

Mental Health of Chinese Postgraduates: Meta - Analysis of Studies Using SCL-90 Scale

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Abstract — The Symptom Checklist 90 (SCL-90) was extensively used to investigate postgraduates' mental health in China. However, results of these studies have been inconsistent. The authors collected 64 published and unpublished documents from 2000 to 2015, including 94 independent and effective samples. Then they meta-analyzed those articles in order to systematically assess the mental health status of postgraduates in the past 16 years and found:(1) the mental health of postgraduates was not in serious condition. Located between the 2 norms, the overall mental health status is close to Chinese Normal People Norm (CNPN) and better than Chinese College Norm (CCN) . (2) Along with time, there is a trend for postgraduates to get a lower SCL-90 score. The result can be affected by their major, type of school and other factors. (3)Effects of death rate, consumption level, unemployment rate, growth rate of postgraduate applicants, Gini coefficient, educational appropriations, postgraduate acceptance rate and national college entrance rate were also significant on SCL-90 scores. The changes of social environment also have effects on mental health of postgraduates. Relations need to be highlighted between social change and the mental health of postgraduates in the future.

Keywords - *postgraduates; SCL-90; mental health; Meta—analysis*

I. INTRODUCTION

Postgraduates are now a huge group among the higher education system. The number of them rose sharply from 129,000 in 2000 to 647,000 in 2015. Therefore, it is an important task for us to pay attention to and know about the mental health status of those advanced talents. Among all the tools used to evaluate psychological health in China, SCL-90 is the one that is most widely used and has been exerted to Meta-analyze the mental health of the army members, migrant workers and college students [1.2.3]. When SCL-90 is used to check up a normal person, psychological problems or sub-healthy symptoms are described; this is totally normal in nature [4]. When evaluating the mental health of postgraduates, researchers often use SCL-90 and compare it with Chinese Normal People Norm (CNPN) [5]. Indeed, those previous researches and surveys have provided significant data for us. However, the results of those researches seemed diverse. Three of the major results are: ①“grim”. There are more than a few mental problems among postgraduates and the scores of most factors have proven to be higher than the adult norm set in 1986.This is widely acknowledged by most researchers [6.7.8.9.10.11.12]. ②“favorable”. Zhang & Muo have shown that Chinese postgraduates perform pretty well mentally on the whole [13]. ③“the same as others”. Many researchers concluded that while differences could exist between the SCL-90 factor scores of postgraduates and CNPN, they are of no statistical

significance and the differences are too small to be taken into account [14.15].

In terms of horizontal-comparison research, comparisons were made between the mental health of undergraduates and postgraduates. Besides, comparisons were also made among the differences of various factors in the internal group of postgraduates. For example, Fang evaluated mental health of the postgraduates using Chinese College Norm (CCN) as the control group. As a result, 37.8% of the postgraduates are tested positive, and the psychological health levels of them are relatively higher than that of average college students [16]. While a study in 2003, having surveyed students in 40 colleges claimed that 30% of the postgraduates were afflicted with serious mental disorders, 8% higher than the rate of undergraduates. Furthermore, the affliction rate of female postgraduates (37.35%) was higher than that of male ones (26.25%) [17]. Some researchers also approved of the statement that girls were more vulnerable than boys in terms of mental health [13.14]. However, other researchers have proved otherwise [18]. Some made their studies specific on those postgraduates majoring in medicine, and also came to a range of different results [19.20]. In conclusion, it is still unknown to us whether the mental health of postgraduates is worse than adult norms, whether gender, campus, or financial condition exerts an impact on their mental health and whether medical related student have their own laws of

mental changes. So, the results will not be listed all in this paper.

II. METHODS

A. Literature Collection

Key words like“SCL-90, postgraduates (masters and PhDs), mental health, and mental hygiene” were searched respectively on China Journal Net, excellent master and PhD dissertation database, Wei Pu Information and Wan Fang data. Criteria for literature selection: ①The subjects involved must be postgraduates of China mainland, including masters and PhDs.②SCL-90 must be used as a research tool. ③The sample size of the first 9 factors researched, factor average as well as the standard deviation must all be specifically reported. ④The survey must be conducted at usual times, which means days like when the second round of examination of postgraduates enrollment are held or the eve of graduation are excluded. With the criteria mentioned above to read and select articles, reviews and meta-analysis articles as well as the studies with incomplete data and the republished ones were then removed. Finally, we acquired 64 documents, including 94 independent and effective samples.

