Changes in Mental Health of Members of the Chinese Army (1990~2007): A Cross-Temporal Meta-Analysis

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Translated by Min Qiang

Abstract: This study, by using 142 groups of data from 1990 to 2007 and the method of cross-temporal meta-analysis, researched the changing trend of status of mental health of 108736 members of the Chinese Army along with the change of years. All the data came from 94 related research reports, and all the research reports used SCL-90 (the Symptom Checklist 90) as the testing tool of mental health. The study found that:(1) mental health of members of the Chinese Army steadily improved between 1990 and 2007; (2) during those 18 years, the Interpersonal Sensitivity factor of SCL-90 of Chinese Army members changed most significantly, and the least significantly changed factor was Somatization; (3) Chinese Army members showed evidence of fewest problems on the Photic Anxiety factor, in contrast to the consistent problems indicated by scores on the Obsessive-Compulsive and Interpersonal Sensitivity scales;(4) Chinese Army members from single-child families (N =1,944) showed significant lower evidence of positive mental health than soldiers from multiple child families (N =2,649); (5) The mental health of soldiers from non-agricultural backgrounds (N =7,808) was less positive than that of soldiers from agricultural households(N =11,459); (6) Chinese Army members with senior high school education level (N = 10,189) had less positive mental health than those with junior high school (N = 8,407) or university education (N = 863).

Key words: Chinese Army members; mental health; SCL-90; cross-temporal meta-analysis

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1.Introduction

The combat effectiveness of an army depends on the overall quality of its members. The soldiers' psychological diathesis is the core of their overall quality, and their mental health is the basis of their strong psychological diathesis. Therefore, the mental health status of members of the army is closely linked with the army's overall combat effectiveness. Effectively evaluating and monitoring the mental health status of members of the army are the basis of making relative military policies. To realize effective evaluation, we need the comprehensive application of the relative research methods of psychology. Therefore, Driskell and Olmstedt (1989), two famous military psychologists, once said, "Maybe there is no other organization or institution will like armies, which have close relationship with the mature and development of psychology."

Over the past several decades of peaceful time, what's the changing trend of mental health of members of the Chinese Army? Is it steadily improving or decreasing? Are there any significant differences in mental health between soldiers from single-child families and those from multiple-child families after the implement of the one-child policy? Are there any significant differences in mental health between the soldiers from non-agriculture backgrounds and the soldiers from agricultural households? Are there any significant differences in mental health between the soldiers who have different educational backgrounds? These questions are not only the most common and concerned issues for China's researchers of national defense and military science, but also the issues that we need pay attention to in order to strengthen the revolutionization, modernization and regularization of the Chinese Army, consolidate and enhance the army's combat effectiveness, as well as ensure the high centralization, unification, safety and stability of the army.

1.1 The Argument about the Mental Health of Members of the Chinese Army

Generally, the Chinese name of SCL-90 (the Symptom Checklist 90) is "90 项症状自评测量表". SCL-90 is a testing tool for mental health that is widely used in clinical researches. It includes many things about the study of mental symptoms, such as thoughts, emotions, behaviors, interpersonal relationships and living habits, etc. Meanwhile, there are 9 factors considered in the checklist: Somatization, Obsessive-Compulsive, Interpersonal Sensitivity, Depression, Anxiety, Hostility, Photic Anxiety, Paranoid Ideation and Psychosis. In 1980s, China began to pay attention to the mental health status of members of the Chinese Army. In the late 1980s, China began to make systematic researches on that issue. Although most of the testing

tools are same (SCL-90), there are huge differences between the conclusions. Most of the conclusions are "the mental health status of members of the Chinese Army is poor, which is lower than the norm or the control groups; the members of the Chinese Army have a lot of mental problems and their mental health status level under the military stresses is lower than normal"(Feng, Z. Z. & Dai, Q., 2008). For example, the researches made by researchers like Wang H. L.(Wang, H. L., Sun, J., Yu, H. Y., Chen, F. B., Shi, J. A., & Li, N., etc, 1999) indicated that the aggregate SCL-90 scores of members of the Chinese Army was 144.10± 43.20, in which both the scores of the positive entry number and of all factors were higher than those of the local people ($P<0.01$). Some factors, especially like Obsessive-Compulsive, Interpersonal Sensitivity, Depression, Hostility and Paranoid Ideation, had increased most. After the test on 12486 members of the Chinese Army, researchers like Liu J. L.(Liu, J. L., Liu, Y. B., Feng, Z. Z., Yang, G. Y., Xia, L. B., Zhong, T. J., Wang, T. , Liao, Y. Q., Qin, A. F., Wang, J. L., Zhang, Y., & Wang, F., 2005) found that the aggregate SCL-90 scores of members of the Chinese Army were lower than those of norm of soldiers and the norm of Chinese populace, and almost 16.5% of the members of the Chinese Army had various mental health problems. Based on the analysis of status of mental health in 375 new recruited members of the Chinese Army, researchers like Zeng L.(Zeng, L., Li, Q. C., He, Y. Q., & Lan, X. Y. ,2002) found that the level mental health status of new recruited members of the Chinese Army was low. Their scores of factors, except factors of Interpersonal Sensitivity, Hostility and Photic Anxiety, were outstandingly higher than the scores of the norm of domestic teenagers; their scores of factors, except the factor of Photic Anxiety, were outstandingly higher than the scores of the norm of the new recruited members of the Chinese Army. However, some researchers believed that the whole status of mental health of members of the Chinese Army was positive. For example, after the analysis of 630 normal members of the Chinese Army, researchers like Li W. X. (Li, W. X., Dou, L. J., Xu, S. J., Tang, S. R., & Liu, W. L.,1992) found that their status of mental health, except factors like the symptoms of psychosis and depression were a little higher than the norm, had no significant difference compared with Chinese young men. According to the result of testing 1917 members of the Chinese Army, researchers like Yang, Z.(1995), found that, in general, the status of mental health of members of the Chinese Army was positive. The result suggested that only 0.4%~4.5% members of the Chinese Army's scores of each factors were higher than or equal to 3, which far below the demarcation line(10%), and their status was healthier than those of the groups of university students. Researchers like Yang Z. (Li, C. Y., Yan, J., Xu, T., Liu, X. H., Cheng, L. Z., & Li, Z. S.,2004) had

analyzed the status of mental health of 1077 new recruited members of the Chinese Army, and the result indicated that although there were some symptoms of their mind and body, the status of mental health of the new recruited members of the Chinese Army was generally positive. Researchers like Zhao T. & Xu S. M. (2000) also found that the new recruited members of the Chinese Army had positive status of mental health, and they had no remarkable difference compared with normal people in mental health.

