

# Development of Anti-Depressive Foods Using Traditional Chinese Medicine Dietary Principles

Yongxi Huang<sup>1</sup>, Kaiqing Tian<sup>2</sup>, Xinyi Hu<sup>1</sup>, Xiaoyang Gan<sup>1</sup>, Zhihao Shanbian<sup>1</sup>, Mu Yang<sup>1</sup>, Yongshi Li<sup>1</sup>, Garnet Mou<sup>1</sup>, Mengjin Liu<sup>3</sup>, Haowen Hu<sup>1</sup>

<sup>1</sup>Sendelta International Academy, Shenzhen, China

<sup>2</sup>CAL Center China, Hangzhou Foreign Language School, Hangzhou, China

<sup>3</sup>International Department, The Second High School, Beijing Normal University, Beijing, China

Email: huangsunny019@gmail.com

**How to cite this paper:** Huang, Y. X., Tian, K. Q., Hu, X. Y., Gan, X. Y., Shanbian, Z. H., Yang, M., Li, Y. S., Mou, G., Liu, M. J., & Hu, H. W. (2024). Development of Anti-Depressive Foods Using Traditional Chinese Medicine Dietary Principles. *Open Journal of Social Sciences*, 12, 97-113.

<https://doi.org/10.4236/jss.2024.124007>

**Received:** February 28, 2024

**Accepted:** April 14, 2024

**Published:** April 17, 2024

Copyright © 2024 by author(s) and Scientific Research Publishing Inc.

This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

<http://creativecommons.org/licenses/by/4.0/>



Open Access

## Abstract

Depression affects approximately 280 million people around the world. In China, the number of depression patients exceeds 95 million, with 50% being students. Mental health issues are becoming increasingly prominent, especially among younger age groups. Existing psychological care and intervention methods mostly occur after the diagnosis of depression, leaving adolescents lacking effective ways to prevent depressive moods. This study originates from the concept in traditional Chinese medicine that “prevention is better than cure.” It targets adolescents with depressive moods but without clinical depression, aiming to create healthy foods that alleviate depressive moods by incorporating traditional Chinese medicine heritage and pharmaceutical research, both proven to have significant effects on mood improvement. These foods, derived from ingredients with medicinal properties, are combined with collective activities designed for self-care against depressive moods, based on reports from the World Health Organization and psychology. The effectiveness of the intervention is evaluated using the PHQ-9 depression scale, employing diverse methods to mitigate adolescent depressive moods. The research employs literature review, questionnaire surveys, and interviews for analysis. Feedback from participants and pre- and post-comparisons using the PHQ-9 scale confirm the efficacy of the intervention in preventing the onset of depression. This approach not only alleviates depressive moods among adolescents but also provides a new perspective and method for preventing depression, carrying positive social value and practical significance.

## Keywords

Depressive Mood, Preventive Treatment, Dietotherapy, Adolescents

## 1. Introduction

With the accelerating pace of societal rhythms, the psychological pressure faced by humans is rapidly increasing. “Depression” has become a common mental disorder, involving prolonged periods of low mood, loss of pleasure, or diminished interest in activities. The duration of depressive moods is less than two weeks, and the severity is relatively mild.

Currently, it is estimated that globally, 280 million people suffer from depression, with many more experiencing depressive moods (i.e., low mood, loss of pleasure, or diminished interest in activities within a two-week period). Following the COVID-19 pandemic, the global burden of mental disorders has intensified, with a 28% increase in severe depression cases and a surge of 53 million more individuals with depression, marking a 27.6% rise. Over 700,000 people die by suicide each year, and in low- and middle-income countries, over 75% of patients do not receive treatment (World Health Organization, 2023).

The “2023 Annual Blue Book on Mental Health in China” reveals that the number of individuals with depression in China exceeds 95 million, with an adult depression risk detection rate of 10.6%. Only 36% of the population considers their mental health to be good. Among those who self-assess as “poor,” the depression risk detection rate exceeds 45.1%. Approximately 280,000 people die by suicide annually, with 40% of them experiencing depression (Happy Mood Health Industry Group & Chinese Association of Anesthesiologists, Mental Health Branch, 2023).

Fifty percent of the total population with depression in China consists of students, with those aged 18 and below accounting for 30.28%. The student population faces increasing challenges related to parent-child relationships, academic pressure, and emotional stress, and exhibits a trend toward younger age groups. The difficulty in preventing and treating adolescent depression lies in the level of emphasis on mental health, accurate understanding, professional mental health services, and societal discrimination against mental disorders (Chen & Guo, 2020).

Currently, interventions for adolescent “depression” primarily focus on treatment after clinical diagnosis, lacking effective methods for preventing depressive emotions in high school students.

