ISSN 2663-8169 Vol. 6, Issue 5: 79-88, DOI: 10.25236/IJNDE.2024.060513

Meta-Analysis on the Psychological Resilience of Basic Education Teachers in China

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Abstract: *Teachers' psychological resilience affects teachers' psychological and physical health, and plays a vital role in teachers' education and teachers' growth. Chinese scholars have carried out empirical research on teachers' psychological resilience in different sections of basic education, but the conclusion is not the same, causing widespread controversy. This study uses the method of meta-analysis to analyze the results of 34 empirical studies on teachers' psychological resilience in order to clarify the psychological resilience of basic education teachers in China. The research shows that: on the whole, the psychological resilience level of Chinese basic education teachers is significantly lower than that of normal students and equal to that of ordinary adults; in terms of regulatory variables, teaching age and teaching period have a significant impact on teachers' resilience level. Educational background only have a significant impact on individual dimensions of teachers' psychological resilience, while gender has no significant impact on teachers' psychological resilience level and all dimensions. This study analyzes the resilience of Chinese basic education teachers from the macro level, which provides a decision-making basis for the follow-up intervention and adjustment of basic education teachers' psychological resilience.*

Keywords: *Psychological resilience; Basic education teachers; Meta-analysis*

1. Introduction

Resilience, a psychological quality that covers almost all positive personality traits in health psychology, can help teachers adapt to the challenges brought by the fast-paced and high-pressure work environment. [1]Teachers' resilience level is not only related to their work status and quality of life, but also to the cultivation of students' resilience and even the quality of the entire education system. In the early 21st century, Chinese researchers gradually paid attention to teachers' resilience issues and conducted relevant surveys nationwide, providing practical references for the research and cultivation of teachers' resilience. Most of these surveys used the Chinese version of the Connor-Davidson Resilience Scale as a tool. This scale was revised by Yu Xiaonan after administering the English version of the CD-RISC to different age groups and occupations in China. The original five dimensions of the scale were adjusted to three dimensions that are more suitable for the Chinese population: tenacity, strength, and optimism.[2]Due to its good reliability and validity, the Chinese version of the CD-RISC has become a widely used resilience measurement scale in China, showing high internal consistency reliability and good structural validity in multiple teacher resilience measurement studies.

In China, research on teachers' resilience is often compared with the general adult norm or control group data compiled by Yu Xiaonan in 2007. Some studies have also compared the differences in teachers' resilience levels among different demographic variables such as gender and education level, but the conclusions are inconsistent. Some studies have optimistic conclusions, believing that teachers' resilience level is higher than ordinary people,[3]while other studies show that teachers' resilience level is lower than ordinary people;[4]in terms of gender differences, Zhou Chunle believes that female teachers' resilience level is slightly higher than male teachers,[5]Xia Yaoxin believes that male teachers' resilience level is significantly higher than female teachers,[6]and Fan Xiaoyu believes that there is no difference in the overall level of resilience between male and female teachers. In addition, there are also discrepancies in the research results regarding teaching experience, education level, and other aspects, which will not be elaborated here. Then, what is the actual level of resilience of primary and secondary school teachers in China? Are there differences in demographic variables such as gender, education level, and teaching experience? Clarifying these issues can provide objective evidence for the

ISSN 2663-8169 Vol. 6, Issue 5: 79-88, DOI: 10.25236/IJNDE.2024.060513

cultivation of teachers' resilience and the construction of a quality basic education teacher team. Furthermore, to obtain objective and comprehensive conclusions, the comparison standard is also a concern. Currently, the general adult norm compiled by Yu Xiaonan in 2007 has been widely recognized by Chinese scholars and has been widely used in comparing resilience among different groups such as teachers and students. However, as a relatively special professional group, the comparison of teachers' resilience level with ordinary adults can provide limited valuable information. Therefore, the norm used for comparison should be diverse, representative, and closely related to the teaching profession. Meta-analysis can quantitatively analyze multiple similar studies, providing repeatable and quantitative methods to integrate empirical evidence on unified research issues, which is more objective than traditional literature reviews. Therefore, this study intends to use meta-analysis to address the following issues: (1) Examine the resilience status of basic education teachers through meta-analysis and comparison with different norms; (2) Evaluate the impact of demographic variables and professional characteristics such as gender, education level, teaching experience, and teaching stage on teachers' resilience.

