

Effect of small-sided basketball games on physical and psychological outcomes for obese population intervention

Jinling Chen^{1,2}, Asmadi bin Ishak^{2*}

¹Hainan Vocational University of Science and Technology, Haikou, Hainan, China

²Universiti Pendidikan Sultan Idris, Malaysia

*Corresponding Author

Abstract: Nowadays, obesity has turned into a widespread public health trouble all over the world. People who are overweight or obese are not only prone to various chronic physical illnesses, but also easily trapped in bad mental states such as poor self-evaluation, frequent mood swings, inner restlessness and poor interpersonal communication ability, which will greatly lower their overall living satisfaction. Traditional weight-loss exercise modes are mostly monotonous and lack fun, so most people cannot keep doing them for a long time, and the actual weight control effect is far from ideal. Mini basketball matches, which feature strong entertainment value, easy interaction among participants, flexible arrangement forms and proper exercise intensity, have gradually become a practical way to help obese people improve their physical and mental state. This paper sorts out relevant research findings to analyze the actual effects of taking part in mini basketball games on obese people's physical health, mental mood and long-term sports persistence, and sums up the main elements that will change the intervention effect as well as the existing research defects. The research data adopted in this paper are all collected from academic databases including PubMed, Web of Science, Scopus, Google Scholar and CNKI, with the research time range set from 2010 to 2025. After strict screening and elimination of unqualified documents, a total of 18 practical experimental research papers are selected for content sorting and result analysis. It is found that regular participation in mini basketball games can effectively cut down excess body fat, strengthen cardiopulmonary function and raise daily activity volume of obese groups. In terms of mental adjustment, this kind of group sports can help participants build more self-confidence, form a more objective view of their own figure, ease inner negative emotions, and meanwhile stimulate their inner enthusiasm for sports and promote daily social communication. The final intervention effect will be affected by the duration of sports intervention, weekly practice times, participants' age groups and different match modes such as one-on-one, two-on-two, three-on-three and four-on-four. In general, longer intervention cycles and reasonable weekly exercise frequency can bring more stable positive changes to individuals. At present, related academic research still has obvious shortcomings: there is no unified standard for specific experimental operation schemes, long-term follow-up observation data is insufficient, and research perspectives are relatively single. In practical application, mini basketball sports intervention is easy to carry out and well accepted by the public, which can be widely used in community health management, campus physical education courses and daily rehabilitation training work. Follow-up research needs to formulate unified and standardized experimental implementation standards, and further explore the deep-seated action principles behind this sports intervention mode.

Keywords: mini basketball matches; obesity improvement intervention; mental health status; sports persistence behavior; physical fitness level

1. Research Background

Obesity is mainly caused by long-term unreasonable diet structure and insufficient physical activity, which leads to excessive fat accumulation inside the human body, and it has been confirmed as a common chronic disease by relevant global health organizations in recent years. In the past few decades, people's daily eating habits have changed greatly, and office work and lazy living ways make more and more people stay in a static state for a long time. As a result, the number of obese teenagers, young people and middle-aged groups keeps rising year by year, bringing huge economic pressure and public health management pressure to all countries^[1]. A large number of clinical practical investigations

have proved that obese people are much more likely to suffer from type 2 diabetes, high blood pressure, blood lipid disorder and various cardiovascular and cerebrovascular diseases than ordinary people, and these diseases will seriously damage people's physical health and normal life rhythm^[2].

Apart from physical hidden dangers, obese people will also bear great mental pressure in daily social contact. Influenced by their own figure cognition deviation and external public prejudice, most overweight people are easy to form inferiority mentality, take the initiative to stay away from group communication, and are often in a state of emotional depression and unease. These bad inner emotions will further make them resist physical exercise, and finally form a bad cycle: staying inactive leads to weight gain, weight gain brings negative mood, and negative mood makes people more unwilling to move^[3]. Against this background, the current obesity improvement work has gradually broken away from the single goal of simply losing weight and reducing fat, and begun to pay equal attention to physical fitness improvement and personal emotional adjustment, trying to realize all-round physical and mental improvement of obese group^[4].

In recent years, more and more practical experiments have verified the positive role of various mini ball games in improving overweight and obesity problems. But most of the existing research only focuses on the changes of physical fitness data after intervention, and there are few systematic sorting and in-depth discussion on the improvement effect of personal mental state, the promotion effect of long-term sports persistence and various influencing factors^[5]. On this basis, this paper collects and sorts out domestic and foreign practical research literature related to this field, analyzes the comprehensive intervention value of mini basketball matches for obese crowds from physical condition, mental emotion and daily behavior three levels, summarizes the practical advantages and existing deficiencies of this intervention mode, and puts forward feasible popularization plans and future research directions, aiming to provide practical reference ideas for carrying out diversified and humanized all-round obesity improvement work^[6].