B. Literature Coding

Feature coding of primary literature. Since 7 of the 64 articles only provide research data of the sub-items, the dealing methods of previous meta-analysis were referred to [21]. The results of the sub-researches were weighed and combined, and the conclusive results were acquired through the formula $S_T = \sqrt{[\sum n_i s_i^2 + \sum n_i (x_i - \bar{x})^2] / \sum n_i}$ (\bar{x} : combined average; S_T , combined standard deviation; n_i : sample size of a certain sub-research; x_i :average of a certain sub-research; s_i : standard deviation of a certain sub-research) . Gender of the participants, university quality, publication type, major, publication time, sample size, major conclusion and the factor average of the first 9 factors and standard deviation are all coded in order to set up a database. Of all the 64 articles, the total sample size was 48546, with the maximum size of 9522 and the minimum size of 34; the participants were from various parts of China, and 23 of the articles were set in the East China, 19 in Central China, 13 in the West China and 7 unknown; 18 of the articles were published on core periodicals, 37 on ordinary ones, and 9 are dissertations; the publication time spans from 2000-2015. The distributions over the years are shown in table 1.

TABLE 1. SCL-90 DATA COLLECTION OF POSTGRADUATES AND ITS DISTRIBUTION OVER THE YEARS

Time	Total		Gender		School Type		Major	Region			Publication Type		
	Article	Quantity	Sample size	Male	Female	key	Ordinary	Medicine	East	Central	West	Core	Ordinary
2000	1	750	0	1	0	0	0	1	0	0	1	0	0
2002	2	335	2	2	0	1	0	0	2	0	1	1	0
2003	3	965	3	3	3	0	0	2	0	0	3	0	0
2004	5	1218	3	3	1	2	0	2	3	0	1	4	0
2005	5	1868	4	4	2	0	2	1	3	1	0	3	2
2006	1	161	0	0	0	1	1	0	0	1	0	1	0
2007	8	3499	3	3	3	2	3	2	2	2	1	4	3
2008	5	2298	5	5	0	3	5	2	1	2	2	4	0
2009	7	4495	3	3	0	0	1	3	2	1	3	3	1
2010	6	3068	2	2	0	2	5	4	0	1	0	6	0
2011	8	6535	2	2	1	4	5	2	3	2	3	4	1
2012	3	3804	1	1	1	0	2	1	0	0	1	0	2
2013	2	2425	2	2	1	0	1	2	0	0	2	0	0
2014	4	7608	4	4	1	1	1	0	2	2	0	4	0

2015	3	10192	2	2	2	0	0	1	1	1	0	3	0
Total	64	48546	37	37	16	17	26	23	19	13	18	37	9

C. Statistical Method

1) Calculation of Effect Size

Effect size is a common statistical indicator. Cohen's d is used in this paper as the effect size. The calculation formula:

$$d = (Me - Mc) / SD$$

$SD = \sqrt{(ne - 1)Se^2 + (nc - 1)Sc^2 / (ne + nc - 2)}$ (Me : factor average of the primary literature; Mc : factor average of norm group; Se^2 : standard deviation of the primary literature, Sc^2 : standard deviation of norm group; ne : sample size of the primary literature, nc : sample size of the norm group)[22]. Combined effect size \bar{d} is the final statistical indicator of meta-analysis. $\bar{d} = \sum Widi / \sum Wi$,

$Wi = 2ni / 8 + di^2$ (Wi : weight of the i th research; di : effect size of the i th research; ni : sample size of the research) Then we can make the statistical judgment by the condition if or not "0" is contained in 95% of the confidence intervals of the combined effect size: if contained, the effect size is of no statistical significance; If not, the effect size is statistically significant [1,23].

2) Test for Homogeneity

Before the combination, the effect sizes of the multiple researches included in meta-analysis needed to be checked to see if they were homogeneous. The checking formula: $Q = \sum wi(di - \bar{d})^2$, the homogeneity coefficient Q obeys the chi-square distribution of $df = k - 1$ [24]. If the Q values of the factors calculated were below the critical value, the multiple researches were assumed to be homogeneous and then the fixed effects model was adopted to analyze; if above, the multiple researches were assumed to be heterogeneous. There were two methods to handle this: one was to remove the most extreme effect values until homogeneity is achieved, and the other was to use random effects models [25].