2. Research Design

2.1. Document Retrieval

This study conducted a comprehensive search of relevant literature in both Chinese and English. Given that the term "resilience" does not have a unified translation in China, adhering to the principle of completeness, this study utilized the advanced search function of various literature databases to simultaneously search for multiple semantically similar or related keywords, aiming to minimize the omission of literature. For Chinese literature, CNKI, VIP Database for Chinese Technical Periodicals, and Wanfang Database were primarily searched, with keywords such as "teacher" and "resilience" (or related Chinese translations) as the subject terms, resulting in a total of 1,463 Chinese articles. Regarding English literature, databases like Web of Science, ScienceDirect, and Elsevier were primarily searched, with keywords like "teacher" and "resilience" or "resiliency" combined with "China," "Chinese," "Mainland," etc., as the subject terms, yielding a total of 241 results. The final search date was March 31, 2024.

2.2. Literature Collection

2.2.1. Inclusion and Exclusion Criteria

In this study, the following four literature inclusion criteria are established: (1) the subjects are teachers in the stage of basic education in China (preschool education, primary school, junior high school, high school); (2) all studies use the Chinese version of CD-RISC scale; (3) the time range of literature collection is from January 2010 to March 2024. (4) the quantitative indicators of teachers' resilience (sample size, average and standard deviation) were reported clearly in the study.

2.2.2. Screening Process

First of all, use the document management software Endnote to delete all the literature retrieved; secondly, select the deleted literature according to the title and abstract; finally, screen the remaining literature according to the above inclusion and exclusion criteria. The above data extraction and coding process is operated independently by the two authors, and the consistency calculated by the reliability level formula is 92%, and the result is highly reliable.[7]Finally, a total of 34 research literature samples were obtained, with a total sample capacity of 19317 people, of which the largest sample was 2866 and the smallest sample was 36.

2.2.3. Variable Coding

Based on the controversial points of existing research and the focus of this study, we categorize subgroups based on the demographic variables of gender and education level, as well as the professional characteristics of teaching experience and teaching stage. We then calculate the individual average effect size of each subgroup and their differences between groups. The potential moderating variables in this study are encoded as follows: (1) Gender is divided into male and female; (2) According to laws and regulations such as the Education Law, education level subgroups are categorized into three types: junior college, bachelor's degree, and postgraduate; (3) Relevant research indicates that the first 5-10 years after teachers start working are a critical period for their professional development and mental health status.[8]Combining with the *Regulations on Teacher's Teaching*

ISSN 2663-8169 Vol. 6, Issue 5: 79-88, DOI: 10.25236/IJNDE.2024.060513

Experience Allowance issued by the government, we classify teachers' teaching experience into three subgroups: 1-5 years, 6-10 years, and over 10 years; (4) Teachers' teaching stages are divided into four categories: kindergarten, primary school, junior high school, and high school.

2.3. Statistical Method

2.3.1. Comparative Standard

The diversification of comparative standards can deepen the understanding of teachers' resilience scores. At the same time, two norms were selected in this study: (1) 560 ordinary adult norms reported by Yu Xiaonan in 2007; (2) Zhang Bei randomly sampled 1001 normal students from six normal universities directly under the Ministry of Education and other provincial normal universities in 2019. The two norms are called norm 1 and norm 2 respectively, and compared with 34 samples included in this study. Norm 1 is the norm of ordinary adults in China, which has been widely recognized by many scholars in China, and has been widely used in the comparison of resilience of different groups such as teachers. Norm 2 is the norm of normal school students, and normal students are the reserve force of teachers. By comparing the resilience of normal school students and teachers, we can observe the dynamic changes of teachers' mental health status in the process of transformation from pre-service to in-service. On the whole, the two regular moulds selected are representative and are closely related to the profession of teachers at the same time.

