

**THE INFLUENCE OF PHYSICAL EXERCISE ON
DEPRESSION AMONG CHINESE COLLEGE
STUDENTS: THE MEDIATING ROLE OF
RESILIENCE AND THE MODERATING
ROLE OF SOCIAL SUPPORT**

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UNIVERSITI SAINS MALAYSIA

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STUDENTS: THE MEDIATING ROLE OF
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ROLE OF SOCIAL SUPPORT**

by

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TABLE OF CONTENTS

ACKNOWLEDGEMENT	ii
TABLE OF CONTENTS	iii
LIST OF TABLES	xi
LIST OF FIGURES	xiv
LIST OF ABBREVIATIONS	xv
LIST OF APPENDICES	xvi
ABSTRAK	xvii
ABSTRACT	xix
CHAPTER 1 INTRODUCTION	1
1.1 Introduction	1
1.2 Background of the Study	7
1.2.1 The Effect of Physical Exercise on Depression	7
1.2.2 The Effect of Resilience on PE and Depression	10
1.2.3 The Effect of Social Support on PE and Depression	13
1.3 Problem Statement	15
1.4 Research Aim	22
1.5 Research Objectives	22
1.6 Research Questions	23
1.7 Significance of the study	24
1.7.1 Theoretical significance	24
1.7.2 Practical significance	24
1.8 Definition of Terms	25
1.8.1 Depression	25
1.8.2 Physical Exercise	26
1.8.3 Resilience	26

1.8.4	Social Support	27
1.8.5	Chinese College Students	27
1.9	Summary	28
CHAPTER 2 LITERATURE REVIEW		29
2.1	Introduction	29
2.2	Depression among Chinese College Students	29
2.2.1	Definition of Depression	29
2.2.2	Causes of depression	33
2.2.3	Structure of Depression	35
2.2.4	Measurement of Depression	36
2.2.4(a)	Depression Self-Rating Scale (CES-D)	36
2.2.4(b)	Beck Depression Inventory (BDI)	36
2.2.4(c)	Hamilton Depression Scale (HAMD)	36
2.2.4(d)	Patient Health Questionnaire-9 (PHQ-9)	36
2.2.4(e)	Depression Self-Rating Scale (SDS)	37
2.2.5	Current Status of Depression among Chinese College Students	37
2.3	PE among Chinese College Students	41
2.3.1	Definition of PE	41
2.3.2	Structure and Measurement of PE	43
2.3.3	Research on Benefits of PE	46
2.3.4	Current Status of PE among Chinese College Students	53
2.3.5	Studies on the Mechanism of PE on Depression	54
2.3.5(a)	PE Affects Depression Through a Biological Perspective	54
2.3.5(b)	PE Affects Depression Through a Psychological Perspective	56
2.3.5(c)	PE Affects Depression Through a Sociological Perspective	58
2.3.6	Effect of PE on Depression	58

2.4	Resilience among Chinese College Students	65
2.4.1	Definition of Resilience	65
2.4.2	Mechanisms of Resilience	68
2.4.2(a)	Psychological Resilience Organizational Framework	69
2.4.2(b)	Theoretical Model of Kumper	70
2.4.2(c)	Psychological Resilience Protective Model, Compensatory Model, Challenge Model	72
2.4.3	Structure of Psychological Resilience	74
2.4.4	Measurement of psychological resilience	77
2.4.4(a)	Dispositional Resilience Scale (DRS)	77
2.4.4(b)	Scale (RS)	77
2.4.4(c)	The CD -Resilience Scale (CD -RISC)	77
2.4.4(d)	Resilience Scale for adults (RSA)	78
2.4.5	Current Status of Resilience among Chinese College Students	79
2.4.6	Effects of Resilience on Depression	79
2.5	Social Support among Chinese College Students	84
2.5.1	Definition of Social Support	84
2.5.2	Research on the Mechanism of Social Support	88
2.5.2(a)	Main Effect Model	88
2.5.2(b)	Buffering Effect Model	89
2.5.2(c)	Dynamic Effect Model	89
2.5.3	Structure of Social Support	90
2.5.4	Measurement of Social Support	91
2.5.4(a)	Social Support Rating Scale (SSRS)	91
2.5.4(b)	Multidimensional Scale of Perceived Social Support (MPSS)	92
2.5.4(c)	The Perceived Social Support Scale (PSSS)	92

2.5.5	Current Status of Social Support among Chinese College Students	93
2.5.6	Effect of Social Support on Depression and PE	94
2.6	The Impact of Mediating and Moderating Variables	97
2.6.1	Mediating Role of Resilience in the Relationship between PE and Depression	97
2.6.2	Moderating Role of Social Support in the Relationship between PE and Depression	103
2.7	Theoretical Basis of the Study	110
2.7.1	Self-Determination Theory (SDT)	110
2.7.2	Social Cognitive Theory (SCT)	113
2.7.3	Self-Efficacy Theory (SET)	116
2.8	Theoretical Framework	118
2.9	Conceptual Framework	120
2.10	Research Hypotheses	123
2.11	Summary	124
	CHAPTER 3 METHODOLOGY	125
3.1	Introduction	125
3.2	Research Design	125
3.3	Research Population and Sampling	128
3.3.1	Research Population	129
3.3.2	Sampling Method	132
3.3.2(a)	Sampling Technique	133
3.3.2(b)	Sampling Process	134
3.3.3	Sample Size	136
3.4	Instrumentation	138
3.4.1	The Physical Activity Rating Scale (PARS-3)	138
3.4.2	Self-rating Depression Scale (SDS)	140
3.4.3	Connor-Davidson Resilience Scale (CD-RISC-25)	142

3.4.4	Perceived Social Support Scale (PSSS).....	145
3.5	Pilot Study.....	147
3.5.1	Pilot Test Process and Sample Characteristics.....	148
3.5.2	Test Criteria for Reliability and Validity Analysis.....	149
3.5.3	Reliability and Validity Analysis of Pilot Test.....	152
3.5.3(a)	Analysis of PARS-3.....	152
3.5.3(b)	Analysis of SDS.....	153
3.5.3(c)	Analysis of CD-RISC-25.....	157
3.5.3(d)	Analysis of PSSS.....	160
3.6	Data Analysis.....	163
3.7	Ethical Considerations.....	166
3.8	Summary.....	167
CHAPTER 4 DATA ANALYSES AND RESULTS.....		168
4.1	Introduction.....	168
4.1.1	Sample Characteristics.....	169
4.2	Reliability and Validity Analysis.....	170
4.2.1	Analysis of PARS-3.....	170
4.2.2	Analysis of SDS.....	172
4.2.3	Analysis of CD-RISC-25.....	174
4.2.4	Analysis of PSSS.....	176
4.3	Analysis of the Current Situation among College Students.....	178
4.3.1	Analysis of the Basic Status of PE among College Students.....	178
4.3.1(a)	Statistical Analysis of the Current Status of PE among College Students.....	178
4.3.1(b)	Analysis of the Differences in the Amount of PE among College Students by Majors.....	179
4.3.1(c)	Analysis of the Differences in the Amount of PE among College Students by Household Registrations.....	180