3) Evaluation of Publication Bias

There might be a certain degree of "publication bias" of the researches. That is to say, editors of periodicals may prefer reports with remarkable differences. In light of this, first we needed to ensure a more comprehensive gathering of the articles. For example, academic reports and dissertations that have not been published were also included to lower

the risk of publication bias. Another common way was to adopt fail-safe number (Nfs) to check the articles. Nfs , refers to the minimum value of "unremarkable" reports which make the existing conclusions less remarkable. The larger Nfs is the less publication bias is likely to appear. Nfs Cannot be determined through statistical examination and only be determined by standards of experience [4]. $Nfs = (\sum zi / z\delta) - k$ Zi , the standard deviation of primary research; $z\delta$, the critical value of the unilateral test for remarkable level, $z\delta_{(0.05)} = 1.645$, $z\delta_{(0.01)} = 2.33$, k is the number of primary researches. If $Nfs < 5k + 10$, it means the risk of publication bias exists. Rosenthal suggested that researchers should notice that publication bias is not the only factor that affects the result of Nfs . Bornstein et al added that we could also distinguish the bias by directly comparing the published efforts to those who are not.

4) Data Processing and Analysis

The collation of the previous literature, coding and data entry were done through Excel 2010. Excel 2010 was also used to weigh and combine sub-researches test the homogeneity and calculate the publication bias. The combination of effect sizes and subsequent analysis were finished in SPSS20. In the analysis of the relations between social environment and the SCL-90 scores of postgraduates, previous studies [26]. Were referred to and 8 social environment indexes closely related were selected. They are: growth rate of registration for postgraduate examination, death rate, consumption level, unemployment rate, gini coefficient, educational appropriations, postgraduate enrollment rate and national college entrance rate. All the data were from Statistical Yearbook of China.

D Selection of Comparison Standards

The first comparison standard is CNPN, which is built on the basis of 1388 normal adult samples. Most of the researchers used the same norm as the standard in their primary articles, but have failed to come to the same conclusion. Therefore, meta-analysis was used in this paper to get a general conclusion by analyzing the previous studies. And we also selected CCN by Zhang, & Luo as one of our standards [27]. There are two reasons for this. One is that college students and postgraduates are closely related and thus make the comparison more reasonable; the other is that CCN came out later than CNPN, so the former is more up-to-date. CCN also included a larger sample size ($N=4141$) than CNPN. By comparing with the two norms

simultaneously, the conclusion of our research shall be more comprehensive and reliable.

III.RESULTS

A. Test for Homogeneity and Evaluation of Publication Bias

The test result of homogeneity Q is shown in Table 2. The Q value of nine factors and factor average were all larger than critical value 128.80, which means heterogeneity existed in different samples. This may be caused by different publication time or different sample features. Previous methods of meta-analysis have been used for reference in this article and random effects models have also been adopted for analysis [28]. Nine dissertations were

included in the articles, accounting for 14.3% of all the 64 articles. This helped avoid publication bias to a reasonable degree. As shown in Table 2, only the safety factors of hostility ($Nfs = 324.09$) and paranoid ideation ($Nfs = -54.57$) are below the critical value 480, revealing potential publication bias. Having considered the suggestions of Card, we directly compared the average scores of core periodicals, ordinary periodicals and dissertations. The result revealed that homogeneity of variance test was not remarkable (shown in table 2). This indicated that the difference among the 9 factors and factor average of SCL-90 in 3 groups was not distinct. Therefore, we concluded that the publication bias was not evident. However, as mentioned before, the result of Nfs could be affected by other factors.