2.3.2. Calculation Process

Calculating effect size: In scientific research, a quantitative index is necessary to measure the intensity of a phenomenon, known as the effect size.[9]Because the 34 articles mainly reported the average score of teachers' resilience, which needed to be compared with the two norms respectively, the value of Cohen's d was selected as the effect in this study. The calculation formula is $d=(\overline{X}_1-\overline{X}_2)/s_p^2$, $\overline{X}_1$and $\overline{X}_2$ are the average of the experimental group and the control group, respectively, and s_p^2 is the combined standard deviation of the experimental group and the control group. In this study, $\overline{X}_1$ is the average score of resilience of the teacher samples included in the meta-analysis, $\overline{X}_2$ is the average score of norm 1 and norm 2 respectively, and s_p^2 is the joint standard deviation of the two compared teachers and norm, that is, the square of the weighted average of the two variances. In this study, the effect value is calculated by Comprehensive Meta-Analysis 3.0 software.

Combined effect size and heterogeneity test: The combined effect size is the final statistical indicator of meta-analysis. Before combining, it is necessary to conduct a heterogeneity test on the results of multiple studies to determine whether there are genuine differences in the research findings. This study comprehensively examines the degree of heterogeneity among studies through Q test and I^2 test. After that, a statistical model is selected based on the heterogeneity test results. If the heterogeneity is very obvious, the random effect model is chosen, otherwise, the fixed effect model is used. The statistical test of the combined effect size is made by examining whether the 95% confidence interval of the combined effect size includes "0" for statistical inference. If the 95% confidence interval does not include "0", which means $P<0.05$, it is statistically significant. At the same time, according to Cohen's standard for effect size, when the effect size $|d|\leq 0.2$, it is considered as a small effect; when $0.2<|d|<0.8$, it is a moderate effect; and when $|d|\geq 0.8$, it is a large effect.[10]

3. Research Results and Analysis

3.1. The Effect of Resilience Meta-analysis of Basic Education Teachers (compared with two norms)

At present, fixed effect model or random effect model is mainly used in meta-analysis. The fixed effect model holds that all the studies included focus on the same real effects, and the variation is only caused by random errors. According to the random effect model, there is not only one true effect in the study of meta-analysis, but also different due to different research groups and research tools. By combing the relevant literature, it is found that teachers' resilience is affected by many factors, such as family, school, society and so on. 34 studies included in this study have different samples, which will lead to large differences among groups, so the random effect model is chosen in this study. When compared with the two norms, the heterogeneity test results further verify the rationality of using the random effect model in this study (see Table 1). When I^2 is between 75% and 100%, there is

ISSN 2663-8169 Vol. 6, Issue 5: 79-88, DOI: 10.25236/IJNDE.2024.060513

considerable heterogeneity among the effects, indicating that the differences between studies are not caused by random errors.[11]

Table 1: Effect quantity and heterogeneity test results compared with two norms

Result variable	Comparative standard	d	95%CI	P_a	Fail-safe N	Q	P_b	I^2
Tenacity	Norm one	0.48	0.22,0.752	0.000	1656	2944.18	0.000	99.05
	Norm two	-0.27	-0.47,-0.06	0.012	1633	2338.78	0.000	98.8
Strength	Norm one	-0.16	-0.36,0.05	0.14	563	1803.14	0.000	98.45
	Norm two	-0.36	-0.58,-0.14	0.000	5008	2619.3	0.000	98.93
Optimism	Norm one	0.25	0.1,0.39	0.000	2768	955.05	0.000	97.07
	Norm two	-0.36	-0.54,-0.18	0.000	5317	1800.35	0.000	98.45
Resilience	Norm one	0.11	-0.06,0.28	0.21	1362	1976.2	0.000	98.28
	Norm two	-0.34	-0.51,-0.16	0.000	6405	2731.9	0.000	98.76

Compared with Yu Xiaonan 's norm 1, the average effect after the merger is positive and negative, in which the two dimensions of tenacity and optimism are significant ($p<0.05$), and the dimension of self-improvement and resilience is not significant, of which the largest dimension is tenacity. The average effect of the dimension is 0.48, reaching the medium effect level, indicating that compared with ordinary adults in 2007, the tenacity quality of teachers is the most prominent. Compared with Zhang Bei's norm 2, the average effects of tenacity, self-improvement, strength and resilience reached a significant level ($p<0.05$). The three qualities of tenacity, strength and optimism and the level of resilience of teachers are lower than those of normal school students, and the effect of the difference between them is in the middle to small effect.