1.2 The Current Method of Meta-Analysis and Its Limitations

In the field of psychology, generally, the method of meta-analysis can be used to solve the controversies over the research results and conclusions mentioned above. As a kind of research method in which researchers will systematically sort out the existing research systems, meta-analysis was officially put forward by Glass (1976). By making comprehensive statistical analysis of a lot of single research results, meta-analysis can make a more common conclusion. The mainstream of meta-analysis is realized by calculating the effect size. The frequently-used statistical index in the effect size calculating is d. The calculation formula of d was firstly put forward by Cohen, and then Glass made further improvement and supplement on the formula(Xin, Z. Q., & Zhang, M., 2009). Glass's formula is: d=(Me -- Mc)/SD, in which Me means the mean value of the experimental group, Mc means the mean value of the control group (usually the norm scores of the scale can also be regarded as the scores of the control group) and SD is the common standard deviation of the two groups. So far, there is only one meta-analysis research on the mental health status of members of the Chinese Army (Feng, Z.Z., & Dai, Q.,2008). The research collected 77 documents and the result suggested that "the mental health status of members of the Chinese Army is not that bad". To be more specifically, the mental health status of members of the Chinese Army under the non-military stresses was almost the same as the military norm. For the members of the Chinese Army under the non-military stresses, their mental health status was higher than the military norm before the military stresses, lower than the military norm during the military stresses and almost the same as the military norm after the military stresses. According to the result, the status of mental health of members of the troops garrisoned in urban areas was better than those in plateau areas and those in border areas. Although the traditional meta-analysis method has its own advantages, which can systematically sort out the mass of related researches under the conditions of lacking original data and thus making a conclusion with general meaning, it still has been applied very limitedly in fields like psychology, even the whole social sci-

ences(Xin, Z. Q., & Zhang, M., 2009).

1.3 The Cross-Temporal Meta-Analysis

Professor Jean M. Twenge, an American scholar, put forward a new meta-analysis method——Cross-Temporal Meta-Analysis. Chinese psychologists, like Xin Z. Q., call it "横断历史研究" in Chinese for short(Xin, Z. Q., & Zhang, M., 2009). It is an analysis that uses the "design" of the cross-temporal meta-analysis to make meta-analyses on the changes of the psychological variables in the range of long span of time and eras(or the development of history). Here the "design" is not a design that previously makes the method, like those used in the cross-temporal research on the individual development, but a design that is "subsequently confirmed", which means it connects the isolated researches in order of time so that the previous researches can become the cross-temporal samples about the development of history(Xin, Z. Q., & Chi, L. P. , 2008). Twenge had studied many kinds of psychological problems by this analysis method (Twenge, 2001a; Twenge, 2001b; Twenge, Zhang, & Im, 2004; Twenge, Im, 2007). She compared this method with the traditional method of meta-analysis and called it the within-scale met-analysis. Chinese cross-temporal meta-analysis was introduced by scholars like Xin Z. Q. (Xin, Z. Q., & Chi, L. P. , 2008). Except for the theory and the summarize of the methods, the cross-temporal meta-analysis has been used in the researches on the mental health of the middle school students (Xin, Z. Q., & Zhang, M., 2009), the coping style of Chinese male and female university students (Xin, Z. Q., Liu, C. H., & Zhang, L. ,2008) and the anxiety of Chinese middle school students (Xin, Zhang & Liu., 2010), etc. Their researches, however, was mainly on juveniles. As time goes on, what are the changes of the status of mental health of Chinese adults in different professions? Recently, in order to answer this question, some researchers researched the trend of the mental health development of 7824 Chinese railwaymen from 1988 to 2009 (Yi, X. F., Liu, Y., Liao, J. Q., Dou, D. H., & Peng, K. P., 2010) and they found that the status of mental health of this adult group stayed relative stable in the process of the development of history. As a result, in this research we use the cross-temporal meta-analysis to study the changing process of the status of mental health of members of the Chinese Army since 1990.

2. Research Methods

2.1 Documents Collection

2.1.1 The Standards of Documents Collection

(1) All the researches should use the same testing tool for mental health——

SCL-90;

(2) The objects of the researches are members of different arms of the services of the Chinese Army of the mainland China, not including those of Hong Kong, Macao and Taiwan;

(3) There should have quantitative and specific statistical data results (which generally include mean value and standard deviation) in the research reports;

(4) The research should be published in the years between 1979 and 2010.

Only when the researches meet the following conditions will their statistical data of SCL-90 can be collected into the documentary data base of this research.

2.1.2 Documents Retrieval

After setting the time range from 1979 to 2010, we searched the index words like "armed forces", "troops", "servicemen", "soldiers", "warriors", "officers", "SCL-90", "mental health" and "mental hygiene", etc, under the searching items like title, key words and abstract of the Chinese Full-text Database, China Master's Theses Full-text Database and China Doctoral Dissertations Full-text Database of China National Knowledge Infrastructure (CNKI), and then we collected the documents met the conditions mentioned above from the documents we searched. And we found 94 eligible documents (all published from 1990 to 2010), including 142 groups of data. Each year's numbers of groups of data and tested numbers will be showed in Form 1. The time of the data collected are all two years before the time they published (except those that marked their data collecting time in their researches). Therefore, the researching time in our study is from 1990 to 2007. There are three reasons for choosing this period as our researching time. Firstly, it's the result that is according to the criteria of choosing documents mentioned above. Secondly, China's new round of reform and opening up started from Deng Xiaoping's talks on his 1992 inspection tour to the south of China. Therefore, the data of this period can deeply reflect the changes of the status of mental health of members of the Chinese Army after the reform and opening up policy. Thirdly, in May, 1985, China's government made the decision of disarmament by reducing one million members of the Chinese Army. Up to the year of 1987, the aggregate number of the Chinese People's Liberation Army (PLA) reduced to 3.235million from 4.238 million. After that, the government made further disarmament. Up to the year of 1990, the total aggregate number of the PLA reduced to 3.199 million, and the total number of the disarmament was 1.039 million, which accounts for 24.5% of the total number of the PLA before disarmament. By then, the task of disarmament had been finished exceeding the quota. Therefore, the data of this period can deeply reflect

the trends of the development of the status of mental health of the members of the Chinese Army after the disarmament.