This research, guided by the traditional Chinese medicine concept of “prevention is better than cure,” targets individuals with depressive emotions but who are not diagnosed with depression. By incorporating some traditional Chinese nourishing ingredients into cookies, a healthy food product is developed to alleviate depressive emotions. These ingredients, being safe food-medicine counterparts, have been proven through centuries of traditional Chinese medicine inheritance and modern medical research to significantly improve emotions. In conjunction with reports from the World Health Organization and principles from psychology, collective activities for self-care against depressive emotions are designed. Using a psychological depression emotion scale as an effective measure

and employing diverse methods, the aim is to mitigate adolescent depressive emotions, effectively prevent the occurrence of depression, preemptively safeguard against it, and keep high school students away from depression.

## 2. Essential Research

In the preliminary investigation, this study employed literature review, questionnaire survey, and interview methods.

For the public awareness of depressive emotions and acceptance of traditional Chinese medicine (TCM) principles, a web-based survey questionnaire was designed. The questionnaire included information on subjects' gender, self-emotional awareness, awareness of depression, attitudes towards TCM principles, and treatment methods, comprising a total of 10 questions. A total of 401 questionnaires were collected, with 370 valid responses (31 questionnaires were deemed invalid due to completion time being less than 20 seconds).

### 2.1. Depressive Mood Is Almost Everywhere and Its Consequences Are Serious

Depression presents with complex and diverse clinical manifestations. The recognition of depressive emotions, given the degree and duration of depressive symptoms, is insufficient for a definitive diagnosis. Moreover, it falls under the category of "reactive emotions," and timely intervention with a focus on mental health care can alleviate depressive emotions.

Characteristic features include the symptom of morning heaviness and evening lightness. The most prominent and primary characteristic symptom is the prolonged and continuous experience of low mood. In severe cases, this mood may manifest as pessimism and despair, persisting despite changes in the surrounding environment. Some patients may not outwardly display signs of depression but harbor suppressed and gloomy emotions, a condition referred to as smiling depression, where they put on a cheerful facade; their behavior, expressions, and demeanor reflect their depressive state. Adolescents with depression also exhibit clear symptoms of loss of interest, manifested as an overall inability to experience joy or sadness in response to pleasant or distressing events; nothing seems to bring them happiness. Patients may experience unexplained fatigue, headaches, bodily pains, decreased energy, or loss of interest in activities they once enjoyed. They feel inadequate in achieving their goals, leading to self-blame. These symptoms may be rooted in depression itself or exacerbated by sleep disorders.

Psychomotor retardation results in slowed thinking, delayed reactions, reduced speech, slower speech speed, usually accompanied by impaired memory and difficulty concentrating. Patients often have low self-esteem, feeling disappointed and guilty, repeatedly contemplating their perceived faults, and may even experience delusional guilt. The most dangerous symptom is harboring suicidal thoughts, with severe cases involving concrete plans and actions. Approximately 80% of patients experience sleep disturbances, classified into two types: early awakening and difficulty falling asleep. Early awakening patients

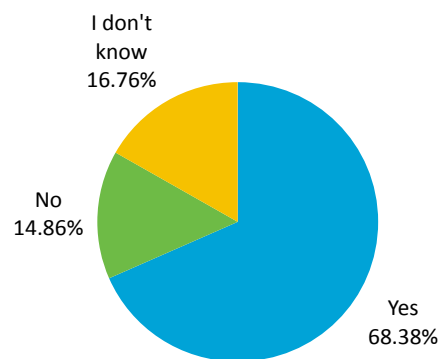
wake around 2-3 a.m. and struggle to fall back asleep, while those with difficulty falling asleep find it challenging to initiate sleep within half an hour of getting into bed, often accompanied by anxiety. Some patients experience fragmented or excessive sleep and vivid nightmares. Approximately 70% - 80% of patients exhibit symptoms of decreased appetite and weight loss. Patients may also experience various other symptoms, such as pain in different body parts, discomfort in the nervous, digestive, and cardiovascular systems.

In our self-designed questionnaire for this study, under the question “Do you think depression is currently a prevalent phenomenon?” (Figure 1), 68.38% of respondents believe that depression is a prevalent condition in contemporary society.

Suffering from depression inflicts significant harm on the physical and mental well-being of patients, underscoring the importance of mental health.

## 2.2. The Mental Health of Teenagers Urgently Needs Attention

Due to the intense fluctuations in both psychological and physiological hormones that adolescents experience, and considering that the state of the adolescent population represents the future state of society, addressing adolescent mental health issues is of urgent importance. According to research, the detection rate of depression in middle and high school students is as high as 40% for high school students and 30% for middle school students. This outcome may reflect issues related to students’ mental health, requiring attention and timely intervention (Chen & Guo, 2020). The prominent mental health issues among adolescents include feelings of loneliness at 40.00%, smartphone dependence at 33.40%, and depressive symptoms at 14.80% (Fu & Zhang 2023). Many parents tend to focus solely on their children’s external behavioral expressions, often overlooking the underlying emotional and psychological aspects. They may simplify problems by attributing them to a lack of interest in learning, adolescent rebellion, or weak willpower. This perspective, over the long term, places adolescents on a challenging path towards depression, potentially leading to tendencies for self-harm, suicide, and other dangerous behaviors.