3.2. Test and Analysis of Regulation Effect

In meta-analysis, the inclusion study can be divided into subgroups according to certain research characteristics, and subgroup analysis is one of the common methods to explore the effect of regulation. The purpose of subgroup analysis is to investigate the effects of some demographic variables and research characteristic variables on teachers' resilience and various dimensions. Therefore, this study is divided into different subgroups according to the characteristics of teachers' gender and educational background, and explores the effects and differences of different subgroups. The specific analysis results are as follows:

3.2.1. The Regulative Effect of Gender

It can be seen from Table 2 that the level of teachers' resilience and the intergroup test results of the three dimensions show that $p>0.05$, that is, gender has no significant effect on teachers' resilience, tenacity, strength and optimism. It shows that the level of resilience of male and female teachers is the same.

Table 2: Regulative effect of gender

Result variable	Subgroup	k	d	95%CI	Q	p
Tenacity	Male	6	0.66	-0.05,1.37	0.45	0.5
	Female	6	0.27	-0.61,1.16		
Strength	Male	6	-0.35	-0.68,0.01	0.27	0.61
	Female	6	0.51	-1.03,0.01		
Optimism	Male	5	0.33	0.12,0.54	0.01	0.91
	Female	5	0.31	0.04,0.58		
Resilience	Male	10	0.04	-0.31,0.39	0.149	0.7
	Female	10	0.06	-0.43,0.32		

Note: K indicates the number of samples included in the analysis

There is no significant difference in the resilience level of teachers based on gender, consistent with the existing research results of most scholars such as Zhou Zheng and Zhu Xiaomin. It is generally believed that men are often portrayed as resilient and successful in society, and they are expected to exhibit perseverance and courage when facing difficulties and pressures. These societal role expectations give men greater motivation for career advancement, fostering resilience, strength, and optimistic qualities. However, the results of this study do not support this empirical hypothesis.[12]The possible reasons are: on one hand, compared to male teachers, female teachers are better at handling

ISSN 2663-8169 Vol. 6, Issue 5: 79-88, DOI: 10.25236/IJNDE.2024.060513

negative emotions. When encountering troubles at work, they tend to seek support and help from friends, which helps them get rid of negative emotions more quickly. On the other hand, influenced by social expectations and role positioning, the number of female teachers in China's teaching staff is significantly higher than that of male teachers, and women have a higher sense of professional identity towards the teaching profession,[13]which also positively affects the resilience of female teachers to a certain extent. Therefore, in general, there is no significant difference in the resilience level between male and female teachers.

3.2.2. The Regulative Effect of Academic Qualifications

It can be seen from Table 3 that educational background only has a significant effect on teachers' optimism (Q = 0.436, P < 0.05), but has no significant effect on resilience, tenacity and strength. Through further comparison, it is found that the effect of postgraduates in the dimension of optimism is the largest, although there is no statistically significant difference in resilience, tenacity and strength among teachers with different academic qualifications. However, the effect of teachers with bachelor's degree is the largest in three aspects.