Form 1. The Distribution of the Groups of Data and the Tested Numbers of SCL-90 of Members of the Chinese Army (1990~2007)

Year (year of publication-2)	1990	1993	1994	1996	1997	1998	1999	2000
Data groups	1	1	6	9	4	10	4	21
Testing numbers	630	990	21690	2376	1420	23097	1084	7211

The Continuation of Form 1. The Distribution of the Groups of Data and the Tested Numbers of SCL-90 of Members of the Chinese Army (1990~2007)

Year (year of publication-2)	2001	2002	2003	2004	2005	2006	2007	Total
Data groups	13	30	19	2	5	2	15	142
Testing numbers	5927	17449	4013	12677	1263	2392	6517	108736

2.2 The Sorting Out of the Data

In order to sort out the data, we coded all the data according to the indexes like published time, testing time, armed services, numbers of the objects of the test, genders, age, length of military service, hometowns, whether they are the only child of their families or not, education backgrounds and in which journal the data was published, etc. Besides, due to most of the related researches of SCL-90 were scored according to the scale of 5-grade marking system (1~5), we added 1 point to the data of 4-grade marking system (0~4) for convenience. The sources of our researched documents were coming from more than 40 kinds of journals like Journal of Preventive Medicine of Chinese People's Liberation Army, Chinese Mental Health Journal, Chinese Journal of Psychiatry, Health Psychology Journal, etc.

In addition, the research added China's annual expenditure on national defense from 1990 to 2007 as an index of reflecting the changes of social environment of members of the Chinese Army and it would investigate the relationship between this index and the changes of the status of mental health of members of the Chinese Army. The data of China's annual expenditure on national defense came from related statistical almanacs.

3. The Research Results

3.1 The Changes of the Status of Mental Health of Members of the Chinese Army over Years

What changes happened in the status of members of the Chinese Army from 1990 to 2007? The research suggested that the mean value of SCL-90 of members of the Chinese Army was decreasing as time went on, which meant the overall level of the status of members of the Chinese Army was improving. Chart 1 is the line graph of the changes of the mean value of the 9 factors of the SCL-90 of members of the Chinese Army from 1990 to 2007. Chart 2 is the 15 data points and the trend line of the mean value of SCL-90 of members of the Chinese Army from 1990 to 2007, and the trend of the line is gradually decreasing, which means the status of mental health of members of the Chinese Army steadily improved between 1990 and 2007. In order to make more precisely quantitative description of the changes of each factors of SCL-90 as time went on, we made related and regression analysis of the mean value and standard deviation of each year and each factor and the results is in Form 2.

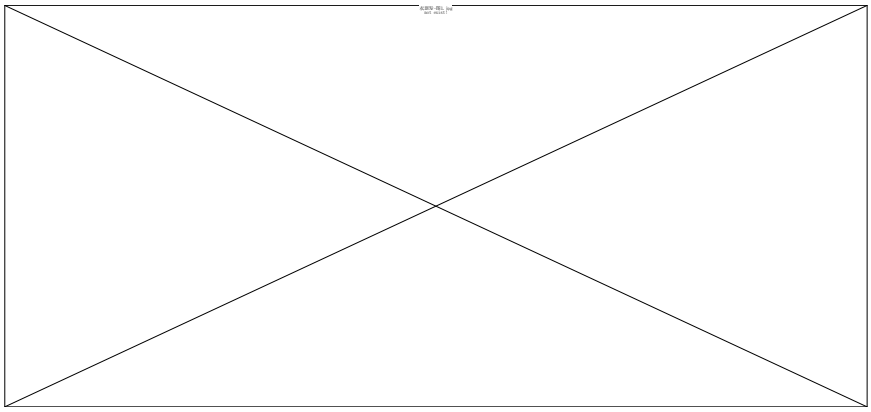

Chart 1. The Line Graph of the Changes of the Mean Value of the 9 Factors of SCL-90 of Members of the Chinese Army from 1990 to 2007

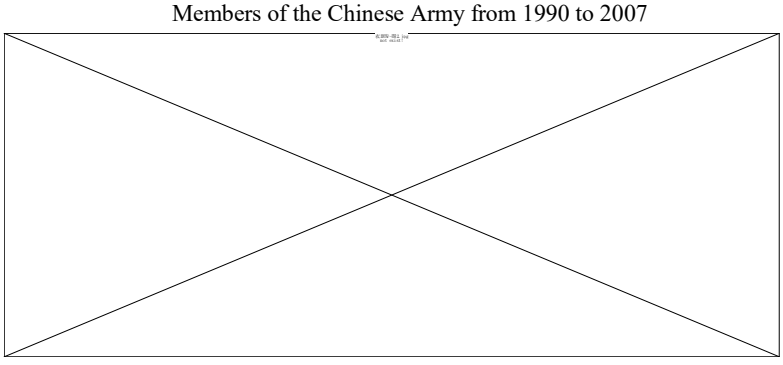

Chart 2. The 15 Data Points and the Trend Line of Mean Value of the SCL-90 of Members of the Chinese Army from 1990 to 2007

Form 2 indicated that the mean value of the 9 factors of SCL-90 of members of the Chinese Army and their standard deviation had remarkably negative correlation with their years, which meant that the overall status of mental health of members of the Chinese Army steadily improved between 1990 and 2007, and, meanwhile, the range of difference of the status of mental health of members of the Chinese Army was diminishing each year.