4.3.2	Analysis of the Basic Status of Depression Levels among College Students	180
4.3.2(a)	Analysis of Depression Levels among College Students	180
4.3.2(b)	Analysis of Differences in Depression Level Scores among College Students by Gender	181
4.3.2(c)	Analysis of Differences in Depression Level of College Students by Major	182
4.3.2(d)	Analysis of Differences in Depression Level Scores among College Students by Household Registrations	183
4.3.3	Analysis of the Basic Status of the Resilience Level among College Students	184
4.3.3(a)	Descriptive Statistics of the Current Status among College Students' Resilience Level Scores	184
4.3.3(b)	Analysis of Differences in Scores on Different Factors of Resilience among College Students by Genders	185
4.3.3(c)	Analysis of Differences in Scores on Factors of Resilience among College Students by Major	186
4.3.3(d)	Analysis of Differences in Resilience Scores of College Students between Different Household Registrations	188
4.3.4	Analysis of the Basic Status of Social Support Scores among College Students	189
4.3.4(a)	Descriptive Statistics of the Current Status of College Students' Social Support	189
4.3.4(b)	Analysis of the Differences in the Scores of Social Support Factor of College Students by Gender	190
4.3.4(c)	Analysis of the Differences in the Scores of Social Support Factors of College Students by Major	191
4.3.4(d)	Analysis of the Differences in the Scores of the Factors of Social Support of College Students by Household Registrations	192
4.4	Assessment of Structural Model	193
4.4.1	Direct Effect	194

4.4.2	Testing the Mediating Effect	196
4.4.3	Testing the Moderating Effect	198
4.5	Summary	200
CHAPTER 5 DISCUSSION AND CONCLUSION		201
5.1	Introduction	201
5.2	Summary of the Study	202
5.3	Discussion	204
5.3.1	The Current situation and comparative analysis of PE, psychological resilience, social support and depression level among Chinese college students	204
5.3.1(a)	Current status and differences of PE level among Chinese college students PE	204
5.3.1(b)	Current status and differences of depression level among Chinese college students	211
5.3.1(c)	Current status and differences of resilience among Chinese college students	217
5.3.1(d)	Current status and differences of social support among Chinese college students	221
5.3.2	Direct influences of different variables on the dependent variable in this study	225
5.3.2(a)	Influence of PE on depression among Chinese college students	225
5.3.2(b)	Influence of resilience on depression among Chinese college students	230
5.3.2(c)	Influence of social support on depression among Chinese college students	234
5.3.3	Mediating Effect	239
5.3.4	Moderating Effect	245
5.3.4(a)	Social support plays a moderating role in the relationship between PE and depression among Chinese college students	245
5.3.4(b)	There is a difference between the high and low social support groups on the effect of PE on depression levels	252

5.4	Contribution to New Knowledge	255
5.5	Practical Implications	258
5.6	Recommendation for Future Research	260
5.7	Conclusion	263
	REFERENCES	266
	APPENDICES	

LIST OF TABLES

		Page
Table 3.1	<i>Sample item of PARS-3</i>	139
Table 3.2	<i>The summary report of validity and reliability for Chinese version of PARS-3</i>	140
Table 3.3	<i>Sample item of SDS</i>	141
Table 3.4	<i>The summary report of validity and reliability for both original and Chinese version of SDS</i>	142
Table 3.5	<i>Sample item of CD-RISC-25</i>	143
Table 3.6	<i>The summary report of validity and reliability for both original and Chinese version of CD-RISC-25</i>	144
Table 3.7	<i>Sample item of PSSS</i>	145
Table 3.8	<i>The summary report of validity and reliability for both original and Chinese version of PSSS</i>	146
Table 3.9	<i>Summary of Basic Characteristics of Pilot Test Samples</i>	149
Table 3.10	<i>Reliability Analysis Results of PARS-3 Pilot Test</i>	152
Table 3.11	<i>The EFA Results of PARS-3 Pilot Test</i>	153
Table 3.12	<i>Reliability Analysis Results of SDS Pilot Test</i>	154
Table 3.13	<i>The EFA Results of SDS Pilot Test</i>	155
Table 3.14	<i>The Overall Fit Index of SDS Pilot Test</i>	155
Table 3.15	<i>The CFA Results of SDS Pilot Test</i>	156
Table 3.16	<i>Reliability Analysis Results of CD-RISC-25 Pilot Test</i>	157
Table 3.17	<i>The EFA Results of CD-RISC-25 Pilot Test</i>	158
Table 3.18	<i>The Overall Fit Index of CD-RISC-25 Pilot Test</i>	159
Table 3.19	<i>The CFA Results of CD-RISC-25 Pilot Test</i>	160
Table 3.20	<i>Reliability Analysis Results of PSSS</i>	161
Table 3.21	<i>The EFA Results of PSSS Pilot Test</i>	162

Table 3.22	<i>The Overall Fit Index of PSSS Pilot Test</i>	162
Table 3.23	<i>The CFA Results of PSSS Pilot Test</i>	163
Table 3.24	<i>Procedures for Quantitative Data Analysis</i>	164
Table 3.25	<i>Summary of Research Questions and Data Analysis Method</i>	166
Table 4.1	<i>Summary of Basic Characteristics of Samples</i>	170
Table 4.2	<i>Reliability Analysis Results of PARS-3</i>	171
Table 4.3	<i>The EFA Results of PARS-3</i>	171
Table 4.4	<i>Reliability Analysis Results of SDS</i>	172
Table 4.5	<i>The EFA Results of SDS</i>	173
Table 4.6	<i>Reliability Analysis Results of CD-RISC-25</i>	174
Table 4.7	<i>The EFA Results of CD-RISC-25</i>	175
Table 4.8	<i>Reliability Analysis Results of PSSS</i>	176
Table 4.9	<i>The EFA Results of PSSS</i>	177
Table 4.10	<i>Statistics on the Level of PE among College Students</i>	179
Table 4.11	<i>Comparison of PE Amount of College Students in Different Majors</i>	179
Table 4.12	<i>Comparative Analysis of PE among College Students from Different Household Registrations</i>	180
Table 4.13	<i>Statistical Situation Analysis of Depression Level among College Students</i>	181
Table 4.14	<i>Comparative Analysis of Differences in Depression Level Scores among College Students by Gender</i>	182
Table 4.15	<i>Comparison of Depression Level of College Students in Different Majors</i>	182
Table 4.16	<i>Comparative Analysis of Differences in Depression Scores of College Students by Different Household Registrations</i>	183
Table 4.17	<i>Descriptive Statistics of the Current Status of College Students' Resilience Scores</i>	185
Table 4.18	<i>Analysis of Differences in Resilience Scores among College Students by Gender</i>	186