Table 3: Regulative effect of academic qualifications

Result variable	Subgroup	k	d	95%CI	Q	p
Tenacity	Junior college	6	0.749	0.42, 1.08	0.689	0.876
	Undergraduate	7	0.989	0.49, 1.48		
	Graduate student	5	0.723	-0.09, 1.54		
Strength	Junior college	6	0.749	0.42, 1.08	2.344	0.504
	Undergraduate	7	0.989	0.49, 1.48		
	Graduate student	5	0.723	-0.09, 1.54		
Optimism	Junior college	6	0.749	0.42, 1.08	0.436	<0.05
	Undergraduate	7	0.989	0.49, 1.48		
	Graduate student	5	0.723	-0.09, 1.54		
Resilience	Junior college	6	0.749	0.42, 1.08	0.47	0.925
	Undergraduate	7	0.989	0.49, 1.48		
	Graduate student	5	0.723	-0.09, 1.54		

The subjective experience of the public may think that the higher the educational background is, the higher the resilience level of teachers is. The conclusion of this paper is to the left of the subjective experience of the public, but it is consistent with the existing research results of most scholars such as Xia Yaoxin, Wang Zhao and so on. This is mainly because the profession of teachers requires not only a solid theoretical foundation, but also superb teaching skills, and different stages of education have their own emphasis on the training of teachers, which can not take into account the training requirements of the two aspects at the same time. Therefore, teachers with different academic qualifications have their own strengths in practical work. As a result, there is no complete positive correlation between the level of resilience and the level of education. In this study, education only has a significant impact on teachers' optimism, and teachers with bachelor's degree have the best level of resilience as a whole. Optimism refers to the confidence shown by teachers in the face of stressful events, and whether they can have this confidence depends on teachers' trust in their own resources and social resources. After years of theoretical study, teachers with graduate degrees have a certain understanding of pedagogy and psychology. When they encounter all kinds of unexpected situations in teaching, if they can apply the theories they have learned to specific situations, they can solve the problem to a certain extent, so they are more optimistic about their working ability and level. On the one hand, teachers with low educational level will have a certain sense of inferiority because of their educational background, and do not believe that they have the ability to deal with unexpected situations effectively. On the other hand, due to the lack of systematic learning of theoretical knowledge, in the face of difficult and complicated problems in educational work, they are unable to see through the essence quickly through phenomena, and when dealing with problems, they often rely on our own subjective experience and lack confidence in our own ability. As a result, they will doubt whether your judgment and handling methods are correct. On the other hand, teachers with bachelor's degree have the greatest effect in three aspects: resilience, tenacity and strength, mainly because the education in the new era puts forward higher requirements for teachers' comprehensive professional attainment. Teachers are required not only to have extensive and profound theoretical knowledge, but also to have the ability to transform theoretical knowledge and practice. Compared with paying attention to the cultivation of skills at the junior college stage and the theoretical system at the graduate stage, undergraduate education is

ISSN 2663-8169 Vol. 6, Issue 5: 79-88, DOI: 10.25236/IJNDE.2024.060513

between the two, so it is more likely to balance the relationship between skill training and theoretical learning.

3.2.3. The Regulative Effect of Teaching Age

As can be seen from Table 4, in addition to the dimension of self-improvement, teaching age has a significant impact on teachers' resilience, optimism and resilience. By further comparing the effect of teaching seniority in each group, it is found that in terms of tenacity and resilience, there is a trend of more than 10 years > 5 years > 6 years. Teachers with more than 10 years of teaching experience are the highest in all aspects. On the other hand, young teachers with 1-5 years working experience are more tenacious and have a higher level of resilience than those who have worked for 6-10 years. In terms of optimism, the longer the teachers are, the more optimistic they are.

Table 4: Regulative effect of teaching age

Result variable	Subgroup	k	d	95%CI	Q	p
Tenacity	1~5	12	1.010	0.72,1.3	0.432	<0.05
	6~10	7	0.945	0.52,1.37		
	More than 10	13	1.166	0.65,1.68		
Strength	1~5	12	0.115	-0.17, 0.4	0.222	0.895
	6~10	10	0.201	-0.14, 0.54		
	More than 10	13	0.218	-0.22,0.65		
Optimism	1~5	12	0.465	0.29, 0.64	0.376	<0.05
	6~10	9	0.507	0.24, 0.77		
	More than 10	14	0.558	0.31,0.8		
Resilience	1~5	15	0.412	0.23,0.6	0.385	<0.05
	6~10	10	0.359	0.11,0.613		
	More than 10	19	0.504	0.26,0.75		