Form 2. The Related and Regression Analysis of the Mean Value and Standard Deviation of Each Year and Each Factor of SCL-90

Factors	R_1	R_1^2	R_2	R_2^2
Somatization	-0.43**	0.19	-0.24**	0.06
Obsessive-Compulsive	-0.54**	0.29	-0.50**	0.25
Interpersonal Sensitivity	-0.66**	0.44	-0.42**	0.18
Depression	-0.58**	0.34	-0.43**	0.19
Anxiety	-0.51**	0.26	-0.47**	0.22
Hostility	-0.35**	0.12	-0.31**	0.10
Photic Anxiety	-0.49**	0.24	-0.25**	0.06
Paranoid Ideation	-0.53**	0.28	-0.47**	0.22
Psychosis	-0.46**	0.21	-0.33**	0.11

Annotation: R1 is the related coefficient of the mean value and the year; R2 is the related coefficient of the standard deviation and the year; *stands for $p<0.05$; ** stands for $p<0.01$.

3.2 The Variation of Mental Health As Years Went On

In conclusion, the scores of all the 9 factors of SCL-90 were decreasing as years went on. In order to study the specific decreasing numbers, we needed to use the regression equation and the standard deviation of each research to do statistics (Twenge & Campbell, 2011; Twenge & Im, 2007). At first, we used the regression equation to calculate the variation of each factors of mental health of the starting year and the ending year. The regression equation of the research is $y=Bx+C$, in which B stands for the unstandardized regression coefficient, x stands for the year, C stands for the constant term and y stands for the mean number. Then, we calcu-

lated the mean standard deviation by averaging the standard deviations of all researches. This method of using the variation of individual levels can avoid ecological fallacies efficiently (Twenge & Im, 2007; Xin, Z. Q., & Zhang, M., 2009).

Form 3. The Variation of Mental Health of Members of the Chinese Army

Factors	M_{1990}	M_{2007}	$M_{变化}$	M_{SD}	d
Somatization	1.40	1.26	0.14	0.43	0.32
Obsessive-Compulsive	1.63	1.44	0.19	0.53	0.35
Interpersonal Sensitivity	1.68	1.27	0.41	0.49	0.84
Depression	1.58	1.23	0.35	0.49	0.71
Anxiety	1.41	1.23	0.18	0.42	0.43
Hostility	1.49	1.18	0.31	0.45	0.68
Photic Anxiety	1.25	1.12	0.13	0.34	0.37
Paranoid Ideation	1.52	1.19	0.33	0.48	0.69
Psychosis	1.40	1.21	0.19	0.40	0.49

Annotation: d = (M2007 - M1990) / MSD

The statistical results(Form 3) suggested that the mean value of the 9 factors of mental health in 1990 was between 1.25 and 1.68, the mean value of the 9 factors of mental health in 2007 was between 1.12 and 1.44 and the mean standard deviation was between 0.34 and 0.53. The range of the variation of the mean value of the 9 factors during this 18 years was between 0.13 and 0.35, which decreased about 0.32 standard deviation to 0.84 standard deviation(the value of d). It also suggested that the improving process of mental health of members of the Chinese Army remained steady, in which the Interpersonal Sensitivity factor changed most significantly and the least significantly changed factor was Somatization. Additionally, combined with the results of Form 1, we found that if we analyzed from the status of all the 9 factors of SCL-90, we would discover that, over the 18 years, the mean value of the factor of Photic Anxiety was always the lowest one and the mean value of the factors of Obsessive-compulsive Symptoms and Interpersonal Sensitivity were always higher than other factors.

3.3 The Correlation between China's Annual Expenditure on National Defense and the Annual Status of Mental Health of Members of the Chinese Army

According to the results above, we found that, between 1990 and 2007, the status of mental health of members of the Chinese Army was steadily improved. Why? Troops are an organization that is relatively isolated from the local society, so that it is inappropriate to use the social indexes applied in some researches before, such as divorce rate, unemployment rate, crime rate, consumption level and Gini coefficient, etc, to study the correlation between the changes of the society and the changes of mental health of members of the Chinese Army. Therefore, we applied China's expenditure on national defense, an index that more directly correlated with the works and lives of members of the Chinese Army, to investigate the impact of social changes on mental health of members of the Chinese Army. According to Form 4, we found that there was an obvious negative correlation between the 9 factors of SCL-90 of members of the Chinese Army and the China's expenditure on national defense of the corresponding year, which suggested that, along with the China's increasing expenditure on national defense, the status of mental health of members of the Chinese Army was improving steadily.

Form 4. The Correlated Coefficient of China's Annual Expenditure on National Defense and the 9 Factors of SCL-90 of Members of the Chinese Army of the Corresponding Year

	Somatization	Obsessive-Compulsive	Interpersonal Sensitivity	Depression	Anxiety	Hostility	Photic Anxiety	Paranoid Ideation	Psychosis
Expenditure on National Defense	-0.49**	-0.65**	-0.77**	-0.67**	-0.61**	-0.48**	-0.65**	-0.64**	-0.58**

Annotation：**stands for $p < 0.01$

3.4 The Influence of whether Members of the Chinese Army Are the Only-child of the Family(or Not) on Their Mental Health

In order to investigate the influence of whether members of the Chinese Army are the only-child of the family (or not) on their mental health, we synthesized the samples of members of the Chinese Army that were labeled soldiers from single-child families and soldiers from multiple child families in all researches, including 1944 Chinese Army members from single-child families and 2649 soldiers from multiple child families, and we made the line graph of the mean value of all factors of the SCL-90 of the two groups (Chart 3). Intuitively, the mean scores of all the 9 factors of the Chinese Army members from single-child families were higher than the scores of soldiers from multiple child families. Testing the overall difference of the mean scores of all the 9 factors of the two groups by using t ($t = 11.09$, $p < 0.001$),

we found that there was obvious difference between the two groups. Therefore, from the point of view of statistics, we found that the scores of all the 9 factors of the Chinese Army members from single-child families were higher than the scores of soldiers from multiple child families, which indicated that the status of mental health of the Chinese Army members from single-child families was poorer than the status of mental health of the Chinese Army members from multiple child families.