TABLE 2 RESULT OF TESTS FOR HOMOGENEITY OF EFFECT SIZE AND PUBLICATION BIAS

Factor	Q	$Nfs_{0.05}$	Core Periodical		Ordinary Periodical		Dissertation		F(2 91)
			M	SD	M	SD	M	SD	
somatization	661.23	2178.96	-0.12	0.53	-0.24	0.40	-0.02	0.58	0.89
obsessive-compulsive	681.02	4213.16	0.16	0.54	0.14	0.40	0.38	0.73	0.84
Interpersonal sensitivity	533.15	4721.87	-0.11	0.56	-0.11	0.35	-0.01	0.54	0.19
depression	700.46	1601.61	0.10	0.49	0.02	0.40	0.37	0.83	1.66
anxiety	790.10	10360.41	0.23	0.61	0.25	0.53	0.39	0.64	0.25
hostility	465.76	324.09	-0.02	0.49	-0.10	0.37	0.09	0.48	0.83
phobic anxiety	676.11	8492.25	0.35	0.69	0.16	0.36	0.35	0.62	1.04
paranoid ideation	456.19	-54.57	-0.03	0.46	-0.05	0.28	0.18	0.65	1.17
psychotic	388.96	9117.47	0.27	0.37	0.22	0.30	0.32	0.45	0.33
Factor average	383.03	708.84	0.09	0.44	0.03	0.29	0.22	0.55	0.96

Notes: $\chi^2(93)_{\alpha=0.01}=128.80$; $Nfs = 5k+10=5 \times 94+10=480$

B. SCL-90 Combined Effect Size of Postgraduates

The SCL-90 combined effect size of postgraduates is shown in table 3. Comparing it with CNPN, we knew that \bar{d} ranged from -0.17 to 0.23. The size of the effects (absolute value) was judged by experience according to

Cohen [29]. The effect was small if $d < 0.2$, medium if $0.2 < d < 0.7$, big if $d > 0.8$. According to this standard, only the effects of anxiety ($\bar{d} = 0.23$) and psychotic ($\bar{d} = 0.21$) reached medium level, and the effects of other factors were all small. Zero was not contained in 95% of the

confidence intervals, which indicated the statistical significance. Whereas the difference is very small, meaning the SCL-90 scores of postgraduates were close to CNPN and their mental problems were not serious. Compared with CCN, all the combined effect sizes of postgraduates are negative values ($-0.38 \leq \bar{d} \leq -0.14$). Further, zero was not

contained in 95% of the confidence intervals, and the effects of obsessive compulsive, interpersonal sensitivity, depression, phobic anxiety, paranoid ideation and psychotic were all of medium level, meaning that the overall psychological condition of postgraduates was better than norm college students.

TABLE 3. COMBINED SCL-90 EFFECT SIZES AND 95% OF THE CONFIDENCE INTERVALS OF POSTGRADUATES

F actor	Compared with CNPN			Compared with CCN		
	\bar{d}	95%C ⁻	95%C ⁺	\bar{d}	95%C ⁻	95%C ⁺
somatization	-0.17	-0.19	-0.15	-0.14	-0.16	-0.12
obsessive-compulsive	0.15	0.13	0.17	-0.29	-0.30	-0.27
Interpersonal sensitivity	-0.11	-0.12	-0.10	-0.24	-0.26	-0.22
depression	0.06	0.04	0.07	-0.26	-0.28	-0.24
anxiety	0.23	0.21	0.24	-0.17	-0.18	-0.15
hostility	-0.08	-0.09	-0.07	-0.14	-0.15	-0.13
phobic anxiety	0.20	0.18	0.22	-0.24	-0.26	-0.22
paranoid ideation	-0.03	-0.05	-0.01	-0.38	-0.39	-0.37
psychotic	0.21	0.18	0.23	-0.23	-0.25	-0.21
Factor Average	0.03	0.01	0.05	-0.19	-0.21	-0.18

C. Effects of Feature Differences

1) Gender Effect

The SCL-90 scores of male and female postgraduates from 37 groups of data were compared to find out the influence of gender difference. First, we conducted meta-analysis of the data with male postgraduates being the experimental group and female the control group. As a result, male postgraduates scored a bit higher than girls in 3 factors: interpersonal sensitivity ($\bar{d}=0.03$), psychotic ($\bar{d}=0.01$) and paranoid ideation ($\bar{d}=0.07$). However, male postgraduates all scored slightly lower for the other 6 factors and factor average. Further, zero was contained in 95% of the confidence intervals of factors obsessive-compulsive, interpersonal sensitivity, hostility and psychotic, meaning they were statistically insignificant. The

combined effect size \bar{d} ranged from -0.18 to 0.07 and was thus a small effect. Therefore, the influence of gender difference on postgraduates' SCL-90 scores was not remarkable.