Teaching experience has a significant impact on teachers' resilience level, which is consistent with the research results of all the literatures included in this study. Teachers with more than 10 years of teaching experience have the highest resilience level, and their overall performance in terms of tenacity, strength and optimism is also the best. This is mainly because the accumulation of long-term work experience enables them to face troubles and problems calmly without panicking, and they can flexibly apply educational wisdom to solve various problems in work. In addition, teachers with more than 10 years of teaching experience are mostly over 30 years old, and their family, life, and interpersonal relationships are relatively stable, so their resilience level is generally good. However, teachers with 1-5 years of teaching experience have a better resilience level than those with 6-10 years of teaching experience. This is because although newly recruited teachers may encounter many difficulties and failures in their work, they are young and have room and time for trial and error. They are also likely to receive tolerance and guidance from others. However, teachers with 6-10 years of teaching experience have more rich teaching experience, but this also means that schools and teachers themselves will have higher requirements for them. They will also encounter various problems and setbacks, most of which are caused by job adjustment, position transfer, title competition, etc. If they fail to meet their own expectations in terms of title competition, they may doubt their abilities and future development space, thereby affecting their resilience level.

3.2.4. The Regulative Effect of Teaching Section

It can be seen from Table 5 that any teaching stage has a significant impact on tenacity, optimism and resilience except strength. By further observing the size of the effect, it is found that in the three aspects with significant differences, the effect of senior high school teachers is the largest, and that of primary school teachers is the smallest. And all show the trend of senior high school > kindergarten > junior middle school > primary school, but in the dimension of strength, the effect of senior high school teachers is still the largest. The effects of junior high school teachers and primary school teachers are relatively small, indicating that the overall level of resilience of senior high school teachers is the highest, kindergarten teachers are basically the same as senior high school teachers, and the overall level of resilience of primary school teachers is the lowest.

The difference in teaching stages has a significant impact on teachers' resilience level, which is in line with teachers' subjective experience. Teachers at different teaching stages face different characteristics of student groups, different working environments, and differences in work requirements and sources of occupational stress, which will all affect the resilience level of teachers at various

ISSN 2663-8169 Vol. 6, Issue 5: 79-88, DOI: 10.25236/IJNDE.2024.060513

teaching stages. According to statistics, in 2022, the student-teacher ratio in primary schools was as high as 16.19:1,[14] the highest among all teaching stages, indicating that the problem of fewer teachers and more students in primary schools is the most prominent. Students in primary schools are in a critical period of physical and mental development, and the role and tasks of teachers in primary schools are more complex and diverse. They must act as teachers who impart knowledge and answer questions, as well as parents who take care of students' physical and mental health and guide them to form correct values. However, the excessively high student-teacher ratio undoubtedly further aggravates the occupational pressure of primary school teachers. These risk factors are not conducive to the formation and improvement of resilience in primary school teachers. High school teachers have the highest resilience level on the whole, which may be due to the fact that although high school teachers face considerable pressure for students to enter universities, compared with students in other stages, high school students are more mature in terms of physical and mental development and have a clearer understanding of life planning, so high school teachers also have the highest comfort level in terms of career prospects. On the other hand, according to statistics, in 2022, the qualification rate of full-time teachers in Chinese high schools reached 99.03%. It can be seen that high school teachers have a higher overall education level, and according to the previous text, teachers with a bachelor's degree have the highest resilience level on the whole. The combination of these favorable factors places the resilience level of high school teachers at the top of the pyramid among basic education teachers. Kindergarten teachers face a group of innocent young children and are generally in a dynamic work environment. In addition, kindergarten teachers do not have rigid indicators such as the pressure of enrollment, and they face fewer risk factors that affect the formation and development of resilience. Therefore, they have a higher resilience level. Junior high school teachers face a group of students in the critical period of behavioral autonomy development, as well as a period of conflict and contradiction in exploring future planning.[15] Managing students requires much effort, and facing the pressure of the high school entrance examination, these stressors pose significant challenges to improving the resilience level of junior high school teachers. Therefore, the resilience level of junior high school teachers is also relatively low on the whole.