Table 4.19	<i>Comparison of Resilience Level of College Students by Major</i>	187
Table 4.20	<i>Comparison of Differences in Factor of Tenacity among College Students by Major</i>	188
Table 4.21	<i>Analysis of Differences in Resilience Scores of College Students by Household Registration</i>	189
Table 4.22	<i>Descriptive Statistics of College Students' Scores on Each Factor of Social Support</i>	190
Table 4.23	<i>Differences in Scores on Factors of Social Support among College Students by Gender</i>	191
Table 4.24	<i>Comparison of Factors of Social Support among College Students by Major</i>	192
Table 4.25	<i>Differences in the Scores of Social Support Factors of College Students by Household Registration</i>	193
Table 4.26	<i>Hypothesis Testing for Direct Effects.</i>	195
Table 4.27	<i>Correlation of Variables in the Mediation Model</i>	196
Table 4.28	<i>Regression Analysis of the Relationship between Variables in the Mediation Model</i>	197
Table 4.29	<i>The Mediation Effect of Resilience in the Association between PE and Depression</i>	197
Table 4.30	<i>Test of the Moderation Effect of PE on Depression</i>	199
Table 4.31	<i>Conditional direct effect(s) of PE on Depression</i>	200

LIST OF FIGURES

	Page
Figure 2.1	<i>Theoretical Model of Psychological Resilience (Kumper, 1999)</i> 70
Figure 2.2	<i>Self-Determination Theory (Deci & Ryan, 2002)</i> 111
Figure 2.3	<i>Determinants in Social Cognitive Theory</i> 114
Figure 2.4	<i>The Self-efficacy Theory</i> 117
Figure 2.5	<i>The Theoretical Framework of the Study</i> 119
Figure 2.6	<i>Conceptual Framework of the Study</i> 123
Figure 3.1	<i>Research Design Diagram</i> 127
Figure 3.2	<i>Research Design Flowchart</i> 128
Figure 3.3	<i>Prevalence of depression by provinces in China (%)</i> 130
Figure 4.1	<i>Measurement Model Path Coefficient.</i> 195
Figure 4.2	<i>Path Coefficient Plots for PE, Resilience and Depression</i> 198
Figure 4.3	<i>The Moderating Role of Social Support</i> 199

LIST OF ABBREVIATIONS

AHA	American Heart Association
AMOS	Analysis of Moment Structures
APA	American Psychological Association
CDC	Centres for Disease Control
CD-RISC-25	Connor-Davidson Resilience Scale-25
CES-D	Depression Self-Rating Scale
CITC	Corrected-Item Total Correlation
DASS-21	Anxiety Stress Scale-21
HAMD	Hamilton Depression Scale
HPA	Hypothalamus-Pituitary-Adrenal
KMO	Kaiser-Meyer-Olkin
MPSS	Multidimensional Scale of Perceived Social Support
PA	Physical activity
PARS-3	Physical Activity Rating Scale
PE	Physical exercise
PHEIC	Public Health Emergency of International Concern
PHQ-9	Patient Health Questionnaire-9
PSSS	Perceived Social Support Scale
PTSD	Post-Traumatic Stress Disorder
SDS	Self-Rating Depression Scale
SEM	Structural Equation Modeling
SET	Self-Efficacy Theory

LIST OF APPENDICES

- Appendix A Investigation on the correlation between PE and mental health among Chinese college students

**PENGARUH SENAMAN FIZIKAL TERHADAP KEMURUNGAN DALAM
KALANGAN PELAJAR KOLEJ DI CINA: PERANAN PERANTARAAN
RESILIENSI DAN PERANAN MODERATOR SOKONGAN SOSIAL**

ABSTRAK

Kajian ini bertujuan untuk meneroka peranan resiliensi sebagai pembolehubah pengantara dan sokongan sosial sebagai pembolehubah moderator dalam hubungan antara senaman fizikal dan kemurungan dalam kalangan pelajar kolej di China. Objektif kajian ini adalah untuk mendapatkan pemahaman yang lebih komprehensif mengenai potensi kebaikan senaman fizikal dalam mengurangkan kemurungan dan untuk mengenal pasti dalam keadaan kebaikan ini paling yang ketara. Penyelidikan ini akan menyumbang kepada pembangunan intervensi dan strategi yang disasarkan untuk menangani kemurungan melalui senaman fizikal dan mungkin mempunyai implikasi untuk promosi dan rawatan kesihatan mental. Satu tinjauan telah dijalankan ke atas 453 pelajar kolej, yang mana peserta diminta untuk melengkapkan satu set soal selidik iaitu Skala Penilaian Aktiviti Fizikal (PARS-3), Skala Kendiri Kemurungan (SDS), Skala Resiliensi Connor-Davidson (CD-RISC-25), dan Skala Penerimaan Sokongan Sosial yang Dirasakan (PSSS). Pendekatan kuantitatif telah dipilih kerana objektif utama kajian ini adalah untuk menyiasat hubungan antara pembolehubah dan bukannya mendalami fenomena tersebut. Dapatan kajian ini menunjukkan bahawa senaman fizikal, resiliensi, dan sokongan sosial semuanya mempunyai pengaruh yang signifikan terhadap kemurungan. Resiliensi bertindak sebagai pengantara dalam hubungan antara senaman fizikal dan kemurungan dalam kalangan pelajar kolej di China. Selain itu, sokongan sosial bertindak sebagai moderator dalam hubungan antara senaman fizikal

dan kemurungan, dengan perbezaan dikenal pash tentang bagaimana senaman fizikal mempengaruhi tahap kemurungan antara kumpulan yang mempunyai sokongan sosial yang tinggi dan rendah.

**THE INFLUENCE OF PHYSICAL EXERCISE ON DEPRESSION AMONG
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ABSTRACT

This study aims to explore the role of resilience as a mediating variable and social support as a moderating variable in the relationship between physical exercise and depression among Chinese college students. The objective is to gain a more comprehensive understanding of the potential benefits of physical exercise in reducing depression and to identify under which circumstances these benefits are most significant. This research will contribute to the development of targeted interventions and strategies to address depression through physical exercise and may have implications for the promotion and treatment of mental health. A survey was conducted among 453 college students, asking participants to complete a set of questionnaires, including the Physical Activity Rating Scale (PARS-3), the Self-Rating Depression Scale (SDS), the Connor-Davidson Resilience Scale (CD-RISC-25), and the Perceived Social Support Scale (PSSS). A quantitative approach was chosen because the study's overarching aim is to investigate the interrelationships among variables rather than delve into the depth of a phenomenon. The findings of this study indicate that the physical exercise, resilience, and social support all have significant influence on depression. Resilience acts as a mediator in the relationship between physical exercise and depression among Chinese college students. Additionally, social support serves as a moderator in the relationship between

physical exercise and depression, with differences observed in how physical exercise affects depression levels between groups with high and low social support.