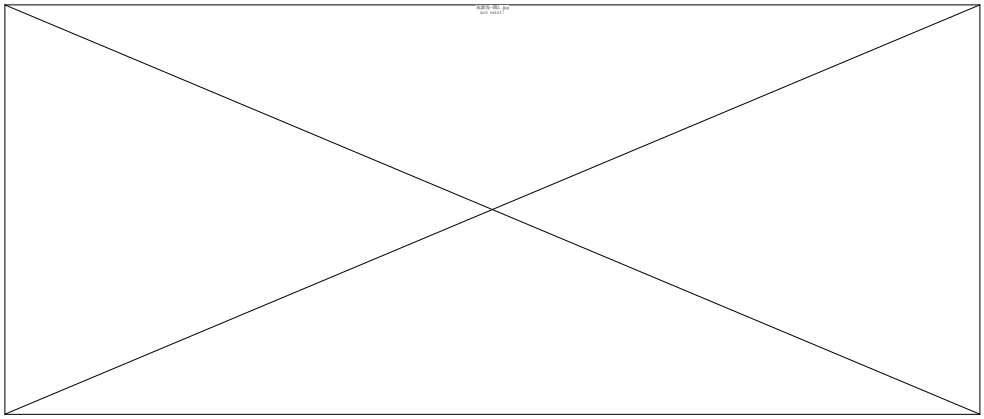

Chart 3. The Comparison of the Mean Value of Each Factors of SCL-90 between the Chinese Army Members from Single-child Families and Soldiers from Multiple Child Families

3.5 The Comparison of Mental Health between Soldiers from Non-agricultural Backgrounds and Soldiers from Agricultural Households

In order to investigate the differences of the status of mental health between soldiers from non-agricultural backgrounds and soldiers from agricultural households, we synthesized the samples of members of the Chinese Army that were labeled from non-agricultural backgrounds and agricultural households, including 7808 soldiers from non-agricultural backgrounds and 11459 soldiers from agricultural households, and we made the line graph of the mean value of all factors of SCL-90 of the two groups (Chart 4). Intuitively, except for the factor of Psychosis, the mean scores of other 8 factors of the Chinese Army members from non-agricultural backgrounds were higher than soldiers from agricultural households, which indicated that the status of mental health of the former might poorer than the latter. Testing the overall difference of the mean scores of the other 8 factors of the two groups by using t ($t = 2.34$, $p < 0.05$), we found that there was obvious difference between the two groups. Therefore, from the point of view of statistics, we found that the scores of the other 8 factors of the Chinese Army members from non-agricultural backgrounds were higher than the scores of soldiers from agricultural households, which indicated that the status of mental health of the Chinese Army members from

non-agricultural backgrounds was poorer than the status of mental health of the Chinese Army members from agricultural households.

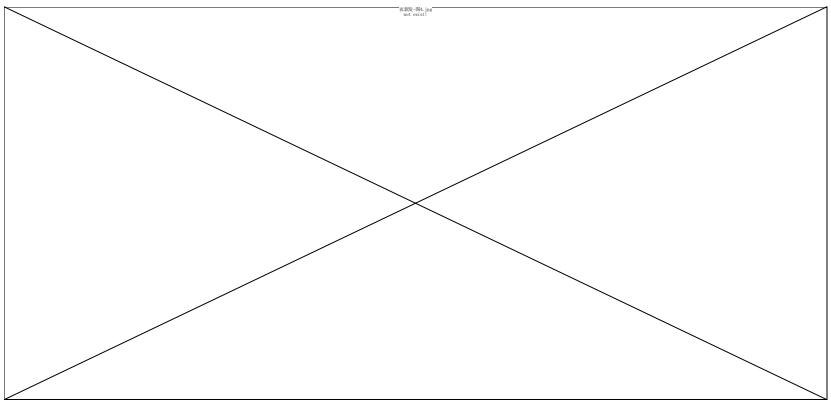

Chart 4. The Comparison of the Mean Value of Each Factors of SCL-90 between the Chinese Army Members from Non-agricultural Backgrounds and Soldiers from Agricultural Households

3.6 The Comparison of Mental Health between Soldiers from Different Educational Backgrounds

In order to investigate the differences of the status of mental health between soldiers from different educational backgrounds, we synthesized the samples of members of the Chinese Army that were labeled with different educational backgrounds, including 8407 soldiers with junior high school educational backgrounds, 10189 soldiers with senior middle school educational backgrounds and 863 soldiers with university educational backgrounds, and we made the line graph of the mean value of all factors of SCL-90 of the three groups (Chart 5). Intuitively, the mean scores of all the 9 factors of the Chinese Army members with senior high school educational backgrounds are higher than soldiers with junior high school educational backgrounds and university educational backgrounds, while there is no obvious difference between the scores of the latter two groups. In order to precisely understand the distinction of the soldiers' scores of the status of mental health between the three groups, we tested the overall difference of the mean scores of all the 9 factors of the three groups by using statistical treatment and we found that: 1.the scores of soldiers from senior high school educational backgrounds were not only obviously higher than the scores of soldiers from junior high school educational backgrounds ($t = 6.40$, $p < 0.001$), but also obviously higher than the scores of soldiers from university educational backgrounds ($t = 4.12$, $p < 0.01$); 2. there was no obvious difference between the scores of soldiers from junior high school educational backgrounds and the scores of soldiers from senior high school educational backgrounds ($t = 0.69$, $p = 0.511$). Therefore, from the point of view of statistics, we found that

the status of mental health of the Chinese Army members from senior high school educational backgrounds were poorer than the status of mental health of the Chinese Army members from junior high school educational backgrounds and university educational backgrounds.