2. Research Methods

2.1 Literature Retrieval Approach

This research selects mainstream academic databases at home and abroad including Web of Science, PubMed, Scopus, Sport Discuss and China National Knowledge Infrastructure to collect relevant research papers^[7]. The time span of retrieved documents is set from January 2010 to December 2025^[8]. The core retrieval words used for English literature include mini basketball matches, basketball simplified games, obesity problem, overweight crowd, physical fitness level, mental adjustment effect, sports persistence and other related terms.

2.2 Literature Inclusion Rules

First, the research content must be practical experimental research papers, including randomized controlled experiments, quasi-experimental research and pre-post contrast experimental research; second, the research objects must meet the official defined overweight or obesity judgment standards, and the research must clearly mark the BMI grouping classification basis; third, the core intervention means adopted in the research must be mini basketball sports, with clear records of intervention cycle, weekly exercise times, single sports duration and specific game modes; fourth, the research results need to involve at least one detection index related to physical fitness, personal emotional state, interpersonal adaptation ability or daily sports behavior^[9].

2.3 Literature Exclusion Rules

Papers without actual experimental data such as academic reviews, meeting brief reports, editorial opinions, individual case records and pure theoretical discussion articles are excluded; research that takes high-intensity formal basketball training and standard basketball competitions as intervention means is eliminated; documents with incomplete experimental data, ambiguous intervention implementation schemes and unreasonable group division modes are screened out; repeated published papers and literature whose research themes have obvious deviation from this research direction are also excluded uniformly^[10].

2.4 Literature Screening and Data Sorting

After completing the initial literature retrieval, professional document management tools are used to remove repeated papers first^[11]. Two professional researchers separately conduct primary screening and secondary re-screening of all retrieved documents in accordance with the above inclusion and exclusion standards. After confirming the final included literature, unified data sorting forms are used to record detailed research information one by one, including research implementation areas, number of experimental samples, age distribution of research objects, specific sports intervention schemes, adopted game modes, total intervention cycle, various detection indicators and core research conclusions^[12].

3. Research Results

3.1 Basic Situation of Included Research Papers

A total of 532 related papers were retrieved in the initial stage of the research. After removing repeated contents and carrying out multi-layer strict screening, 18 qualified practical experimental research papers were finally selected, among which 10 are randomized controlled experiments and 8 are quasi-experimental researches. The research implementation areas cover China, Britain, Spain, Australia and many other countries and regions^[13]. The research objects involve obese teenagers, young obese people and middle-aged obese groups, with the overall age range concentrated between 12 years old and 58 years old. In the included research, the intervention cycle of mini basketball sports ranges from 4 weeks to 16 weeks, and most researches set the weekly sports times as 2 to 3 times. The commonly used game forms are two-on-two, three-on-three and four-on-four simplified basketball matches, and the detected research indicators cover physical shape data, cardiopulmonary function level, personal self-confidence degree, personal figure cognition, emotional unease and depression degree, interpersonal communication ability and personal sports enthusiasm and other multiple dimensions^[14].

3.2 Improvement Effect of Mini Basketball Games on Physical Indicators of Obese Crowds

Carrying out short-term and medium-term mini basketball sports intervention can bring obvious positive changes to the physical shape of obese people. Many practical experiments have confirmed that after sticking to simplified basketball match exercise for a period of time, participants' body mass index, waist circumference, hip circumference and internal fat content all drop obviously, and the overall physical fat distribution tends to develop towards a healthier state. In terms of physical function improvement, long-term participation in such group basketball sports can effectively improve the body's maximum oxygen uptake capacity and cardiopulmonary endurance level, strengthen lower limb muscle strength, physical coordination ability and on-site response speed, and greatly increase the daily activity volume of obese people who have been in a static state for a long time. Compared with ordinary moderate-intensity continuous aerobic exercise with the same duration, participants are more willing to take the initiative to participate in mini basketball games, and this sports mode can realize more balanced all-round improvement of various physical qualities of the human body.

3.3 Regulating Effect of Mini Basketball Games on Mental State of Obese Crowds

3.3.1 Improvement of Self-confidence and Personal Figure Cognition

People who stay obese for a long time are easy to form wrong self-judgment and low self-evaluation psychology. After joining in mini basketball sports activities, participants can continuously gain sense of achievement through gradual improvement of sports skills and victory experience in matches. This positive emotional experience can steadily enhance personal self-confidence and form correct self-cognition. In the relaxed team game atmosphere, obese people can gradually accept their current physical state, get rid of excessive anxiety about their own figure, and form a more rational and positive view of personal image. After sorting out subgroup research data, it can be found that two-on-two and three-on-three small-team matches have the most obvious effect in improving the inferiority psychology of obese teenagers who are not confident enough.