Table 5: Regulative effect of teaching period

Result variable	Subgroup	k	d	95%CI	Q	p
Tenacity	Kindergarten	8	0.817	0.54,1.1	10.39	<0.05
	Primary school	9	0.262	-0.15,0.68		
	Junior middle school	7	0.493	0.03,0.95		
	high school	5	1.414	0.77,2.06		
Strength	Kindergarten	8	0.197	-0.08, 0.47	4.654	0.199
	Primary school	9	-0.174	-0.45,0.1		
	Junior middle school	7	-0.211	-0.73,0.31		
	high school	5	0.233	-0.4,0.87		
Optimism	Kindergarten	8	0.481	0.25,0.72	8.71	<0.05
	Primary school	9	0.08	-0.05,0.28		
	Junior middle school	7	0.111	-0.23,0.39		
	high school	5	0.5	0.05,0.94		
Resilience	Kindergarten	9	0.401	0.21,0.59	11.214	<0.05
	Primary school	13	-0.051	-0.3.0.2		
	Junior middle school	10	0.086	-0.23,0.4		
	high school	8	0.505	0.18,0.83		

3.3. Publication Bias

Bias refers to the deviation of research results or inferences from reality. Publication bias is difficult to control and has a great influence, so it is particularly important to identify it. In order to ensure the accuracy of the study, funnel chart, insecurity Fail-safe N and Egger linear regression were used to comprehensively evaluate the publication bias of the sample.

ISSN 2663-8169 Vol. 6, Issue 5: 79-88, DOI: 10.25236/IJNDE.2024.060513

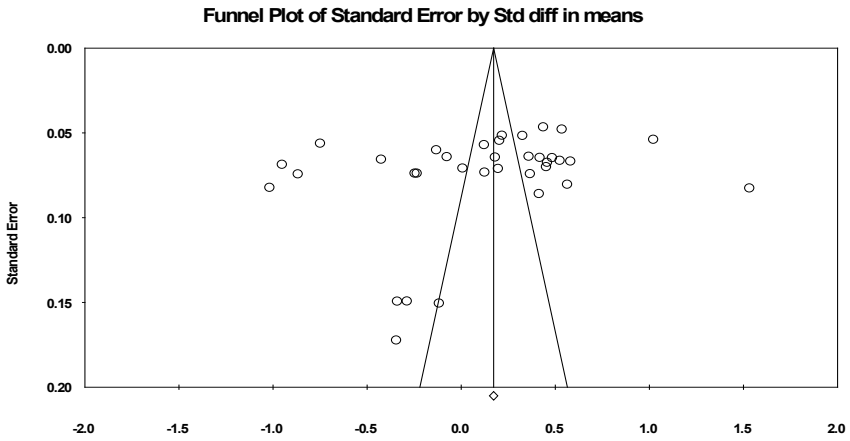

Figure 1: Funnel chart of teachers' resilience and norm

As seen in Figure 1, the research literature comparing teacher resilience with norm 1 is mostly distributed on both sides of the total effect size, yet displaying a slight asymmetry, suggesting a possible publication bias. Given the subjective nature of funnel plot interpretation, further precision tests using fail-safe N and Egger's linear regression are necessary. According to Table 1, the fail-safe N for the comparison between teacher resilience and norm 1 is 1362, greater than 5n+10 (n=34). The Egger test shows P=0.11>0.05, satisfying the condition of no publication bias. Combining these three tests, we can conclude that the included studies do not exhibit significant publication bias. Similarly, using the same method to examine the comparisons between teacher resilience and norm 2, as well as teacher resilience, tenacity strength, and optimism with norms 1 and 2, the results indicate that the included studies do not have severe publication bias and are suitable for further analysis.