CHAPTER 1

INTRODUCTION

1.1 Introduction

Throughout the past several decades, the prevalence of mental illness has increased globally. By 2022, the global population affected by mental illness will have surpassed one billion. Social and economic inequalities, public health emergencies, war, and climate change are among the structural threats to mental health. It is estimated that 5% of adults worldwide suffer from depression, making it is a common mental disorder. Approximately 350 million people in the world have depression (World Health Organization, 2022).

Since its first outbreak in Wuhan, China, the corona virus illness (COVID-19) has exhibited a rapid spread to several regions inside China as well as other countries (Hajivalili et al., 2020; WHO, 2020). The COVID-19 pandemic has precipitated a global approach health emergency and represents a major Public Health Emergency of International Concern (PHEIC). This pervasive phenomenon not only poses a threat to human life but also exerts an impact on individuals' psychological well-being (WHO, 2005, 2020; Zhong et al., 2021).

Although China was the first outbreak site of the COVID-19 (Huang & Zhao, 2020), the containment of the pandemic was successfully handled, resulting in a limited number of confirmed cases among the student population, indicating a comparatively low risk of infection. COVID-19 has not only resulted in bodily harm but has also imposed significant psychological distress upon individuals living in China and other nations worldwide (Xiao, 2020). Recent studies have shown that during the COVID-19 pandemic, there was a prevalent occurrence of mental health

issues, including but not limited to fear, anxiety, and depression, across various demographic groups such as the general population, children, patients, medical staff, and the elderly.

Numerous studies indicate that significant psychological consequences commonly arise following disaster situations. Post disaster malignant psychological crisis occurrences may demonstrate a delayed onset. For example, the highest point of contemplating suicide in relation to the Wenchuan earthquake took place six months later (Ran et al., 2015). Following exposure to a traumatic event, individuals may develop severe psychological problems or engage in suicidal behaviour, even decades after the initial trauma. The COVID-19 pandemic has further intensified the mental health challenges faced by university students, particularly in China, where prolonged campus lockdowns, online learning, and reduced peer interaction have significantly disrupted students' daily lives. Compared to other age groups, college students are especially vulnerable to the psychological impacts of pandemic-related isolation due to their developmental stage, characterized by heightened needs for social belonging, identity exploration, and autonomy (Arnett, 2000). The sudden loss of in-person social support networks, extracurricular activities, and physical movement on campus not only increased levels of loneliness and emotional distress but also limited students' access to coping resources (Wang et al., 2020; Zhang et al., 2020). According to psychologists and psychological health professionals, the pandemic will increase the incidence of suicides, depression, and self-harm globally attributable to the disease (Li et al., 2020; Yao, Chen, & Xu, 2020; Zhang et al., 2024). In March 2022, WHO reported that the global prevalence of anxiety and depression increased by more than 25% during the initial year of the COVID-19 epidemic (Zhang et al., 2024). "Psychological preparedness" has become another

"battlefield" in the fight against the epidemic. With the changing situation of the epidemic and the long-term isolation at home, people's lifestyles have changed dramatically with the fear of infection. Many people also have different degrees of anxiety, impatience, panic and other negative emotions. As a result of COVID-19 outbreaks around the globe, a significant number of individuals have been negatively affected physically, socially, and psychologically.

The Blue Book on Depression 2022 of China compiles and examines extensive data derived from user research, literature reviews, and expert evaluations, concentrating on the current state of depression in China, encompassing patient demographics, healthcare services, medication utilisation, preventive strategies, and interventions. The report urges society to prioritise mental health and supports the investigation of novel diagnostic and therapeutic strategies. Epidemiological studies indicate that the prevalence of depression in China is increasing annually. There are more than 95 million depression patients nationwide. Even more serious is the fact that 50% of those suffering from depression are school students. Depression has become one of the most serious areas of mental health problems affecting Chinese school students.

The rate of college students experiencing mental health disorders such as anxiety, depression, and stress has markedly risen lately (Pedrelli et al., 2015; Falsafi, 2016; Park et al., 2020). Around half of college students may have symptoms of a minimum one mental health problem (Bruffaerts et al., 2018). College students experience significant life transitions, such as departing from their homes and families, acquiring independent living skills, forming new friendships, and adapting to heightened academic obligations (Pedrelli et al., 2015; Falsafi, 2016). These challenges are frequently connected to the beginning of elevated stress, anxiety, and

even depression in the population of college students .A meta-analysis published in the Chinese Journal of Mental Health in 2020 showed that the detection rate of depressive symptoms among college students was 24.71%. A survey of 3,609 Zhengzhou University students showed that 48.24% of them were found to have depressive symptoms. A survey involving 3195 college students from three universities in Shandong Province showed that the detection rate of depressive symptoms was 25.7%, the detection rate of anxiety symptoms was 39.6%, and the detection rate of anxiety combined with depression symptoms was 22.3%.An investigation examined the mental health of Chinese college students during the initial phase of the COVID-19 outbreak and analysed associated factors. This multi-center cross-sectional study collected a total of 3,641 valid questionnaires.At the beginning of COVID-19 outbreak, 14.69% of the students had negative emotions (including depression, anxiety, stress and other symptoms), 11.04% had depressive symptoms, 10.49% had anxiety symptoms and 4.9% had stress symptoms, 34.19% developed post-traumatic stress disorder (PTSD). The incidence of depressive symptoms in male college students was 0.755 times that in female college students. Family support is a protective factor for depression, anxiety, stress symptoms and PTSD in college students.

According to the theory of psychological stress, individuals experiencing a crisis may struggle to effectively manage the detrimental impact of stress. Consequently, this can lead to an unfavourable response within the self-cognitive assessment system, giving rise to enduring emotional states such as anxiety, depression, and behavioural disorders (Tomaka et al., 1997). Students who persist in such a condition will experience varying degrees of influence on their personal lives and academic pursuits.

In the post-COVID-19 era, while individuals are experiencing a gradual restoration of their physical wellness, it is evident that the detrimental effects on mental health resulting from the epidemic may persist or even worsen (Rajkumar , 2020; Liu et al., 2017). Previous study suggests that individuals may have symptoms of depression, anxiety, and PTSD in the aftermath of a significant emergency event, such as a public health crisis. Psychological problems are still very common, and the incidence of PTSD can even reach 33.3% (Liu et al., 2017). College students are frequently perceived as a susceptible demographic within society when it comes to mental health, primarily due to their limited life experiences, unstable psychological conditions, and fluctuating emotional states (Wang et al., 2003).

