23.46***	25.12***

Note 1: * * * P < 0.01, * * P < 0.05, * P < 0.1 (two tailed test).

Table 4 shows the regression models which include the respondents' gender, family income, whether there are children, educational level, physical exercise habits, age and social capital. The model corresponds to the regression results of COVID-19 epidemic. Model two corresponds to the regression results of SARS epidemic, and the regression results of model MERS corresponding to MERS epidemic. The dependent variable of this regression is the mental health of the respondents.

The R^2 corresponding to the regression result of model I, that is, for the COVID -19 epidemic situation, is 0.238, indicating that the regression model included in the above independent variables can explain 23.8% of the variation degree of dependent variables, has certain explanatory power, and the corresponding F value is 21.17, which is significant. The specific observation coefficient table shows that among the many independent variables, gender variables play a significant role in the degree of depression of respondents during the period of COVID-19. The mental health of female respondents is significantly lower than that of male respondents worldwide. There was no significant difference in mental health between the respondents living in high-risk areas and those living in low-risk areas. Income has a significant impact on mental health. People with higher income tend to have higher mental health scores. Whether they have children or not has no significant impact on the mental health

of old LGBT adults' groups during the covid-19 epidemic [23]. The higher the education level, the higher the mental health level of older LGBT adults' group. Compared with the old adults with exercise habits on weekdays, the old adults without exercise habits also scored significantly lower in the dimension of mental health. Having more social capital, that is, friends, can often improve the mental health score of older LGBT adults groups during the covid-19 epidemic [24].

The corresponding R^2 of model two, which is the result of SARS epidemic, is 0.297. It is explained that the regression model with the above independent variables can explain 29.7% of the variation of the dependent variable, and has certain explanatory power. The specific observation coefficient table shows that among the many independent variables, the gender variables play a significant role in the mental health of the respondents during the SARS epidemic. Worldwide, the mental health score of female respondents is significantly lower than that of male respondents. Living in high-risk or low-risk areas will not have a significant impact on the respondents' mental health. Income has a significant impact on the respondents' mental health. Worldwide, the higher the income, the higher the score of mental health. Whether there is a child has no significant effect on the mental health of the respondents during SARS. The higher the education level, the higher the mental health level of older LGBT adults group. Whether there was exercise habit had no significant effect on the mental health of older LGBT adults group during SARS epidemic. The significant negative effect of social capital on psychological depression during the epidemic still exists. Whether there is physical exercise habitat ordinary times has no significant effect on the degree of depression of old adults groups during the epidemic period.

From the table that the R2 corresponding to the regression result of model 3, that is, for the MERS epidemic, is 0.282, indicating that the regression model included in the above independent variables can explain 28.2% of the variation degree of dependent variables, which has a certain explanatory power. The specific observation coefficient table can see that among many independent variables, gender variables play a significant role in the depression degree of respondents during the MERS epidemic, Worldwide, the mental health score of female respondents is significantly lower than that of male respondents. Living in different risk areas had no significant impact on the respondents' mental health. Income has a significant impact on the respondents' mental health. Worldwide, the higher the income, the higher the score of mental health. Whether there are children or not has no significant effect on the degree of depression of the respondents during MERS. The higher the education level, the higher the mental health level of older LGBT adults group. The significant negative effect of social capital on psychological depression during the epidemic still exists. Whether they have physical exercise habits at ordinary times has a significant impact on the degree of depression of older LGBT adults groups during the epidemic. Respondents who have physical exercise habits at ordinary times tend to have higher mental health scores during the MERS epidemic.

By observing the difference of the three coefficient tables, it can be found that different factors play different roles in three epidemic situations, such as COVID-19, SARS and MERS. The similarities of the three epidemic situations are as follows: first, from a worldwide perspective, gender has a significant impact on the degree of depression of the surveyed old adults groups, and the average mental health score of women is significantly lower than that of men; Second, whether living in high-risk areas has no significant impact on the mental health of the old adults. Third, in the three epidemic situations, social capital has a significant negative impact on the degree of depression of the respondents; fourth, income has a significant impact on the mental health of older LGBT adults groups in the three epidemic situations. The higher the income, the higher the score of mental health. The difference is: first, whether there is exercise habit in the COVID-19 and MERS epidemic cases show a strong significance, that is, the higher the income is, the higher the psychological health of the crowd is, but it does not show significant in the SARS epidemic situation. Secondly, the educational level of respondents showed a significant difference in the COVID-19 epidemic and MERS epidemic situation, but there was no significant difference in the SARS epidemic situation.