**Figure 1.** Result of question: Do you think depression is currently a prevalent phenomenon?

In the self-compiled questionnaire of this study, a cross-analysis of the question “Do you often feel gloomy and emotionally low?” (Figure 2) reveals that among 13-18-year-old middle school students, the number of respondents selecting “Rarely or never” is the smallest, accounting for only 23.15%, which is the lowest proportion among all age groups. Surprisingly, 7.41% of the respondents chose “Most of the time.”

Under the query “Do you experience the following conditions?” (Figure 3), for middle school students aged 13 - 18, all physical manifestations (including irregular eating habits, frequent loss of appetite, poor sleep quality at night, staying up late, constipation, emotional volatility, difficulty concentrating, menstrual irregularities) are higher than in other age groups. This indicates that the condition of middle school students is markedly inferior compared to other age brackets.

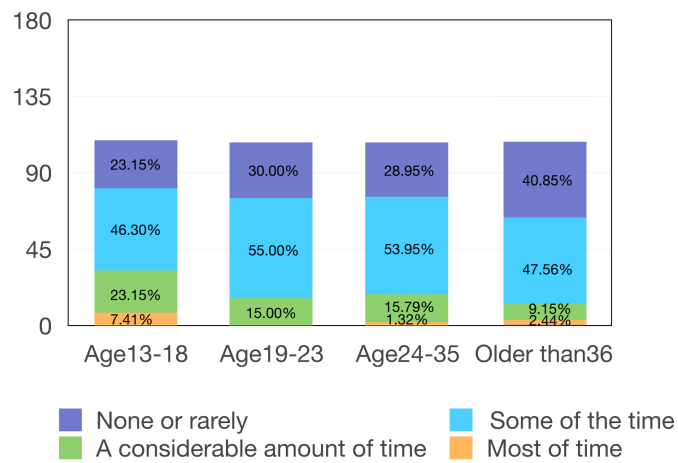


Figure 2. Result of emotional downturn conditions across different age groups.

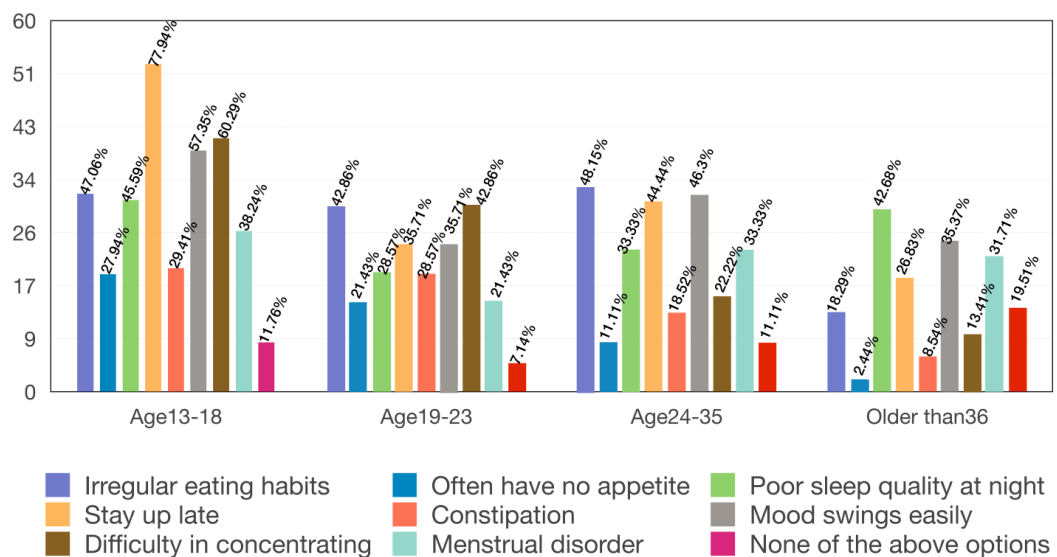


Figure 3. Types of negative emotions at different age stages.

### 2.3. The Public Has a High Acceptance of Traditional Chinese Medicine Principles

This study not only requires providing a scientific basis for the “preventive treatment” but also ensuring public acceptance of traditional Chinese medicine (TCM).

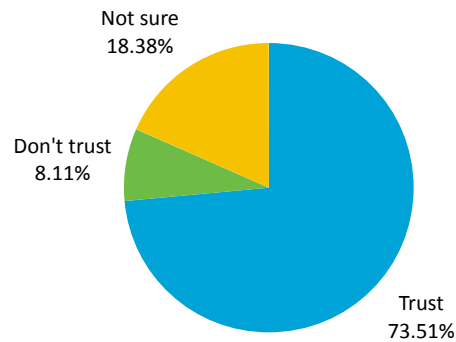
As of the end of 2022, more than 40,000 TCM clinics have been established in community health service centers and township health clinics in China (Xinhua News Agency Beijing, 2023). By the end of 2021, the proportion of TCM diagnosis and treatment volume in community health service centers, community health service stations, township health clinics, and village health clinics reached 22.7% of the total diagnosis and treatment volume in similar institutions. Over 80% of community health service centers and township health clinics can provide six or more TCM techniques. In 2022, the National Administration of Traditional Chinese Medicine, along with ten other departments, jointly formulated the “14th Five-Year Plan” for the project to enhance the capacity of primary-level traditional Chinese medicine services. By 2025, TCM clinics in community health service centers and township health clinics are expected to achieve full coverage, with encouragement for qualified regions to complete service content construction for 15% of community health service centers and township health clinics. Basic TCM services are aimed at achieving full coverage, with 100% of community health service centers and township health clinics able to standardize the implementation of ten or more appropriate TCM techniques. Basic staffing of TCM talents is also targeted for full coverage, with TCM physicians accounting for over 25% of the total number of physicians in similar institutions (National Administration of Traditional Chinese Medicine & National Health Commission, 2022).