College students play a crucial contribution to the economic and social development of a nation. Hence, the escalating public health concern in numerous countries is the increasing occurrence of mental disorders on college campuses, which has garnered significant media attention. In the post-COVID-19 era, young adults and college students encountered heightened psychological issues. Numerous prior investigations have substantiated that the COVID-19 pandemic has engendered significant psychological and behavioral changes among college students (Zhai & Du, 2020; Ma et al., 2020; Huckins et al., 2020; Alemany-Arrebola et al., 2020).

Recent research indicates that college students in China are experiencing increasing psychological distress, largely attributed to academic pressure, employment uncertainty, and rapid social transformation (Wang et al., 2020). For instance, a large-scale survey conducted during the COVID-19 pandemic revealed that over 30% of Chinese college students reported moderate to severe depressive symptoms, highlighting the urgency of addressing mental health issues in this population (Zhang et al., 2020).

Developmentally, college students fall within the stage of "emerging adulthood," a period characterized by heightened emotional instability and identity exploration (Arnett, 2000). This stage presents unique challenges and opportunities for psychological development, making resilience and social support especially relevant constructs to examine. In the context of depression, resilience has been shown to buffer against emotional distress, while social support serves as a key protective factor (Liu et al., 2014). Investigating how these variables function within a Chinese university student population allows for a more contextually grounded understanding of the mechanisms linking physical exercise to mental well-being.

Furthermore, the socio-cultural environment in China, shaped by collectivist norms and strong family orientation, influences how psychological resources such as resilience and social support are perceived and utilized (Chen & Li, 2012). Cultural expectations regarding academic performance and social "face" may also contribute to the stigma surrounding mental illness, complicating help-seeking behaviors among Chinese students (Yang & Kleinman, 2008). These culturally embedded factors underscore the importance of studying psychological constructs within a specific national and cultural framework rather than assuming cross-cultural equivalence.

From a practical standpoint, Chinese universities have increasingly incorporated physical activity into campus life as part of nationwide health promotion policies. Understanding how such interventions may influence mental health outcomes not only enriches academic discourse but also provides empirical support for evidence-based practices in higher education and public health (Zhang et al., 2020). Therefore, focusing on Chinese university students offers both theoretical significance and real-world applicability for improving youth mental health in a high-risk and culturally distinct population.

1.2 Background of the Study

To clarify the conceptual focus of this study, it is important to distinguish between "symptoms of depression" and "depression" as a psychological condition. While the term "symptoms of depression" refers to individual manifestations such as sadness, fatigue, and loss of interest, which may or may not meet diagnostic criteria, the term "depression" encompasses a broader, clinically meaningful construct. In this research, the primary focus is on depression as a unified psychological condition, rather than merely isolated symptoms.

1.2.1 The Effect of Physical Exercise on Depression

Physical exercise (PE) appears to be beneficial to mental health (Paluska & Schwenk, 2000), with multiple studies showing that PE can help reduce anxiety and depression symptoms (Wipfli et al., 2008; Ströhle, 2009; Dinas et al., 2011). It produces changes in the part of the brain that regulates stress and anxiety. It also increases the brain's sensitivity to the hormones serotonin and norepinephrine, which can reduce feelings of depression. Additionally, PE can increase the production of endorphins, which are known to help produce positive feelings and reduce pain.

Researchers have conducted research into the psychological advantages of PE. Numerous studies have found a link between exercising and a person's likelihood of experiencing depressed symptoms (Stephens, 1998; Stathopolou et al., 2006; Rebar et al., 2015). Furthermore, there is evidence linking PE to a decline in anxiety symptoms (Goodwin, 2003; Conn, 2010; Wipfli et al., 2008). Research suggests that physical activity can alleviate anxiety and depression symptoms because of its positive effects (Martinsen, 2008; Ströhle, 2008; Schuch et al., 2018; Schuch & Stubbs, 2019).

PE significantly contributes to psychological wellness and helps alleviate symptoms of psychological illnesses, including depressive disorders and negative emotion (Preedy & Watson, 2010). The physical health advantages of PE are frequently emphasised, although the connection between PE and mental health is generally neglected. Studies indicate that PE not only aids in the prevention of mental health issues but also alleviates symptoms of many pre-existing mental disorders (Mazyakin et al., 2019). Psychologists may use PE into their treatment regimens for particular mental disorders. PE may have possible effects on mental health, including anxiety and stress reduction. PE can diminish the body's susceptibility to anxiety responses (Aylett et al., 2018). Furthermore, a consistent PE regimen can alleviate symptoms of various prevalent comorbidities (Zhou et al., 2019). The growth of new neurons, including the hippocampus. Some studies suggest this may help alleviate symptoms of certain psychiatric disorders, including depression and anxiety (Anderson et al., 2013). Low-intensity, moderate-intensity, and high-intensity PE have been shown to reduce the severity of depression. In fact, PE may be just as effective as other treatments for depression (Helgadottir et al., 2016). Regular PE may reduce inflammation, which could benefit individuals with depression (Paolucci et al., 2018).

There are many reasons why PE is good for mental health. Participating in PE might inherently enhance mood by diminishing the secretion of stress hormones like cortisol and facilitating the release of endorphins in the body (Budde et al., 2015). Moreover, PE can serve as a distraction from negative thoughts and emotions by enabling individuals to concentrate on the present task or achieve a meditative state, thereby diverting attention, alleviating stress, and enhancing self-confidence. Consistent PE enhances physical fitness and supports the maintenance of a healthy

body as well as positive confidence (Swift et al., 2014). Meanwhile, PE can serve as a valuable source of social support. The advantages of social support are extensively proven, and numerous PE can also serve as social activities (American Psychological Association, 2019). Engaging in PE, such as yoga or outdoor football, alongside others might provide enhanced stress alleviation. Improved physical health may correlate with enhanced mental wellness. Individuals who engage in increased PE may experience reduced susceptibility to stress.

Long-term PE positively influences psychological well-being and exerts a therapeutic effect on physical and psychological disorders (Gonia & Zulaiks, 2000). Over the last few decades, multiple researchers investigated the psychological advantages of physical education from various perspectives (Zhong et al., 2006; Su et al., 2005; Fang, 2006). The research evaluated the impact of PE on cognition, emotion, personality, and social adaptation. Numerous studies show that both long-term and one-time PE produce positive emotional benefits. Studies demonstrate that 30 minutes of running can markedly enhance adverse emotional conditions, including stress, fatigue, anxiety, and depressive symptoms, while maintaining elevated PE levels. PE can reduce obsessive-compulsive symptoms, improve interpersonal relationships, reduce depression, relieve anxiety, and effectively improve mental health (Yuan, 2005). According to health behaviorists, PE for the purpose of enhancing physical fitness and health is a health-related behavior, which is conducive to health, explicit, and basic health-promoting behavior (Yang et al., 2005).