2) Effect of Publication Year

The changing trend of SCL-90 scores of postgraduates along with the time was also studied. After making the relative analysis of factor average, standard deviation and publication year, we concluded the results in table 4. As we can tell, the effect of publication year was very remarkable. Among all the correlations of the 9 factors and publication year, only 3 are weak and the other 6 are all remarkably negative. The value of d still had a notable negative correlation with publication year when the factor average was changed into effect size. That is to say, along with the

time, the SCL-90 scores of postgraduates had a downward trend.

TABLE 4. CORRELATIONS BETWEEN SCL-90 FACTOR AVERAGE OF POSTGRADUATES, EFFECT SIZES AND PUBLICATION YEAR

Factor	Somatization	obsessive-compulsive	interpersonal-sensitivity	Depression	Anxiety	Hostility	Phobic-anxiety	Paranoid-ideation	psychotic
r ₁	-0.19	-0.45***	-0.56***	-0.31*	-0.30*	-0.33**	-0.06	-0.68***	-0.31*
r ₂	-0.16	-0.27*	-0.22	-0.33*	-0.25	-0.24	-0.14	-0.36**	-0.28*
r ₃	-0.21	-0.31*	-0.28*	-0.30*	-0.27*	-0.29*	-0.09	-0.39**	-0.28*

Note: *p<0.05 **p<0.01 ***p<0.001, r₁: time and factor average, r₂: standard deviation of each factor, r₃: correlation coefficient of effect size.

3) Other Effects

Quality of report, university quality, region and major were also included in the analysis as research features. Their influences on the SCL-90 scores of postgraduates are as follows. Despite the fact that the factor scores ranked as dissertation>core periodical>ordinary periodical, the effect of report quality was not evident; after the comparison of east China (k=29), Central China (k=23) and West China (k=17) using the F-test method, no specific difference was found to be caused by region; the effect of university quality was remarkable: For key universities (k=20) and ordinary universities (k=32), the scores of all the 7 factors and factor average of the ordinary universities were higher than the key ones, obsessive-compulsive and interpersonal sensitivity excluded. The factor averages were evidently different (p=0.03). The factor scores of medical students were all lower than those of non-medical students, yet only the factor of psychotic was remarkably different.

D. Social Environment Influence

It is shown in table 5, the influences of 8 social indicators on the mental health status of postgraduates.

Remarkable correlations were found between the mortality rate, consumption level, educational fund investment that year and average factor scores, obsessive-compulsive, interpersonal sensitivity, depression, paranoid ideation and psychotic (-0.26*≤r≤-0.40**). The growth rate of Graduate School application that year was also remarkably correlated with obsessive-compulsive (r=0.27*) and interpersonal sensitivity (r=0.34**); a clear correlation was found between unemployment rate and phobic anxiety (r=0.26*), psychotic (r=0.28*). By using lagged analysis[26.30], the average of each SCL-90 factor was matched to eight social indicators five years ago and five years after respectively to see how correlated they were. The correlation between social indicators five years after and the average of each SCL-90 factor was not remarkable. Compared with five years ago, Gini coefficient was evidently correlated with depression (r=-0.36*), psychotic (r=-0.34*); postgraduates acceptance rate was clearly correlated with phobic anxiety (r=0.37*), hostility (r=0.35*); correlation was also found between college admission rate and depression (r=-0.35*). (Note *p<0.05 **p<0.01)