Regarding the question “Do you feel that some concepts and treatments of traditional Chinese medicine are effective (such as herbal medicine, preventive treatment, dietary supplements, therapeutic exercises, foot soaking, moxibustion, etc.)?” (Figure 4), 73.51% of respondents believe that TCM concepts and treatments are effective, while only 8.11% explicitly express disbelief.

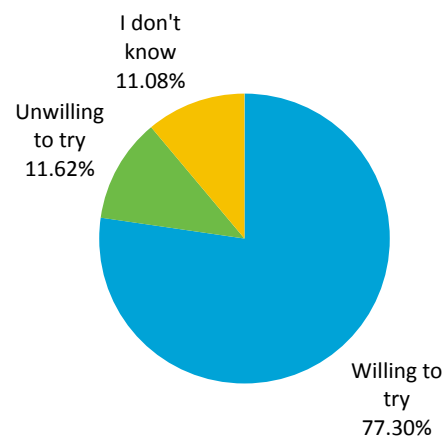
In response to the question “If there is a low-fat, healthy, and safe snack incorporating traditional Chinese medicine dietary concepts that may help alleviate some negative emotions, would you be willing to try it?” (Figure 5), 77.3% of individuals express a willingness to try. This indicates a significantly high level of public acceptance for the product proposed in this research.

### 2.4. Negative Effects of Existing Methods of Depression Therapy

Pharmacotherapy: Antidepressant medications can effectively alleviate depressive symptoms in the short term. However, these medications may lead to a range of side effects such as insomnia, weight gain, and potential addiction (common antidepressants include lorazepam, oxazepam, etc.), which may impact the patient’s quality of life. Additionally, psychiatric medications may impose psychological burdens on patients.



**Figure 4.** Public perception of the effectiveness of Traditional Chinese Medicine.



**Figure 5.** Public acceptance of herbal snacks.

**School Psychological Counseling and Guidance:** Nationally, educational authorities are increasingly mandating the appointment of dedicated psychological counselors in schools to ensure that students facing depressive emotions can receive timely support. However, through in-depth interviews with school counselors and students, we have identified concerns among students. They fear experiencing discomfort due to special attention from teachers, and introverted students may face difficulties in seeking help from school counselors. Moreover, in some schools, psychological counselors are individuals who have transitioned from trained subject teachers, potentially leading to lower levels of professional expertise. This situation may affect the quality of psychological support.

**Psychological Hotlines:** In recent years, government and professional institutions have widely promoted the establishment of psychological hotlines for adolescents to provide counseling services. Psychological hotlines are highly regarded for their public welfare and relatively stable professional standards. However, interviews with school students revealed that most are not well-informed about hotline numbers and usage conditions. Further interviews with relevant hotline counselors found deficiencies in the promotion of hotline services. Additionally, some regions or institutions experience frequent issues such as busy

lines and prank calls, making it challenging to understand the circumstances of callers. Psychological counselors urgently hope for earlier and more comprehensive interventions. To enhance the effectiveness of psychological hotline services, it is necessary to strengthen promotional efforts, improve telephone response conditions, and provide more timely and comprehensive psychological support.

Regarding the question “Do you think some medications for treating depression have side effects? (such as vomiting, poor sleep quality, headache, obesity, etc.)” (Figure 6), 60.81% of individuals believe that some medications have side effects.

Under the question “Do you think being diagnosed with depression and starting medication would cause psychological stress?” (Figure 7), 60.54% of respondents indicated that they believe there would be psychological stress, while only 19.46% explicitly stated that there would be no psychological stress.

Existing mental health interventions mostly occur after the diagnosis of depression. As indicated by the questionnaire results mentioned earlier, the diagnosis itself can contribute to stress for the patients. If depressive symptoms progress to the stage of illness, there may be irreversible physical and psychological effects, such as notable differences in brain structures (including the hippocampus, prefrontal cortex, anterior cingulate cortex, orbital frontal lobe, hippocampus, caudate nucleus, and amygdala) and functional changes (Mao et al., 2022).