In sum, a growing body of research has demonstrated a significant inverse relationship between physical exercise and depression. Physiologically, regular exercise promotes the release of endorphins and brain-derived neurotrophic factor

(BDNF), which enhance mood and reduce inflammation in the brain. Psychologically, exercise contributes to improved self-esteem, emotional regulation, and serves as a distraction from negative thought patterns. Socially, it offers opportunities for interpersonal interaction and connectedness, which can further buffer against depressive symptoms. These mechanisms collectively support the notion that physical activity is an effective protective factor against depression.

1.2.2 The Effect of Resilience on PE and Depression

Resilience is commonly emphasized when addressing how individuals might enhance their capacity to deal with adversity. The term resilience describes the attributes, mechanisms, and results that facilitate individuals in managing adversity and ultimately reverting to a positive situation (Connor & Davidson, 2003; Robertson et al., 2015). A broader definition of resilience is a dynamic system's ability to withstand or recover from major challenges that threaten its stability, survival, or development. Resilience is characterized as the capacity of humans to adapt in the face of sadness, adversity, and constant and significant stress in life (Ma et al., 2019). Simply put, resilience is a protective factor within individuals that is critical for relieving stress and promoting mental health (Morote et al., 2017; Ogińska-Bulik & Michalska, 2020). Mental and physical health rely heavily on resilience, which can be assessed by an individual's ability or ability to adapt effectively in the face of setbacks (Elavsky & McAuley, 2005; Ebersöhn et al., 2015).

Previous studies have shown that anxiety and depression are negatively associated with resilience (Barzilay et al., 2020; Maurer et al., 2020; Ran et al., 2020), and positively associated with emotional regulation (Tugade & Fredrickson, 2004).

Individuals exhibiting elevated resilience ratings were found to have greater pleasant feelings, even under stressful circumstances, in contrast to those with diminished resilience ratings (Tugade & Fredrickson, 2004), and to be more capable of adapting emotionally to a challenging psychological task that is changing quickly (Waugh & Thompson, 2011). Additionally, resilience is linked to speedy recovery from cardiovascular arousal (Tugade & Fredrickson, 2004). Moreover, resilience plays an important role in reducing depressive symptoms, internalizing problems, externalizing problems, and lowering general psychological distress, helping individuals maintain a stable psychological state (Dray et al., 2017; Gerino et al., 2003).

The concept of resilience is a psychological construct composed of multiple components, which may exhibit different patterns depending on the culture and age of the person (Fang & Guo, 2019), and its potential evaluation points include self-confidence and self-efficacy. The process of positive adaptation can still occur after difficult experiences brought about by development and survival (VAN et al., 2018). Several studies have shown that mental resilience is correlated with positive indicators of mental health, and people who participate in PE have a higher mental resilience (Liu et al., 2019; Ouyang, 2012). As college students gain resilience through PE, it may help prevent depression and its development.

Studies suggest that exercise promotes to numerous positive consequences, including wellbeing and resilience (Childs & de Wit, 2014; Zhang & Chen, 2019). Essentially, exercise promotes both physical and mental health by strengthening an individual's resilience to stress, stress exposure, psychological stress (McEwen, 2007), anxiety, depression, and anger (Conn 2010a; Conn 2010b; McDonald et al., 1991; Hassmén et al., 2000). Thus we can contemplate Individuals who engage in

extensive PE are more likely to build resilience (Ho et al., 2015). Young people are allowed to develop resilience and self-efficacy through participation in PE (Bandura, 2012).

The college students are at a significant stage in their lives, thus they need an exorbitant amount of psychological resilience to reduce the negative effects of negative emotions on their mental health. PE cultivates and enhances college students' psychological resilience. According to research, different amounts of PE may boost students' psychological resilience to varying degrees (Hu, 2019). In previous research, it was discovered that exercise could have a direct and significant effect on psychological resilience, as well as an indirect impact via factors such as self-efficacy and coping style (Ouyang, 2012). These findings demonstrate that, by boosting resilience, exercise may influence the incidence and progression of depression.

PE has been shown to increase an individual's psychological resilience. Through exercise, individuals not only improve their physical health but also increase self-efficacy and reduce stress and anxiety, which are important components of psychological resilience. Individuals with higher psychological resilience are more effective in coping with life's stresses and challenges, thereby reducing the onset and development of depressive symptoms. This implies that psychological resilience plays a key role in the impact of PE on depression. Psychological resilience serves as a mediating mechanism for the influence of PE on depression. More precisely, performing PE initially enhances an individual's psychological resilience, which in turn aids in diminishing or preventing depression symptoms. PE enhances psychological resilience by improving self-perception and emotion regulation. These psychological changes help to cope with depressive mood, resulting in a pathway

from PE to psychological resilience to depressive symptoms. Emerging evidence indicates that engaging in PE enhances psychological resilience, and that there is a negative correlation between psychological resilience and depression.

Based on the above research and theoretical support, the selection of resilience as a mediator between PE and depression is justified because it can help to explain how PE affects the onset and progression of depression by increasing psychological resilience.

1.2.3 The Effect of Social Support on PE and Depression

Social support is the sum of the behaviour of a certain social network that uses certain material and spiritual means to help socially vulnerable groups without compensation. In essence, social support refers to the provision of care or assistance from individuals in one's social network that can be perceived, acknowledged, or embraced by the recipient (Wang, 2014; He et al., 2014). Social support plays a significant role as a crucial environmental asset inside an individual's social sphere. It influences various aspects of a person's well-being, encompassing both mental and physical wellness as well as behavioural patterns. Moreover, social support is closely intertwined with the emergence, progression, management, and reduction of depressive symptoms (Thoits, 2011a; Thoits, 2011b).

The concept of social support has been subject to various definitions, but it generally pertains to the resources that an individual has access to or perceives to be available within their social network (Cohen & Wills, 1985). Social connectedness is a comprehensive and multifaceted concept that incorporates not only the quantity of social ties, but also the quality of functions that these relationships can offer. According to Cohen and Wills (1985), depression is characterised by a decrease in

overall functioning of the individual. In order to provide effective assistance, support can be offered in various ways, including assessment, belonging, or tangible support. The assessment of these functional dimensions of assistance sometimes involves the evaluation of persons' views of the likelihood of perceived support when required. This perceived support is associated with decreases in depressive symptoms.