Table 5: Regression results of psychological depressed of older LGBT adults in Hong Kong.

Models and variables	Depressed of older LGBT adults		
	COVID-19	SARS	MERS
Male	.124*	.021	.137*
High risk areas	.214*	.119*	.221*
Income of more than 300000 yuan	.069	.074	.075
No children	.017	.012	.017
undergraduate college	.154*	.153*	.154*
No exercise habit	.131*	.011	.129*
60-65 years	.047	.052	.053
Outreach social capital	.193*	.196*	.198*
Cohesive social capital	.127*	.131*	.165*
R^2	28.1%	29.7%	30.1%
F value	23.44***	26.75***	29.18***

Note 1: * * * P < 0.01, * * P < 0.05, * P < 0.1 (two tailed test).

Table 5 shows the regression models which include the respondents' gender, family income, whether there are children, educational level, physical exercise habits, age and social capital. The model corresponds to the regression results of COVID-19 epidemic. Model two corresponds to the regression results of SARS epidemic, and the regression results of model MERS corresponding to MERS epidemic. The dependent variable of this regression is the degree of depression of the respondents in Hong Kong.

The R^2 corresponding to the regression result of model I, that is, for the covid-19 epidemic situation, is 0.281, indicating that the regression model included in the above independent variables can explain 28.1% of the variation degree of the dependent variable, has a certain explanatory power, and the corresponding F value is 23.44, which is significant. The specific observation coefficient table shows that among the many independent variables, the gender variables play a significant role in the degree of depression of the respondents during the period of COVID-19. From the perspective of Hong Kong, the degree of depression of female respondents is significantly higher than that of male respondents. Respondents living in high-risk areas also tend to have higher levels of depression. Income has an effect on the degree of depression, but it is not significant. Having children also had no significant effect on the degree of depression. Compared with the old adults with exercise habits on weekdays, the old adults without exercise habits tend to score lower in the degree of depression. This may be because people with exercise habits reduce going out and interrupt their exercise habits, which will lead to depression. Having more social capital, that is, friends, can often reduce the psychological depression score of older LGBT adults groups during the covid-19 epidemic. Older LGBT groups with higher education tend to have higher levels of depression.

From table 5 that model two is the R^2 corresponding to the SARS epidemic. The corresponding R2 is 0.297, which shows that the regression model with the above variables can explain 29.7% of the variance of the dependent variable. It has certain explanatory power. The specific observation coefficient table shows that gender variables do not have significant effects on the depression level of the respondents during the epidemic period. Respondents living in high-risk areas also tend to have higher levels of depression. Income has an effect on the degree of depression, but it is not significant. Whether there is a child has no significant effect on the degree of depression among respondents during SARS. The significant negative effect of social capital on psychological depression during the epidemic still exists. Whether there is physical exercise habitat ordinary times has no significant effect on the degree of depression of older LGBT adults groups during the epidemic period. Older LGBT groups with higher education tend to have higher levels of depression.

Furthermore, the R^2 corresponding to the regression result of model 3, that is, for the MERS epidemic, is 0.301, indicating that the regression model included in the above independent variables can explain 30.1% of the variation degree of dependent variables and has a certain explanatory power. The specific observation coefficient table can see that among many independent variables, gender variables play a significant role in the depression degree of respondents during the MERS epidemic, from the perspective of Hong Kong, the degree of depression of female respondents was significantly higher than that of male respondents. Respondents living in high-risk areas also tend to have higher levels of depression. Income has an effect on the degree of depression, but it is not significant. Whether there are children or not has no significant effect on the degree of depression of the respondents during MERS. The significant negative effect of social capital on psychological depression during the epidemic still exists. Whether they have physical exercise habits at ordinary times has a significant impact on the depression level of older LGBT adults groups during the epidemic. Respondents who have physical exercise habits at ordinary times tend to have higher depression scores during the MERS epidemic. This is because the epidemic makes them unable to go out and maintain their exercise habits, so they fall into deeper depression. Older LGBT groups with higher education tend to have higher levels of depression.