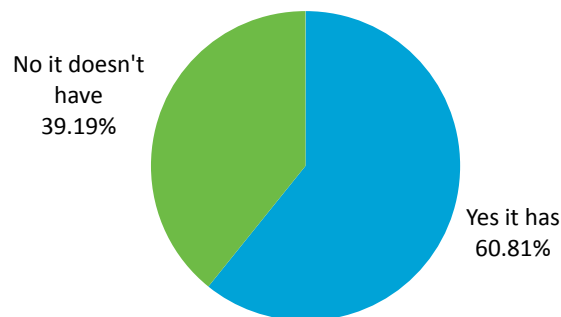


Figure 6. Public awareness of the side effects of antidepressant medications.

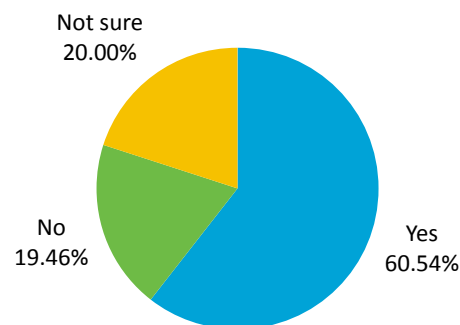


Figure 7. Result on the psychological pressure brought by depression medication.



Given the substantial population of adolescents, this group experiences high levels of academic and life stress. Therefore, preventing adolescent depression and alleviating depressive emotions may be a step more crucial than treatment.

## **2.5. Preventive Treatment, Acts as a Stop Button before an Outbreak**

### **2.5.1. Feasibility of Preventive Treatment in Adolescent Depression**

This research project focuses on employing traditional Chinese medicine (TCM) therapeutic methods to implement the “preventing disease before it occurs” approach for addressing adolescent depressive emotions. The aim is to enhance the physical and mental well-being of adolescents, preventing the progression of depressive emotions into clinical depression.

The concept of “preventing disease before it occurs” has its roots in traditional Chinese medical culture, dating back to the Huangdi Neijing. In essence, it involves improving individuals’ physical fitness to prevent the onset of diseases. Through in-depth research, it is evident that “preventing disease before it occurs” consists of three stages: preventing before illness, preventing changes after illness, and preventing recurrence after recovery. This approach focuses on preventing diseases, avoiding pathological changes, and preventing relapse. Traditional Chinese medicine’s theories and techniques related to health preservation and early intervention have distinct characteristics rooted in Chinese culture, as discussed by [Zhang and Wang \(2007\)](#). With the integration of Eastern and Western medical technologies, the “preventing disease before it occurs” concept has gained recognition and acclaim in Western medicine ([Cai et al., 2023](#)).

Studies indicate that individuals diagnosed with “depression” not only experience psychological distress, but long-term depression may lead to structural and functional changes in the brain. Additionally, social pressure and potential side effects of medication due to a lack of understanding of mental illnesses may further harm patients. Some of these damages are irreversible. This research aims to provide scientific and effective preventive measures for adolescents troubled by depressive emotions before reaching the stage of clinical depression, enhancing psychological resilience and preventing the development of depression.

### **2.5.2. TCM Dietary Prescriptions for Depressive Emotions**

Depression is a complex neuropsychiatric disorder primarily treated with Western medicine, but its efficacy is hindered by side effects and individual differences. In Traditional Chinese Medicine (TCM), depression falls under the broader category of “yu zheng,” and its treatment principle involves soothing the liver. A classic TCM formula, Chaihu Shugan Powder, has a long history and proven efficacy in treating depression.

A study on the compatibility patterns of Chinese herbal compound formulas for treating depression was conducted using data mining techniques on the National Patent Database until July 1, 2022. The study aimed to provide insights for the prevention, clinical treatment, and new drug development for depression. A

total of 325 Chinese herbal compound formulas were included, involving 452 medicinal ingredients and totaling 3532 drug usage frequencies. The top ten drugs in terms of usage frequency were Chaihu (122 times), Bupleurum, Baishao (109 times), Suannao Ren (95 times), and Fuling (94 times). Among them, Chaihu not only had a high usage frequency and noticeable effects but also relatively high safety (Liu et al., 2023).

In clinical practice, Chaihu Shugan Powder, with flexible modifications, is used to treat various forms of depression, including primary depression, post-stroke depression, and postpartum depression. As discussed by Lin et al. (2024), clinical studies and mechanistic research have elucidated the therapeutic effects and anti-depressive mechanisms of Chaihu Shugan Powder.

Bupleuri Radix, commonly known as Chaihu, is a traditional Chinese medicine used to soothe the liver and alleviate depression. Besides its widespread clinical application for depression, it plays a crucial role in the prevention and treatment of various mental and neurological disorders. The study by Feng et al. (2024) systematically analyzes the shared neurobiological basis and mechanisms of Chaihu in preventing and treating mental and neurological disorders such as depression, epilepsy, anxiety, Alzheimer's disease, and Parkinson's disease.