Previous study has demonstrated that the beneficial effects that regular PE on depression may be attributed to both psychological and biological aspects. Social support serves as a crucial protective element against depressive disorders (Plaisier et al., 2007; Penninx et al., 1998; Dormann & Zapf, 1999). The notion of "social interaction" suggests that PE is frequently participated in within an environment of society (Torres et al., 2010). For instance, engaging with the individual overseeing the implementation of exercise interventions in interventional studies may have facilitated the provision of social support, hence leading to amelioration of depressed symptoms (Dowlati et al., 2010; Teychenne et al., 2008). Systematic literature assessments of the impact of physical education treatments on depressive symptoms reveal that several studies failed to account for characteristics such as social support, and participants were mandated to PE under supervision or in groups (Rimer et al., 2012; Torres et al., 2010; Teychenne et al., 2008). Therefore, it can be posited that engagement in PE has the potential to reduce the onset of depression through the promotion of social support.

Social support is considered as a significant element in alleviating depression symptoms. Good social support provides emotional comfort, reduces feelings of isolation, and enhances an individual's self-esteem and self-efficacy, all of which are key factors in combating depression. In the context of PE, social support improves the motivation and persistence of individuals to participate in exercise. For example,

having someone to exercise with can increase enjoyment, provide encouragement and feedback, and thus improve the consistency and efficiency of the exercise. Boosting social support improves an individual's concept of social identity, a crucial element for bolstering mental health and mitigating depressive symptoms. Participation in group PE or getting collective assistance considerably enhances individuals' sense of belonging and self-identity. Social support indirectly influences individual health by enhancing psychological conditions (e.g., alleviating anxiety and stress) and physiological conditions (e.g., enhancing sleep quality and regulating hormone levels). These beneficial modifications augment the efficacy of PE in mitigating depression. Research indicates that social support moderates the relationship between PE and depression symptoms.

The selection of social support as a moderating variable in the research on physical exercise and depression is reasonable as it may clarify how social support affects the relationship between physical exercise and depression. Furthermore, it can elucidate the varying impacts of physical exercise on depression contingent upon the extent of social support present.

1.3 Problem Statement

Depression among Chinese college students has become a significant mental health concern in recent years, with the COVID-19 pandemic exacerbating this issue. Recent studies indicate that approximately 20% of college students in China experience varying degrees of depressive symptoms, with a significant proportion suffering from moderate to severe depression (Zhao et al., 2020). The pandemic has further heightened mental health challenges, with a study conducted during the COVID-19 lockdown revealing that the prevalence of depression among university

students rose to 35.4%, compared to 23.8% before the pandemic (Li et al., 2021). Factors contributing to this increase include prolonged isolation, online learning-related stress, and disrupted social interactions. Academic pressure remains one of the leading causes, as students face immense pressure to perform well in a competitive environment despite the challenges posed by online education (Chen & Liu, 2021). Familial pressure, stemming from parents' high expectations, further exacerbates the mental health challenges that students face (Li et al., 2021). Moreover, the social isolation and adjustment difficulties associated with transitioning to university, compounded by the pandemic's restrictions, have left many students feeling lonely and disconnected, contributing significantly to the onset of depressive symptoms (Xu & Zhang, 2021).

The factors contributing to depression among Chinese college students are multifaceted and have been further intensified by the COVID-19 pandemic. Academic stress, poor self-esteem, social isolation, and unhealthy coping strategies have been identified as major contributors to depressive symptoms. The shift to online education during the pandemic has amplified academic stress, as students have struggled to adjust to virtual learning environments, which lack the social interactions and structure of traditional classroom settings (Zhao et al., 2020). Additionally, a lack of social support and difficulties in forming meaningful relationships during the pandemic have exacerbated feelings of loneliness, which is strongly linked to depression (Xu & Zhang, 2021). Unhealthy lifestyle choices, such as irregular sleep patterns, poor diet, and lack of physical exercise, further contribute to emotional instability and increase the risk of depression (Li et al., 2021). Furthermore, family-related factors, such as financial struggles and strained family relationships, have also played a crucial role in shaping students' mental health, with

the pandemic causing additional financial pressures for many families (Li et al., 2021). These complex and interconnected factors highlight the need for a comprehensive approach to address depression among Chinese college students, particularly in the context of post-pandemic recovery.

Research indicate that physical harm resulting from public health emergencies may typically be recuperated swiftly, whereas their effects on mental health may last for an extended duration (Hu & Hou, 2005). The psychological ramifications of the COVID-19 pandemic, as an extended crisis impacting society at large, are more extensive than those of a singular traumatic incident. The considerable influence of stressful events, such as natural disasters and human-induced trauma, on mental health is well acknowledged, as these events can precipitate various mental health issues, including PTSD and depression (Kopala-Sibley et al., 2016; Schwartz et al., 2019).

The broader impact of the COVID-19 pandemic on the mental health of individuals is becoming increasingly evident, with a strong association with the onset or worsening of psychiatric disorders such as acute stress disorder, depression, and anxiety (Holmes et al., 2020). Studies have estimated that the global prevalence of psychological distress symptoms among college students and young adults during the epidemic ranged from 9.0% to 53.5% (McGinty et al., 2020; Cao et al., 2020; Tang et al., 2020). In addition, Pierce et al. (2020) observed a general upward trend in mental health symptoms among adults from 2019 to April 2020, the beginning of the epidemic. The sample consisting of individuals aged 18-24 years exhibited the most significant escalation in these symptoms.

A recent evaluation of the mental health of college students in China revealed a notable escalation in levels of anxiety and depression increased after the pandemic(Liu et al., 2020; Cao et al., 2020). Studies have indicated that the number of suicides caused by depression has increased over the years (Walker et al., 2015). The development of college students' physical and mental health will be severely hampered if university officials fail to detect this occurrence and take timely, appropriate intervention measures.

The well-being and achievement of college students in higher education have garnered heightened attention in contemporary culture. Several studies indicate that there is a notable prevalence of depression among college students. This can be attributed to the underdeveloped psychological regulation function and limited social adaptability often observed in this demographic. The transition from a dependent high school lifestyle to an independent college experience entails significant environmental changes. Additionally, college students are confronted with unfamiliar surroundings, intricate interpersonal relationships, and the desire for romantic involvement, which can lead to confusion and a series of related issues. The complexity of these challenges surpasses their individual capacity to resolve, resulting in a substantial increase in pressure and the potential for a significant psychological disparity. Consequently, college students may be more susceptible to experiencing depression.

PE has been established to have similar impacts on resilience. The favorable impact of PE on mood is widely acknowledged (Silverman & Deuster, 2014). Childs and de Wit (2014) conducted a study indicating that persons who self-reported participating in physical exercise at least once weekly saw a relatively lesser decline in beneficial effects after performing a mental stress assignment, compared with

participants who were not engaging in PE. Psychological resilience is a multi-component psychological structure, and the relationship between its many aspects, exercise, and depression might vary. A careful examination of the mediating effects of its aspects between exercise and depression will assist us in gaining a clearer understanding of the psychological mechanisms underlying the antidepressant effects of exercise. Consequently, PE may decrease depression in college students by enhancing their resilience. On the basis of these findings, resilience may be an internal system that acts as a mediator between PE and depressive symptoms.