TABLE 5. CORRELATIONS BETWEEN SCL-90 FACTOR EFFECT SIZES OF THE POSTGRADUATE AND SOCIAL INDICATORS THAT YEAR

Social indicator	x ₁	x ₂	x ₃	x ₄	x ₅	x ₆	x ₇	x ₈	x ₉	Average
Growth rate of postgraduate application	0.13	0.27*	0.34*	0.17	0.13	0.11	-0.12	0.24	0.17	0.20
postgraduate acceptance rate	0.03	-0.11	-0.13	-0.18	-0.09	-0.07	0.10	-0.15	-0.03	-0.10
Gini coefficient	0.21	0.04	0.05	0.19	0.14	0.15	0.22	0.18	0.17	0.16
Death rate	-0.08	-0.37*	-0.32*	-0.26*	-0.14	-0.21	-0.01	-0.34*	-0.27*	-0.26*
Consumption level	-0.21	-0.30*	-0.29*	-0.31*	-0.16	-0.23	-0.06	-0.38**	-0.27*	-0.29*
Unemployment rate	0.21	0.18	0.16	0.21	0.17	0.23	0.26*	0.24	0.28*	0.24
Education investment	-0.09	-0.40**	-0.34*	-0.27*	-0.18	-0.25	-0.07	-0.38**	-0.29*	-0.30*

College acceptance rate	-0.16	-0.10	-0.08	-0.25	-0.11	-0.16	-0.10	-0.24	-0.13	-0.17
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Note * $p < 0.05$ ** $p < 0.01$ x1: somatization x2: obsessive-compulsive x3: interpersonal relation x4: depression x5: anxiety

X₆: hostility x₇: phobic anxiety x₈: paranoid ideation x₉: psychotic

IV. DISCUSSION

A. Overall Mental Health Status of Postgraduate

The overall mental health level of postgraduate is close to that of normal adults, and this conclusion is similar to previous studies [8]; this also conflicts with public opinion and many researchers' view that postgraduate are afflicted with a great number of mental disorders. More reports with positive test results tended to appear on primary articles because of the statistical methods adopted. Using T-test to compare experimental groups and control groups, those researchers could make the effect sizes of many positive statistical researches very small. T-test is based on a null hypothesis and can only be used to tell whether there is a difference between the averages of two samples. It cannot tell us the exact difference. Although the difference is statistically significant, it does not necessarily mean the difference is remarkable. What's more, T-test is susceptible to sample size. Direct comparison was made in this research between the two groups' score difference by calculating effect size d (stable and less susceptible to sample size)

.The combined effect size \bar{d} ranges from -0.17 to 0.23, and the factor average is 0.03. The difference is not remarkable on the whole; meaning the mental health of postgraduate is not in a grim condition and is basically on the same level with normal adults. Furthermore, the view that "postgraduate are problem people" is prevalent nowadays simply because the mass exposure of the media about postgraduate hurting themselves and others and subjective generalizations of the causes as "heavy mental problems".

The overall mental health condition of postgraduate is better than that of college students. Possible reasons: ①By studying the changes of mental health of college students over the last 25 years, we find that the mental health level of students of higher grade is superior to freshmen. It seems that the effects of general psychological health education and guidance work are embodied on students of higher grade [2]. In that sense, postgraduate, having received 4 years or above college education, are entitled to be the beneficiaries of mental health service. ②More often than not, postgraduate come from excellent groups of fresh or former college students, and this provides them with a solid foundation of mental health.

B. Analysis of Factors Influencing Mental Health Level of Postgraduate

The impact that gender exerts on the mental health of postgraduate is not remarkable and this conclusion is consistent with part of the previous studies [31.32]. Over the last 25 years, male college students have improved a lot in terms of mental health level, while female college students have always been at a disadvantage [2]. Nevertheless, female postgraduate seem to have got rid of this disadvantaged situation. This might result from the fact that graduate education itself is a protection system for the growth and enhancement of mental health level of disadvantaged groups. This defense function can also be observed in regional difference. There are also researches pointing out that differences of economic development level play a vital role in the prediction of mental health [33.34]. Accordingly, flourishing economy and culture are helpful in terms of the improvement of mental health. This research unveils that the regional difference is not distinct. Graduate education provides a platform for students from various backgrounds and enables the disadvantaged groups to stand on the same scratch line again. As a result, regional difference is eliminated to some extent. Furthermore, this makes individuals relatively independent on the micro-environment of graduate education and. As a result, postgraduates tend to overlook the outside influences such as the imbalance of regional economic development and the stereotypes of women's disadvantaged status in society. The influence of school type is evident. It is found that the mental health level of postgraduate in key universities are at a more advantaged place compared with those of ordinary ones, which has also been proven in the meta-analysis of the psychological health of college students[2]. This phenomenon can mainly benefit from the national policy preferences as well as large quantity of human and financial support for key universities. Consequently, the overall quality of students, including mental health level, is relatively enhanced and is seen as an embodiment of education achievements of key universities. The defense function of postgraduate education proves that the efforts to put forward advanced education, especially the emphasis laid on mental health education and establishment of relating service system have been very successful and productive. Our government should keep attaching much importance to higher education and the mental health of

students; at the same time, supports for ordinary universities should also be strengthened in order to benefit more individuals.