By observing the difference of the three coefficient tables, it can be found that different factors play different roles in three epidemic situations, such as COVID-19, SARS and MERS. The similarities of the three epidemic situations are as follows: First, whether living in high-risk areas also has a significant impact on the degree of depression of the interviewed old adults groups. The degree of depression of residents in high-risk areas is significantly higher than that in low-risk areas. Second, the degree of education showed significant effect on the degree of depression in the three epidemic situations. The higher the degree of education, the higher the degree of depression; Third, in the three epidemic situations, social capital has a significant nega-

Table 6: Regression results of psychological mental health of older LGBT adults.

Models and variables	mental health of older LGBT adults		
	COVID-19	SARS	MERS
Male	.174*	.181*	.182*
High risk areas	-.214*	-.219*	-.221*
Income of more than 300000 yuan	-.069	-.074	-.075
No children	.018	.011	.021
Undergraduate college	.154*	.153*	.154*
No exercise habit	.131*	-.019	.121*
60-65 years	.034	.022	.018
Outreach social capital	.201*	.198*	.199*
Cohesive social capital	.173*	.212*	.273*
R^2	27.7%	27.1%	28.5%
F value	19.32***	19.11***	20.31***

Note 1: * * * P < 0.01, * * P < 0.05, * P < 0.1 (two tailed test).

tive impact on the degree of depression of the respondents; Fourth, the three variables of income, having children or not and age did not have a significant impact on the degree of depression of the respondents in the three epidemic situations. The difference is: first, gender has a strong significance in COVID-19 and MERS epidemic, that is, the degree of depression is significantly higher than that of men, but it does not show significant in SARS epidemic. Second, whether there is exercise habit is significant in covid-19 epidemic and MERS epidemic. People with exercise habit tend to fall into deeper depression in the epidemic. However, there was no significant difference in the SARS epidemic.

The above table shows the regression model which includes the respondents' gender, family income, whether there are children, education level, physical exercise habits, age and social capital. The model corresponds to the regression results of COVID-19 epidemic. Model two corresponds to the regression results of SARS epidemic, and the regression results of model MERS corresponding to MERS epidemic. The dependent variable of this regression is the mental health of the respondents in Hong Kong.

From the table 6 that the R^2 corresponding to the regression results of model I, that is, for the covid-19 epidemic situation, is 0.277, indicating that the regression model included in the above independent variables can explain 27.7% of the variation degree of dependent variables, has certain explanatory power, and the corresponding F value is 19.32, which is significant. The specific observation coefficient table shows that among the many independent variables, the gender variables play a significant role in the mental health of the respondents during the period of COVID-19. From the perspective of Hong Kong, the scores of mental health of female interviewees are significantly lower than those of male respondents. Respondents living in high-risk areas also tend to have lower mental health scores. Income and having children have an impact on mental health, but it is not significant. Compared with the old adults with exercise habits on weekdays, the old adults without exercise habits tend to have lower scores in mental health and more social capital, that is, friends can often improve the mental health scores of older LGBT adults groups during the covid-19 epidemic. The higher the education level, the higher the mental health level of the respondents.

From table that the corresponding R^2 of model two, which is the result of SARS epidemic, is 0.271. It is explained that the regression model with the above independent variables can explain 27.1% of the variation of the dependent variable, and has certain explanatory power. The specific observation coefficient table shows that among the many independent variables, the gender variables play a significant role in the mental health of the respondents during the SARS epidemic. In Hong Kong, the mental health scores of female respondents were significantly lower than those of male respondents. Respondents living in areas with high epidemic risk also tend to have lower levels of mental health. Income has an impact on mental health, but it is not significant. Whether there is a child has no significant effect on the mental health of the respondents during SARS. Social capital still has a significant positive effect on mental health during the epidemic. Whether there was exercise habit did not significantly affect the mental health of respondents during SARS epidemic. The higher the education level, the higher the mental health level of the respondents.