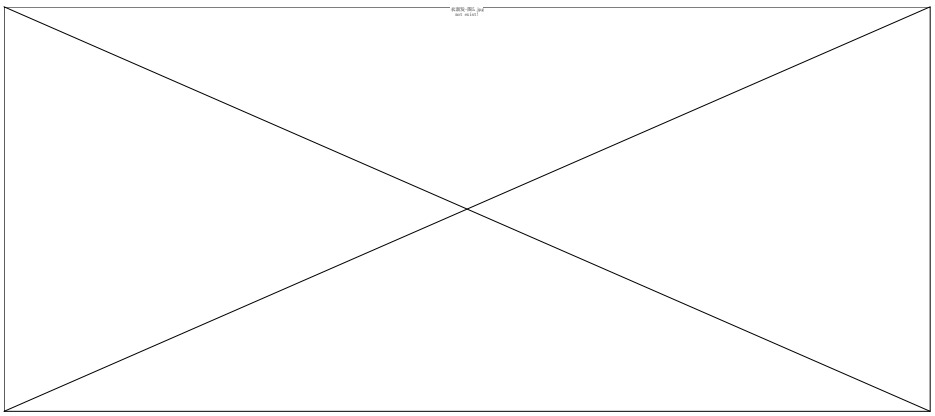

Chart 5. The Comparison of the Mean Value of Each Factors of the SCL-90 between the Chinese Army Members from Different Educational Backgrounds

4. Discussion

4.1 Mental Health of Members of the Chinese Army Steadily Improved between 1990 and 2007

By using cross-temporal meta-analysis method, the study results suggested that mental health of members of the Chinese Army steadily improved between 1990 and 2007. To a certain extent, the results showed that China's a series of policies and developing strategies of national defense was right. To build a strong military, China made various reforms in the army, and those reforms improved the overall level of mental health of members of the Chinese Army. Generally speaking, a country's expenditure on national defense has close relationship with the overall quality, especially with the mental health of soldiers of the country. In a multivariate regression analysis that used the years and the expenditure on national defense as the independent variable, and the status of mental health of members of the Chinese Army as the dependent variable, we found that it was the expenditure on national defense, not the years, could better explain the status that mental health of members of the Chinese Army was steadily improving. According to the National Defense Law of the People's Republic of China and the Budget Law of the People's Republic of China, the Chinese government made the projects of quantity and direction of the expenditure on national defense. China's national defense expenditure mainly comprises expenses for personnel, training and maintenance, as well as

equipment. Expenses for personnel mainly covers the fees on salaries, insurances, food, clothing and welfare services, etc, of military officers, civilian officers, soldiers and employed staffs. Expenses for training and maintenance mainly covers the fees on military training, education, construction and maintenance of engineering facilities and daily consumptive expenditure. Expenses for equipment mainly covers the studies, tests, procurement, maintenance, transport and storage, etc, for weapons and equipment. The range of China's national defense expenditure not only covers forces in active service, militias and reserved forces, but also covers social uses, such as pension for part of retired military officers, education of children of members of the Chinese Army and the supporting for national economic building. Therefore, national defense expenditure, which provides necessary safeguarding of development for members of the Chinese Army from various aspects like lives, training education, upgrade of equipment and social support, is an important material basis affecting healthy development of mental health of members of the Chinese Army. From Form 4 (The Correlated Coefficient of China's Annual Expenditure on National Defense and the 9 Factors of SCL-90 of Members of the Chinese Army of the Corresponding Year), we could obviously find the close relationship between the national defense expenditure and mental health of members of the Chinese Army. Meanwhile, with the task of disarmament by reducing one million members of the Chinese Army finished exceeding the quota in 1990, on the one hand, China had made many efforts on strengthen the revolutionization, modernization and regularization of the Chinese Army, which consolidated and uplifted the combat effectiveness of the Chinese Army, on the other hand, national defense expenditure had been increasing year by year while the numbers of the Chinese Army had been decreasing after the disarmament. Therefore, the per capita national defense expenditure of members of the Chinese Army had increased before the disarmament, which was an important reason why the status of mental health of members of the Chinese Army steadily improved.

From the point of view of studying, the great dispute between the conclusions of the studies on mental health of soldiers mainly because the reference standards of measuring mental health in those studies are different. Compared with different reference standards, the conclusion, certainly, would have great difference. A study (Feng, Z. Z., & Dai, Q. 2008) found that there were 16 reference standards of measuring mental health of soldiers. For example, some studies referred to the norm of groups of normal people and teenagers established by Jin H., Wu W. Y., and Zhang, M. Y. (1986), but that norm established in the middle of 1980s, which might be difficult to reflect the status of mental health of the norm of groups of Chi-

nese normal people and teenagers studied in some researches published after that time. Within the army, there are also the national standard for military use, which was based on a survey of 5500 soldiers, made in 1994, and the norm, which was based on 19662 soldiers, made by researchers like Wang H. L.(1999). The norm samples of the latter were from the servicemen nationwide, including: 1. Group Armies and Provisional Military Regions (Garrison Commands) under the leadership of each Military Region; 2. Flying Troops and ground staff under the leadership of the Air Force of each Military Region; 3. The naval(water surface ships and submarines) staff and naval base staff under the leadership of South China Sea Fleet, East China Sea Fleet and North China Sea Fleet; 4. The five schools and troops under the leadership of The Second Artillery and The Commission for Science, Technology and Industry for National Defense (COSTIND). The areas of the sampling covered more than 500 places of 29 provinces, municipality directly under the Central Government and autonomous regions, almost 50 people in each place. Although Wang H. L.'s norm can reflect the latest status of mental health of members of the Chinese Army and it is more suitable to be used in the comparison between soldiers' mental health status (Feng, Z. Z., & Dai, Q., 2008), from the result of this study, maybe after 10 years, the overall status of mental health of members of the Chinese Army will obviously improved. Therefore, how to lead the related studies by making new standards of mental health of members of the Chinese Army may become one of the most important tasks in China's military psychology studies.

The study also found that, except that there was obvious negative correlation between the mean value of all factors of mental health of members of the Chinese Army and the corresponding year, the standard deviation of each factor also had obvious negative correlation with the corresponding year (Form 2), which suggested that, during the 18 years, the variation of levels of mental health between soldiers had decreased.