### 3. Innovation Design

This study, based on the aforementioned literature, interviews with traditional Chinese medicine practitioners, preliminary research, and ensuring safety, feasibility, and universality, incorporates Bupleuri Radix (Chaihu), confirmed to effectively improve “depressive emotions,” into biscuits. Additionally, a communication session named “Heart-to-Heart Moments” is integrated to serve as an effective method for preventing depressive symptoms in adolescents. The effectiveness of this innovative intervention will be assessed using the Patient Health Questionnaire-9 (PHQ-9) as the baseline and follow-up questionnaire for measuring the effectiveness of the intervention.

#### 3.1. Incorporating Safe Herbs as Ingredients in Cookies

Based on the information provided in the literature, we understand that Bupleuri Radix (Chaihu) has the potential to prevent depression. Therefore, we made some adjustments during the biscuit production process, incorporating a moderate amount of Bupleuri Radix powder. After multiple formulation experiments, the ratio was determined to be 15 grams of Bupleuri Radix powder per 250 grams of biscuit dough. This ratio selection aims to leverage the potential benefits of Bupleuri Radix, intending to introduce its positive effects into the biscuits and endow the product with some potential psychologically health-related characteristics. It is important to emphasize that the formulation is based on current research on Bupleuri Radix, aiming to bring beneficial health effects to the food additive. This study will also conduct further research and monitoring to validate the actual impact of this ratio on the quality of biscuits and potential psychological

health effects.

### 3.2. Combining with Group Exercises

Integrating the World Health Organization's self-care recommendations for individuals with depressive emotions (World Health Organization, 2023), this study designed the production process of Bupleuri Radix (Chaihu) biscuits as an open activity, actively inviting a subset of previously uninvolved unfamiliar student participants.

The activity was held in two school: Hangzhou Foreign Languages School and Sendelta International Academy. Before the activity commenced, the initial PHQ-9 questionnaire was administered to collect baseline psychological health data from the participants. Subsequently, the research team shared details about the implementation methods, intentions, and significance of the innovative project, while inviting the participants to actively engage in the biscuit-making process. During the waiting period for the biscuits to bake, the research team organized a themed interactive session named "Heart-to-Heart Moment." This session was not only about the process of making biscuits but also served as an open discussion platform. In this environment, we collectively explored topics such as academic stress, life pressures, and individual areas of interest. Each topic session lasted for 15 minutes, fostering an increasingly lively atmosphere throughout the 1.5-hour activity.

Finally, the research team collected feedback and suggestions from the participants, playing a crucial role in refining subsequent activities in this study.

To comprehensively understand the potential impact of Bupleuri Radix biscuits on mental health, we invited the participants to fill out the PHQ-9 post-assessment questionnaire on the second and seventh days after the activity. This aimed to obtain more specific data and opinions. Through this series of study designs, we aim to delve deeper into exploring the effects of Bupleuri Radix biscuits in promoting mental health and continuously optimize our research methods.

### 3.3. Product Design and Marketing Feedback

This study has meticulously designed the packaging of the product (Figure 8), emphasizing attention to detail not only in the color and text of the external packaging but also including carefully prepared encouraging language inside the biscuit packaging. Through these designs, the research team aims to provide users with a sense of emotional healing, surprise, or encouragement (Figure 9). Additionally, after the second activity of this project, all packaging materials and dyes comply with food-grade standards, ensuring the safety and edibility of the product.

This holistic design consideration focuses not only on the inherent quality of the product but also on providing users with a positive psychological experience through visual and emotional pleasures. The objective of this design philosophy is to transform Bupleuri Radix biscuits into a food item that not only possesses



**Figure 8.** Design of packing box for Good Mood Cookie.



**Figure 9.** Notes inside the packing box.

potential psychological health effects but also creates positive emotional experiences for users in terms of visual and perceptual enjoyment. Through this approach, we aim to further enhance the product’s attractiveness and user satisfaction.

### 3.4. Iterative Product Development and Feedback of Group Activity

After conducting two events (the first in Shenzhen with 11 participants (**Figure 10**), and the second in Hangzhou with 6 participants (**Figure 11**)), and to ensure the effectiveness of the testing activities, the research team declined one participant whose PHQ-9 score exceeded 14. The research team collected participant feedback and made the following adjustments.

From the preceding research, it was observed that the female group is more prone to experiencing depressive emotions than the male group. Considering the emotional instability during the menstrual cycle of females, the research team added the Motherwort Red Sugar series to the product for the female group and made special modifications in product packaging and notes.

Based on additional literature references and practical feedback, participants expressed concerns about potential weight gain from the biscuits. Additionally, individuals with rapid blood sugar decline exhibited more pronounced negative emotions and physical symptoms than those with slow blood sugar decline (Taylor & Rachman, 1988). Poor metabolic control may exacerbate depression and reduce responsiveness to antidepressant treatment (Lustman & Clouse, 2005). Consequently, the research team developed biscuits incorporating Oats as a base infused with Bupleuri Radix.