The effect of report quality is not remarkable. Many of the previous researchers argued that articles published would include more positive reports than the unpublished ones, and researches with remarkably distinct results would be more likely to be published on high-level periodicals. However no evidence was found in this paper to support this argument. On the contrary, dissertations that are unpublished tend to get generally high factor scores. This can be caused by sampling bias and failure to strictly guarantee the typicality of the samples. Also, it is found that the SCL-90 scores of medical postgraduates are universally low. This is probably because medical students are involved with knowledge concerning the maintenance of mental health, and thus have more positive ways of adjustment when confronted with psychological issues; or this is because they are relatively familiar with mental checkup and they would conceal their real conditions when filling the questionnaires.

Time also affects the psychological health of postgraduate remarkably, and this provided us an entry point for the study of factors influencing postgraduates' mental health. However, many factors also change with time. Therefore, we cannot simply attribute the decreasing of factor scores to the development of time. Accordingly, cross-temporal meta-analysis was used in this paper to find out the effect of time [26,35]. We tried to explain the change of individual mental size from the aspect of social environment by connecting the macro variable of social change and the micro variable of individual psychological development. The 8 social indicators selected are all evidently correlated with part of the SCL-90 factors of postgraduates, meaning changes of social environment have a certain impact on the mental health of postgraduate. For example, the growth rate of postgraduate school applicants that year is positively correlated with obsessive-compulsive and interpersonal sensitivity remarkably; unemployment rate positively correlate with phobic anxiety and psychotic remarkably; the postgraduate acceptance rate 5 years ago and phobic anxiety, hostility as well as college admission and depression all have an evident positive correlation. This is not difficult to understand, since these growths are the significant origins of the study and employment pressure of postgraduates. Besides, the correlation between educational fund investment that year and SCL-90 is negative, and the correlation between education investment and 5 of the 9 factors as well as the factor average is notably negative (shown in table 5). With the increase of the educational fund investment each year and the improvement of living

standards, postgraduate students are likely to get a larger amount of allowance. Consequently, their financial pressures are eased and mental burdens are also relieved.

C. *Deficiencies and Outlook of the Research*

There are three major deficiencies in this research. First, the limitations of SCL-90 can exert an impact on the conclusion of meta-analysis. This kind of checklist tends to be used to describe the "problem" sides of mental health and lack statements of the positive qualities. Second, academic researches of postgraduates' mental health started late in China. The first SCL-90 study report was not published until 2000. Therefore, it is very difficult to select a large number of articles that are as required both at quality and quantity in strict accordance with standards. Third, although efforts were made to explore the degree of influence of time on the mental health of postgraduate, we failed to conduct a thorough analysis of the relations between social change and the mental health of postgraduates.

Three things need to be highlighted in future researches: 1. Proper report of effect sizes should be done in the future researches; 2. Investigations should be made to explore the positive qualities of postgraduate. Too much focus has been put on the negative qualities in the previous researches, and that is why it is necessary for us to recognize the significance of good qualities and help cultivate them among the students. 3. Deep analysis should be conducted to find out the exact reasons for the tendency of improvement of the postgraduates' mental health. As mentioned before, it is noteworthy for us to pay attention to the emphasis on mental health education and construction of relating service system in our country as well as social indicators.

V. CONCLUSION

The mental health of postgraduates was not in serious condition. Located between the 2 norms, the overall mental health status is close to Chinese Normal People Norm and better than Chinese College Norm.

Along with time, there is a trend for postgraduates to get a lower SCL-90 score. The result can be affected by their major, type of school and other factors.

Effects of death rate, consumption level, unemployment rate, growth rate of postgraduate applicants, Gini coefficient, educational appropriations, postgraduate acceptance rate and national college entrance rate were also significant on SCL-90 scores. The changes of social

environment also have effects on mental health of postgraduates. Relations need to be highlighted between social change and the mental health of postgraduates in the future.

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