4.2 During Those 18 Years, the Interpersonal Sensitivity Factor of SCL-90 of Chinese Army Members Changed Most Significantly, and the Least Significantly Changed Factor Was Somatization

According to the study result of the variation (Form 3), we found that, generally speaking, the interpersonal relationship between soldiers might be much better than before. Although there are obvious decline in physically uncomfortable feelings, it had the least decline compared with other factors. The factor of Interpersonal Sensitivity of SCL-90 mainly refers to some personal uncomfortable feelings and the

sense of inferiority, which become more obvious when compared with other people. It also refers to the sense of inferiority, the uneasy feeling of mind, self-consciousness and negative expectation in interpersonal communication. In those 18 years, with the improvement of quality of the overall sources of troops, the overall ability of interpersonal communication of soldiers had improved a lot, which may be an important reason for the obvious changes in interpersonal communication of members of the Chinese Army. In terms of physical situation, including cardiovascular system, digestive system, respiratory system and other systems, as well as headache, backache and muscle ache, etc, because of the nature of military occupation, there is no obvious decline in the physical load of soldiers during the 18 years. In some cases, especially during activities like training, military stresses, or under the circumstances like plateaus, border defense and places with harsh conditions, the tests of soldiers' physical quality might be more severe. How to improve soldiers' combat effectiveness by providing scientific and effective training as well as equipment with higher scientific and technological level is the future task that requires deep-going research in the Chinese Army.

The experience of the United States may have great value for China's reference. Recently, after sufficient study and argumentation, the United States Department of Defense decided to lay the new foundation of the innovation of national defense on the basis of the combination of Nanotechnology, Biotechnology, Information Technology and Cognitive Science (NBIC). The former United States Secretary of Defense, William James Perry, believed that the outbreak of science and technology for national defense was "changing the realities of warfare and the manner of preparing warfare". We took the combination of biotechnology and national defense of the US for example. Defense Advanced Research Projects Agency (DARPA) of the United States is constantly studying useful solutions for improving American soldiers' combat effectiveness and preventing their enemies from making technical innovation. DARPA plans to improve soldiers' power of destruction and efficiency by improving their abilities of physiology and cognition. Its key research fields include metabolic engineering (which explores the technical foundation of controlling human metabolism in the respects of cells, tissues and organisms and its key point is, during military operations, to make the tissue of cell nucleus keep stable and make it successfully recover), human abilities improving by applying exoskeleton technology, cognitive abilities enhancing, constant auxiliary abilities (the goal of it is to find new pharmacological knowledge and training methods to make soldiers keep awake for 96 hours, even more than 168 hours, without sleep) and brain-computer interface (which can use the achieved neural code to

make integration and control of the invasive devices and systems). Besides, a system, called "the monitoring of biomedical status", effectively integrated cognitive science, medicine and wireless communication technology. The system uses sensors to measure soldiers' important pathological signs, electrolytes, stress hormones, neurotransmitter levels and physiological activities. It can have precise position of soldiers' physiological and mental status, which can not only guarantee commanders will find casualty incidents, but also guide initial treatments (Roco M. C. & Bainbridge W. S., 2010).

4.3 Chinese Army Members Showed Evidence of Fewest Problems on the Photic Anxiety Factor, in Contrast to the Consistent Problems Indicated by Scores on the Obsessive-Compulsive and Interpersonal Sensitivity Scales

Combined with Form 1, we found that, from the aspect of the internal factors of SCL-90, the mean value of the scores of the factor of Photic Anxiety is the lowest one during the 18 years while the mean value of the scores of the factor of Obsessive-Compulsive and Interpersonal Sensitivity are higher than other factors. In the factors of SCL-90, the objects of Photic Anxiety mainly include open areas, crowds, public places and means of transportation. Because of the nature of military occupation (soldiers always trained at open areas and the main part of military live is group living, etc), the status of soldiers on factor of Photic Anxiety is always positive. The factor of Obsessive-Compulsive refers to the meaningless thought, act on impulse and behavior that people know it is unnecessary but cannot get rid of it. Military lives are relatively isolated, and the interpersonal relationship within the troops is also quite complicated. Most of soldiers are living far away from their relatives or family members so that they lack social supports from that aspect. Besides, most of the respondents are male adult and they lack opportunities for meeting females. All the problems mentioned above may cause soldiers to have obvious problems in terms of Obsessive-Compulsive. According to the analysis mentioned above, we found that, during the 18 years, in terms of the factor of Interpersonal Sensitivity, soldiers had undergone positive changes in a great extent. Compared with other factors, however, soldiers' problem of Interpersonal Sensitivity is still a major issue. The result suggests that members of the Chinese Army always have great ability in adapting physical environment while the combination of the long-term habit of obeying disciplines and complex interpersonal relationship in the troops makes China's soldiers always have concerns for Obsessive-Compulsive and interpersonal relationship. The result reminds that we must attach great importance to the psychological counseling and the psychological health education in

terms of interpersonal relationship, social support, personal thoughts and acts on impulse of soldiers. Since June 15th, 2010, the new edition of regulations of the armed forces—Interior Service Regulations of the Chinese People's Liberation Army, Discipline Regulations of the Chinese People's Liberation Army and Drill Regulations of the Chinese People's Liberation Army (all be called by a joint name of Common Regulations of the Armed Forces)—came into force. The new edition of regulations formally include the psychological counseling of members of the Chinese Army, which means the work of psychological counseling of the Chinese Army has already become institutionalized. From 1990, the Chinese Army has already tried to make psychological counseling. At present, many troops regularly engage local psychological experts to make psychological health education and special psychological consultation for soldiers, but the proportion of soldiers who can received this kind of education or consultation is relatively low and those psychological health education and special psychological consultation haven't been normalized. The psychological counseling system in troops of the United States or European countries has already matured and many of their experience worth learning by us. The problems in terms of Obsessive-Compulsive and interpersonal relationship of soldiers in this study should be one of the important assignments in future psychological counseling tasks of the Chinese Army.