**Figure 10.** Activities in Shenzhen.



**Figure 11.** Activities in Hangzhou.



#### 4. Verification Results

	Pretest average score	Second day average score	ratio of scores on the second day compared to the pretest scores	Seventh day average score	ratio of scores on the seventh day compared to the pretest scores
Lack of motivation when working	1.59	1.00	-37.04%	1.18	-25.93%
Experiencing feeling of low mood, despondency, or despair	1.88	1.18	-37.50%	1.47	-21.88%
Poor night sleep, difficulty falling asleep, hypersonic	1.59	1.18	-25.93%	1.29	-18.52%
Frequently experiencing fatigue	1.35	1.12	-17.39%	1.12	-17.39%
Loss of appetite or overeating	0.71	0.59	-16.67%	0.71	0.00%
Feeling worthless or incompetent, or disappointing oneself or family members	0.59	0.41	-30.00%	0.41	-30.00%
Difficulty concentrating on tasks, such as reading newspapers or watching television	0.94	0.82	-12.50%	0.88	-6.25%
Speaking or moving slowly to the point of being noticeable by others. Or conversely, being restless or fidgety, with frequent movement or agitation being more common	0.53	0.47	-11.11%	0.47	-11.11%
Having thoughts of death or self-harm	0.18	0.06	-66.67%	0.06	-66.67%
Average individual total score	9.35	6.82	-27.04%	7.59	-18.87%

Dr. Kurt Kroenke and colleagues from Indiana University, USA, developed a simple and efficient self-assessment tool for depression, the Patient Health Questionnaire-9 (PHQ-9), based on the American Diagnostic and Statistical Manual of Mental Disorders (Fourth Edition) (DSM-IV). Since its initial publication in 2001, this questionnaire has gained widespread recognition globally and has been translated into over 100 languages. The PHQ-9 is an internationally recognized depression screening tool, demonstrating good reliability and validity across different populations. It has been incorporated into numerous depression guidelines and was designated as the depression screening scale in the Special Service Program for Exploring Depression Prevention and Treatment released by the National Health Commission of China on September 11, 2020.

The PHQ-9 consists of nine items, each with four response options: “not at all,” “several days,” “more than half the days,” and “nearly every day,” corresponding to scores of 0, 1, 2, and 3, respectively. The total score ranges from 0 to 27, with higher scores indicating a higher likelihood of depression.

In this study, the PHQ-9 was used as the baseline measurement, and comparisons were made before the activity, on the second day of the activity, and on the seventh day of the activity. The results indicated a significant reduction in depression scores on the second day, with an average decrease of 27.04% across the nine questions, and a consistent decrease in the average score for each individual

question. While the effect on the seventh day was not as pronounced as the second day, there was still an 18.87% decrease in depression scores. Additionally, 100% of participants were willing to share this activity, and 0% reported any psychological or physiological discomfort within 48 hours after the activity.

Thus, both the food and the activity demonstrated positive and effective outcomes.

## 5. Discussion and Conclusion

### 5.1. The Prevention of Teenage Depression Is Worth Emphasizing

Globally, the number of individuals suffering from depression continues to rise, and the COVID-19 pandemic has exacerbated the burden of mental disorders worldwide. In China, the population affected by depression exceeds 95 million, with 50% being students, and individuals below the age of 18 accounting for 30.28% of the total.

Currently, primary interventions for adolescent depression are predominantly focused on treatment post-clinical diagnosis, with a lack of effective methods for preventing depressive emotions in middle school students.

### 5.2. The Effectiveness of Sacks Designed for the Project and Group Activities Is Remarkable

1) This study, based on the traditional Chinese medicine concept of “treating before the onset of illness,” aims to create a healthy food product for individuals experiencing depressive emotions but not diagnosed with depression. The addition of Chaihu (Bupleurum)—a traditional Chinese nourishing ingredient—in the cookies is intended to alleviate depressive emotions. Additionally, considering female physiological characteristics, the formula has been modified to include Motherwort (Yimucao) and brown sugar.

2) Integrating insights from the World Health Organization reports and self-care collective activities in psychology, this study proposes a diversified approach to alleviate adolescent depressive emotions. The effectiveness is measured using a psychological depression emotion scale, contributing to the prevention and treatment of depression.

3) Through a series of experimental activities combining the concept of “food as medicine” with complementary health collective activities, it has been empirically demonstrated that the approach is effective.

### 5.3. Research Outlook

This research project conducted a limited-scale experiment during the initial promotional phase; however, constrained by the time limitations of the competition, a more extensive experiment could not be undertaken to obtain more comprehensive and thorough experimental data. Regarding the generalizability and applicability of the research, the current experimental scale may not adequately cover the diversity of factors under different populations and environmental

conditions. Future research efforts could consider expanding the promotional scale, and employing more comprehensive data collection methods to further validate and strengthen the scientific reliability and generalizability of this study.