The R^2 corresponding to the regression result of model 3, that is, for the MERS epidemic, is 0.285, indicating that the regression model included in the above independent variables can explain 28.5% of the variation degree of dependent variables, which has a certain explanatory power. The specific observation coefficient table can see that among many independent variables, gender variables play a significant role in the depression degree of respondents during the MERS epidemic, from the perspective of Hong Kong, the mental health level of female respondents is significantly lower than that of male respondents. Respondents living in areas with high epidemic risk also tend to have lower levels of mental health. Income has an effect on the degree of depression, but it is not significant. Whether there are children or not has no significant effect on the degree of depression of the respondents during MERS. The significant negative effect of social capital on psychological depression during the epidemic still exists. Whether they have physical exercise habits at ordinary times has a significant impact on the mental health of older LGBT adults' groups during the epidemic. Respondents who have physical exercise habits at ordinary times tend to have higher mental health scores during the MERS epidemic. Social capital still has a significant positive effect on mental health during the epidemic. The higher the education level, the higher the mental health level of the respondents.

The difference of the three coefficient tables, it can be found that different factors play different roles in three epidemic situations, such as COVID-19, SARS and MERS. The similarities of the three epidemic situations are as follows: first, from the perspective of Hong Kong, gender has a significant impact on the degree of depression of the surveyed old adults groups, and the average mental health level of women is significantly lower than that of men; Second, whether living in high-risk areas also has a significant impact on the mental health of the interviewed old adults groups. The mental health of residents in high-risk areas is significantly lower than that in low-risk areas. Third, education level has a significant positive effect on mental health in the three epidemic situations; fourth, in the three epidemic situations, social capital has a significant positive impact on the respondents' mental health. The difference of the impact is that whether there is exercise habit is significant in covid-19 epidemic and MERS epidemic, and people with exercise habit tend to fall into deeper depression in the epidemic. However, there was no significant difference in the SARS epidemic.

Discussion

By using the methods of literature, questionnaire and statistical analysis, descriptive statistics of demographic variables such as mental depression, health score, gender, age and other demographic variables in COVID-19, SARS and MERS during LGBT epidemic period were conducted. Regression analysis was conducted on the related factors of mental depression and overall mental health in the old adults during the epidemic period. On the basis of consulting relevant literature, this paper defines the selection of control variables and the measurement methods of independent variables, that is, the measurement of depression and mental health of the old adults.

Through the analysis, from a worldwide perspective, for the degree of depression, gender has a significant impact on the degree of depression of the surveyed old adults groups, and the average degree of depression of women is significantly higher than that of men; Whether living in high-risk areas also has a significant impact on the degree of depression of the surveyed old adults.

The degree of depression of residents in high-risk areas is significantly higher than that in low-risk areas. Education level had no significant effect on the degree of depression in the three epidemic situations; In the three epidemics, social capital showed a significant negative impact on the degree of depression of the respondents; Income in SARS and MERS epidemic showed a strong significance, that is, the lower the income group, the higher the score of depression, but not significant in the COVID-19 epidemic situation. Whether there are children is significant in covid-19 epidemic, but it is not significant in the other two epidemics; whether there is exercise habit is significant in COVID-19 and MERS epidemic. People with exercise habit tend to fall into deeper depression in the epidemic. However, there was no significant difference in the SARS epidemic.

Secondly, from a worldwide perspective, for the level of mental health, generally speaking, gender has a significant impact on the degree of depression of the surveyed old adults groups, and the average mental health score of women is significantly lower than that of men; whether living in high-risk areas has no significant impact on the mental health of the old adults. In the three epidemics, social capital showed a significant negative impact on the degree of depression of the respondents; income has a significant impact on the mental health of older LGBT adults groups in the three epidemic situations. The higher the income, the higher the score of mental health. The difference is: whether or not they have exercise habits show a strong significance in the epidemic situation of COVID-19 and MERS, that is, the higher the mental health of the higher income group, but the less obvious in the SARS epidemic situation. The educational level of the respondents showed a significant difference in the COVID-19 epidemic and MERS epidemic, but not in the SARS epidemic.

Conclusion

Globally, gender variables have significant effects in three outbreaks, but gender variables do not significantly affect the SARS epidemic in Hong Kong. In terms of mental health, the difference between Hong Kong and the world mainly focuses on the variable of whether to live in high-risk areas, which is not significant globally. However, the Hong Kong sample shows that the mental health level of the sample living in high-risk areas is significantly lower than that living in medium and low-risk areas.

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