4. Research Conclusions and Suggestions

4.1. Research Conclusions

The overall levels of tenacity, srength, optimism, and resilience of basic education teachers are significantly lower than those of normal students, possibly due to the following reasons: (1)Normal students are in the pre-service preparation stage, compared to in-service teachers, they face less pressure and responsibilities, and their social circles and interpersonal relationships are simpler. They do not need to communicate and cooperate with students, parents, colleagues, and others to handle complex interpersonal relationships. (2)The mental health courses offered in universities and the mental health instructors they have can provide corresponding support for the formation and development of resilience among normal students. However, in-service teachers often have to bear greater work pressure alone and cannot easily obtain many protective factors like normal students. Therefore, the level of teacher resilience is significantly lower than that of normal students.Teachers' resilience level is comparable to that of ordinary adults, consistent with the research conclusions of most scholars in China. Many people may subjectively believe that teachers face greater work pressure and require a higher level of resilience, thus their resilience level would generally be higher than ordinary adults. However, with the rapid socio-economic development and increasing social competition in China, ordinary adults face pressures in daily life and work that are no less than teachers, which also imposes higher requirements on the resilience level of ordinary Chinese adults. Therefore, the resilience level of Chinese teachers is comparable to that of ordinary adults.

Different moderators have varying degrees of moderating effects on the resilience of Chinese basic education teachers. As shown in the above moderation effect results, teachers' resilience is mainly influenced by two moderators: teaching experience and teaching stage. In terms of teaching experience, teachers with over 10 years of teaching experience have the highest resilience, while those with 6 to 10 years of teaching experience have the lowest. Therefore, China should focus on improving the mental health and resilience of teachers with 6 to 10 years of teaching experience. From the perspective of teaching stage, high school teachers have the highest resilience, while primary school teachers have the lowest. In terms of tenacity, strength, and optimism, high school teachers have the largest effect sizes in all three dimensions. Except for perseverance and optimism, primary school teachers' effect sizes are lower than those of teachers in the other three stages. Therefore, it is urgent to increase the importance

ISSN 2663-8169 Vol. 6, Issue 5: 79-88, DOI: 10.25236/IJNDE.2024.060513

and training efforts for improving the resilience of primary school teachers in China. There is no significant difference in the impact of education level on teachers' resilience, but it has a significant impact on individual dimensions of teachers' resilience. For example, teachers with different education levels show significant differences in optimism. Further comparison of effect sizes reveals that teachers with a bachelor's degree have the best overall resilience, while teachers with an associate degree and a master's degree have their respective advantages and disadvantages in the three dimensions. Gender does not moderate teachers' resilience, tenacity, strength, or optimism.

4.2. Suggestions

On the one hand, attention should be paid to the dynamic changes in teachers' resilience level during the transition from pre-service to in-service teachers, enhancing their psychological adaptability in this process. Meta-analysis results show that the resilience level of teachers in China's basic education is lower than that of pre-service teachers, mainly due to the decrease in protective factors and the increase in risk factors that affect resilience during the transition from pre-service to in-service teachers. Therefore, to prevent a sharp decline in teachers' resilience level during this transition, schools at all levels should attach greater importance to this process and take corresponding protective measures. The management of primary and secondary schools as well as kindergartens should embody humanistic care. By strengthening the mental health education of in-service teachers and optimizing the working environment, it can help teachers better adapt to this transition and provide more protective factors for improving teachers' resilience level.

On the other hand, to enhance the resilience level of Chinese primary and secondary school teachers, targeted measures should be taken based on their characteristics. Meta-analysis results show that there are significant differences in resilience levels among teachers with different teaching experiences, teaching stages, and educational backgrounds, with some differences also existing in specific dimensions. Therefore, to promote the resilience level of the vast population of Chinese primary and secondary school teachers, targeted strategies should be proposed based on their individual needs, demographic characteristics, and professional characteristics. Research on the current status of teachers' resilience can be strengthened by leveraging artificial intelligence and big data to more accurately obtain individual and group characteristic indicators of teachers' resilience level, deeply understanding the models and paths required for resilience development among teachers with different characteristics, and providing practical basis for designing targeted promotion strategies.

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