The outcomes of this research provide a novel approach and method for preventing depression among high school students, holding positive societal value and practical significance. In the future, refining this approach and promoting its application to a broader audience could contribute significantly to the enhancement of societal psychological well-being.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

## References

- Cai, J. R., Chen, H., Chen, S. P., & Meng, C. (2023). Application of Traditional Chinese Medicine Disease Prevention Concept in Disease Management. *Journal of Traditional Chinese Medicine Management*, *31*, 97-99. (In Chinese)  
<https://doi.org/10.16690/j.cnki.1007-9203.2023.24.024>
- Chen, Z. Y., & Guo, F. (2020). *Report on the Mental Health Status Survey of the National Population in 2020: Current Situation, Trends, and Service Needs*.
- Feng, Y. M., Li, H. Z., Ai, Z. F., Liu, Y. L., Yang, M., Zhu, G. H., & Song, Y. G. (2024). Shared Material Basis and Biological Mechanism System Analysis of Chaihu in Preventing and Treating Mental Neurological Disorders. *Chinese Herbal Medicine*, *No. 1*, 307-319. (In Chinese)
- Fu, X. L. & Zhang, K. (2023). *China National Mental Health Development Report (2021-2022) Released: Adolescents' Depression Risk Higher than Adults*. (In Chinese)  
[http://www.psych.ac.cn/news/cmsm/202303/t20230301\\_6687013.html](http://www.psych.ac.cn/news/cmsm/202303/t20230301_6687013.html)
- Happy Mood Health Industry Group & Chinese Association of Anesthesiologists, Mental Health Branch (2023). *China Mental and Psychological Health in 2023*. (In Chinese)
- Lin, J. Y., Duan, Y., Long, M. Y., Li, C. Y., Deng, M. F., & Zeng, P. (2024). Research Progress on Efficacy Substances and Mechanisms of Chaihu Shugan Powder in Anti-depressant Treatment. *Chinese Journal of Experimental Formulae*, *12*. (In Chinese)  
<https://doi.org/10.13422/j.cnki.syfjx.20240117>
- Liu, H. X., Shi, J. Z., Liang, X., Shen, W., Wei, J. J., Liu, Y., & Zhang, Y. L. (2023). Study on the Medication Rules of National Patent Traditional Chinese Medicine Compound in the Treatment of Depression. *Journal of Traditional Chinese Medicine*, *No. 19*, 2027-2032. (In Chinese)
- Lustman, P. J., & Clouse, R. E. (2005). Depression in Diabetic Patients: The Relationship between Mood and Glycemic Control. *Journal of Diabetes and Its Complications*, *19*, 113-122. [https://doi.org/10.1016/S1056-8727\(04\)00004-2](https://doi.org/10.1016/S1056-8727(04)00004-2)
- Mao, N., Wang, B., Gong, P. Y., Ma, H., Wang, Y. L., Li, X. L., & Wang, Q. L. (2022). *Relationship and Mechanism Study of Brain Structure, Metabolism, Function, and Gene Polymorphism of Adolescent Depression*. (In Chinese)  
[https://kns.cnki.net/kcms2/article/abstract?v=sf24\\_f5fySYu-kUvmjaMsdotsN4XCD0tVxvWIZ0GIL\\_d5yLFhCLIKUPSA5LS3d2rBb2711X6yxAkteZlaz2WIHLGB3hSB\\_0qeulxmKZD6OcptsCSk0wjSNRLmFpl9O5f&uniplatform=NZKPT&language=CHS](https://kns.cnki.net/kcms2/article/abstract?v=sf24_f5fySYu-kUvmjaMsdotsN4XCD0tVxvWIZ0GIL_d5yLFhCLIKUPSA5LS3d2rBb2711X6yxAkteZlaz2WIHLGB3hSB_0qeulxmKZD6OcptsCSk0wjSNRLmFpl9O5f&uniplatform=NZKPT&language=CHS)
- National Administration of Traditional Chinese Medicine & National Health Commis-



- sion (2022). *Notice on Printing and Distributing the “Fourteenth Five-Year Plan” Action Plan for Improving the Service Capacity of Primary Chinese Medicine*. (In Chinese) [https://www.gov.cn/zhengce/zhengceku/2022-03/31/content\\_5682724.htm](https://www.gov.cn/zhengce/zhengceku/2022-03/31/content_5682724.htm)
- Taylor, L. A., & Rachman, S. J. (1988). The Effects of Blood Sugar Level Changes on Cognitive Function, Affective State, and Somatic Symptoms. *Journal of Behavioral Medicine, 11*, 279-291.
- World Health Organization (2023). *Depressive Disorder (Depression)*. (In Chinese) <https://www.who.int/zh/news-room/fact-sheets/detail/depression>
- Xinhua News Agency Beijing (2023). *More than 40,000 Primary Traditional Chinese Medicine Clinics in China*. (In Chinese) [https://www.gov.cn/lianbo/bumen/202307/content\\_6893653.htm](https://www.gov.cn/lianbo/bumen/202307/content_6893653.htm)
- Zhang, Z. B., & Wang, Y. Y. (2007). On the Concept and Scientific Content of Traditional Chinese Medicine “Preventive Treatment of Disease”. *Beijing Journal of Traditional Chinese Medicine University, No. 7*, 440-444.