A definitive correlation has been shown between social support and health. This link pertains to the potential of social support to enhance both physical and mental well-being. Social assistance as a mitigating element. The impact of social support on PE and depression may be shown through many methods. Firstly, it is important to acknowledge that social support is essential in providing emotional help, encompassing encouragement, compassion, and comprehension. This provision of emotional support can enhance an individual's self-efficacy, so increasing their motivation to participate in PE and their resolve to continue such activities. Furthermore, social support can provide informational aid through guidance, advice, and feedback. This form of support can significantly augment an individual's skill set and knowledge, ultimately resulting in an enhancement of PE levels. Ultimately, social support can provide several sorts of assistance, such as the formation of friendships, reciprocal aid, and collaboration. These helpful relationships can significantly mitigate feelings of isolation and stress, leading to enhanced mental well-being and a decrease in depressive symptoms.

While existing studies have extensively examined the effects of either internal factors, such as personal traits like resilience and self-esteem or external factors ,

such as social support, academic pressure, and environmental stressors on depression, there is a notable gap in research that integrates both internal and external factors to examine their combined influence on mental health outcomes, particularly in the context of PE.

Most of the existing literature has focused on internal factors like individual resilience, coping strategies, or self-efficacy, exploring how these traits influence depression on their own (Li et al., 2021). On the other hand, other studies have primarily examined external factors such as social support and academic stress, understanding how these external pressures contribute to the mental health of students (Xu & Zhang, 2021). However, few studies have examined how both internal and external factors interact in shaping depression, particularly how PE might mediate or moderate these influences.

Furthermore, the combined effect of PE, resilience, and social support on depression among Chinese college students has not been thoroughly investigated. Research typically isolates these factors, failing to explore how they might work together to alleviate depression. This gap is significant because understanding how internal and external factors interconnect in the context of PE could provide a more comprehensive framework for addressing mental health issues among college students. Thus, the gap lies in the need for an integrated approach that considers both internal and external factors, and examines how these factors work together with PE to influence depression among college students, especially in a post-pandemic environment.

Social support, defined as the emotional, informational, and instrumental assistance provided by family, friends, and peers, has been shown to play a critical

role in buffering against the effects of stress and depression. It is well-documented that high levels of social support can enhance psychological resilience and improve coping strategies, potentially amplifying the benefits of PE on mental health (Li et al., 2021). On the other hand, low social support may exacerbate feelings of loneliness and isolation, possibly reducing the effectiveness of PE in alleviating depression (Xu & Zhang, 2021).

Despite the growing body of research on both PE and social support individually, little is known about the interaction between social support and PE in influencing depression levels. Specifically, there is a gap in understanding whether high social support enhances the positive impact of PE on depression, while low social support diminishes its effectiveness. This study seeks to investigate whether there is a significant difference between the high and low social support groups regarding the impact of PE on depression levels among Chinese college students. By addressing this gap, the research aims to provide a more nuanced understanding of how social support moderates the relationship between physical exercise and depression, offering insights into more effective mental health interventions for university students.

Depression is a notable issue in public health, and there is an increasing interest in comprehending the potential effects of PE as a non-pharmacological intervention. Prior research has suggested a potential correlation between PE and reduced depression. Nonetheless, the precise mechanisms and constraints of this link remain undefined. The study aims to achieve a deeper understanding of the possible benefits of PE in alleviating depression and to identify the conditions in which these benefits are most pronounced. This research will aid in the formulation of focused

treatments and methods for tackling depression through PE, potentially influencing mental health promotion and treatment.

1.4 Research Aim

The aim of this study is to examine the function of psychological resilience as a mediator and social support as a moderator in the association between PE and depression. This study aims to establish a model for further investigation into the mechanisms underlying the impact of PE on depression, as well as to establish a theoretical basis for interventions targeting depression in college students.

1.5 Research Objectives

The most important goal of this investigation was to examine psychological resilience as a mediator and social support as a moderator in the association between PE and depression among college students. In order to accomplish the objectives, the following research objectives are enumerated:

1. To determine the level of depression, PE, resilience and social support among Chinese college students;
2. To determine the influences of PE, resilience, and social support on depression among Chinese college students;
3. To investigate the mediating effect of resilience on the association between PE and depression among Chinese college students;
4. To explore the moderating effect of social support on the association between PE and depression among Chinese college students;
5. To investigate the effects of PE on the high and low social support groups on depression levels among Chinese college students.

1.6 Research Questions

The aim of this study was to demonstrate the function of psychological resilience as a mediator and social support as a moderator in the effect of PE on depression. By studying physical behavior and mental health status of college students, so that researchers can develop better programs and interventions to improve the physical education patterns of college students.

In order to achieve the research objectives, the following research questions need to be answered :

RQ1: What is the current level of depression, PE, resilience and social support among among Chinese college students?

RQ2: Does PE significantly influence depression among Chinese college students?

RQ3: Does resilience significantly influence depression among Chinese college students?

RQ4: Does social support significantly influence depression among Chinese college students?

RQ5: Does resilience mediate the relationships between PE and depression among Chinese college students?

RQ6: Does social support moderate the relationships between PE and depression among Chinese college students?

RQ7: Whether there is a difference between the high and low social support groups on the impact of PE on depression levels?

1.7 Significance of the study

1.7.1 Theoretical significance

In order to improve the meaning and scope of school physical education, it is first necessary to better comprehend and explore the significance and value of the ways in which physical activity benefits social interaction, mental health, and fitness. This will help to combat college students' depression. Second, based on theoretical research and empirical analysis, the multidisciplinary and multifaceted examination of sociology and psychology regarding the impact of physical education on college students' psychological wellness is beneficial in producing novel concepts for the investigation of mental health issues among college students. Thirdly, based on the functional analysis of sociology, it is possible to actively explore the effectiveness of PE in enhancing college students' mental health, which can serve as an invaluable resource for college educators to carry out quality instruction and mental health education.

1.7.2 Practical significance

The practical requirement of creating a pleasant campus is the effective intervention research of depression in college students. Depression is quite common in contemporary students in university. What is more serious is that if students only experience mild depression at first but do not meet the diagnostic criteria for depression, they might not receive timely assistance and effective solutions. Over time, this accumulation will seriously harm the students' physical and mental health; some of them may even experience serious depression, and in the worst cases, they may even engage in suicide risk. Therefore, based on theoretical research and empirical analysis, it is necessary to fully explore and use PE to improve mental