4.4 Chinese Army Members from Single-child Families Showed Significant Lower Evidence of Positive Mental Health than Soldiers from Multiple Child Families

This study found (see in Chart 3) that Chinese Army members from single-child families showed significant lower evidence of positive mental health than soldiers from multiple child families, which proved some studies in military psychology (Cui, S. F., & Liu, X. H. 1998) and some popular points of view in today's society. Those studies and the points of view believed that, compared with soldiers living during war time, soldiers from single-child families grew up under much better material conditions. Those soldiers, compared with generations of soldiers before, are not only lacking in revolutionary idealism but also lacking in experiences of lives' hardships and turbulent times. Therefore, they pay more attention to material comforts and the utilitarian rewards of joining the army, and sometimes they may not adapt military lives well or even disobey orders because they are too individualistic. Many veterans said, "it is difficult to train the new recruited members". Along with the proportion of soldiers from single-child families grows higher, the problem that how to make soldiers from single-child families effectively adapt their strained military lives has been becoming a pressing issue that the Chinese Army needs to face.

The individual problems of soldiers from single-child families found by previous studies, such as problems that they are fond of showing themselves or excelling others, will be easier generating psychological problems, like feeling under the weather, anxiety or the increasing frustrate feeling, under stress. Those features will become more obvious along with the numbers of soldiers from single-child families increase. Some studies found, however, that the overall status of mental health of members of air forces from single-child families is better than the norm of members of the Chinese Army and the norm of normal Chinese people (Chen, Q., Song, H. M., Ao, J. W., Liu, J., & Zhang, Z. L., 2002). Therefore, the problem related to the features and mental health of soldiers from single-child families is sill one of the important issues in psychological studies of the Chinese Army.

4.5 The Mental Health of Soldiers from Non-agricultural Backgrounds Was Less Positive than That of Soldiers from Agricultural Households

This study found (see in Chart 4) that the mental health of soldiers from non-agricultural backgrounds was less positive than that of soldiers from agricultural households. In terms of development approaches, before joining the army, soldiers from non-agricultural backgrounds may have tried many other ways of development but they failed, while for soldiers from agricultural households, whose approaches of development are very limited, joining the army is a relatively great choice. As a result, in terms of comprehensive qualities, soldiers from agricultural households are better than those from non-agricultural backgrounds; in terms of living habits, after joining the army, the physical load and behavior constraints that soldiers from non-agricultural households feel may stronger than soldiers from agricultural households feel. Soldiers from non-agricultural backgrounds receive much more cultural stimulation than those from agricultural households, therefore, their inadaptability to the relatively isolated military lives are stronger. In terms of psychological diathesis, soldiers from agricultural households, who may be engaged in agricultural work since childhood, may have much more experiences in life pressures than soldiers from non-agricultural backgrounds, so that their willpower ability of bearing hardships and being capable of hard work is higher than that of soldiers from non-agricultural backgrounds. Besides, soldiers from non-agricultural backgrounds join in the army may because they have talent but have no opportunity to use it, while soldiers from agricultural households take joining in the army as an important opportunity to change their fates and they will seek further development by seriously adapting military lives. Maybe just because that positive psychology, in aspects of hope, optimism, tenacity and self-confidence, etc, soldiers from agricul-

tural households have better performance than soldiers from non-agricultural backgrounds, so that they appear more positive in status of mental health.

4.6 Chinese Army Members with Senior High School Education Level Had Less Positive Mental Health than Those with Junior High School or University Education

The result of this study (see in Chart 5) suggests that Chinese Army members with senior high school education level had less positive mental health than those with junior high school or university education. From the perspective of life experience, soldiers with senior high school education level have all finished College Entrance Examination and most of them are "losers" of that examination. After finishing nine-year compulsory education, students who study in senior high school all have a certain goal—to be admitted to universities. If they cannot finish that goal through three years hard-working on their study, the experience of setback may become a life-long mental burden for most of them and become a potential inducement of future mental problems. Compared with that situation, if teenagers dropped out of schools just after finishing nine-year compulsory education, most of them may recognize that it is not appropriate to realize their self-worth by entering a higher school and try to find other ways to realize their self-worth. Compared with the encounter that studied hard in senior high school but failed at college entrance examination, the facing-reality niche of life is more helpful in keeping mental health. The soldiers who received college education are always military officers in troops. On the one hand, most of them take joining the army as the best choice of realizing their self-worth. On the other hand, a large proportion of them graduated from military academies or military schools so that they have great political and cultural qualities as well as sound prospects of development. Therefore, those soldiers who received college education have high level of mental health. Besides, some studies believe that soldiers from good educational backgrounds are also easier to have mental problems because those soldiers have higher achievement motivations, stronger sense of competition, more attention to personal interests and deficiency in team spirit (Cai, L. P., Liu, S. Z., & Wang, Q., 2000). Mental health workers should pay great attention to the difference in mental health between different groups because only through targeted psychological health education and psychological consultation works can they achieve great effects. Meanwhile, they need to consider how to create good learning atmosphere so that soldiers or military officers who have great self-expectations and higher achievement motivations can have full resources and opportunities to constantly improve their knowledge and academic

backgrounds. Therefore, we can fundamentally prepare full human resources reservation for the establishment of modernization and regularization of the Chinese Army

5. Conclusions

The study has following conclusions:

1. Mental health of members of the Chinese Army steadily improved between 1990 and 2007;

2. During those 18 years, the Interpersonal Sensitivity factor of SCL-90 of Chinese Army members changed most significantly, and the least significantly changed factor was Somatization;

3. Chinese Army members showed evidence of fewest problems on the Photic Anxiety factor, in contrast to the consistent problems indicated by scores on the Obsessive-Compulsive and Interpersonal Sensitivity scales;

4. Chinese Army members from single-child families showed significant lower evidence of positive mental health than soldiers from multiple child families;

5. The mental health of soldiers from non-agricultural backgrounds was less positive than that of soldiers from agricultural household;

6. Chinese Army members with senior high school education level had less positive mental health than those with junior high school or university education.

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