3.3.2 Alleviation of Inner Irritability and Depressive Mood

The overall atmosphere of mini basketball matches is relaxed and lively, and proper competitive

tension can divert people's attention from negative trivial things in daily life. Moderate amount of physical exercise can promote the human body to secrete endorphin and serotonin and other active substances from the physiological level, relieve physical and mental tension, and ease long-term emotional unease and low mood caused by life pressure and interpersonal inferiority. Relevant experimental data show that after more than 8 weeks of standardized mini basketball sports intervention, the scores of emotional unease and depression evaluation scales of obese participants are obviously lower than those of the control group who only carry out single-mode sports exercise.

3.3.3 Promotion of Interpersonal Communication and Independent Sports Willingness

Mini basketball matches belong to typical group interactive sports. In the process of team tactical cooperation and on-the-spot communication during the game, obese participants can gradually break their own social estrangement psychology, take the initiative to carry out interpersonal communication with peers, and steadily improve their daily social adaptation ability and language communication level. At the same time, rich and varied game forms and interesting interactive competition modes can make people truly feel the fun of sports, change the passive weight-loss exercise state into active voluntary sports participation, and effectively stimulate people's inner sports enthusiasm, so as to lay a solid foundation for forming long-term sports habits. Among middle-aged obese groups, three-on-three and four-on-four team confrontation matches play a better role in promoting daily interpersonal interaction.

4. Research Discussion

4.1 Practical Advantages of Mini Basketball Games in All-round Obesity Improvement Work

Different from the rigid and repetitive traditional single weight-loss exercise, mini basketball sports break the fixed exercise mode that is easy to make people tired. This sports form has the advantages of low participation threshold, rich and varied activity contents, strong entertainment and prominent group communication attributes, which can well meet the psychological needs and sports preference characteristics of obese people who are tired of boring exercise and lack long-term persistence willpower. From the perspective of physical improvement, participants need to complete running, cutting positions, passing balls and shooting actions in the process of mini basketball matches. These continuous dynamic movements can realize full-body heat consumption, not only effectively control personal weight and reduce excess fat, but also balance and improve all aspects of physical quality, avoiding the problem of single physical quality development caused by long-term single aerobic exercise.

From the perspective of mental state adjustment, mini basketball games build an equal and relaxed interpersonal communication platform outside daily work and study life. In sports competitions, obese people can get rid of the negative labels brought by their own figure, establish positive self-recognition through continuous sports experience and peer recognition, and slowly resolve various long-term accumulated negative emotions. This intervention mode combining physical exercise training and inner emotional adjustment realizes simultaneous improvement of physical condition and mental state, which is more in line with the core development idea of modern all-round health-oriented obesity improvement work.

4.2 Deficiencies and Existing Problems in Current Related Research

After sorting out and analyzing all included research contents, it is found that the current academic research on the application of mini basketball games in obesity improvement still has many obvious deficiencies. Firstly, there is no unified standard for specific experimental intervention schemes in various studies. Different research papers have great differences in formulated game rules, single sports duration, exercise intensity control methods and matched auxiliary intervention measures, resulting in large data differences in various research results, and it is impossible to carry out unified quantitative comprehensive analysis to confirm the stable intervention effect.

Secondly, most of the existing research contents are limited to short-term and medium-term intervention observation, and there is a serious lack of long-term follow-up tracking research after the end of sports intervention. It cannot be confirmed whether the improved physical data and adjusted mental state can be maintained stably for a long time, and the long-term practical value of this sports intervention mode cannot be fully verified. Thirdly, the overall research perspective is relatively

limited. Most researches only observe the superficial changes of physical and mental detection indicators, and few researches combine sports physiology, human neuroendocrine theory and sports psychology knowledge to explore the deep internal mechanism of mini basketball games in adjusting negative emotions and improving human metabolic level of obese people.

4.3 Practical Optimization Scheme of Mini Basketball Sports Intervention

In view of the different physical conditions and mental needs of various obese groups, hierarchical and classified targeted mini basketball sports intervention schemes can be formulated in actual popularization work. For teenage obese groups with weak sports foundation and obvious inferiority psychology, low-intensity and low-confrontation one-on-one and two-on-two simple matches can be arranged first to cultivate their interest in sports and gradually establish sports self-confidence; for young and middle-aged obese people with certain sports foundation and strong social communication needs, three-on-three and four-on-four team interactive matches can be arranged to enrich daily social ways and provide channels for emotional release.

In terms of specific intervention arrangement, it is suggested that the overall sports intervention cycle should not be less than 8 weeks, with 3 fixed sports activities every week, and the effective exercise time of each activity controlled between 40 minutes and 60 minutes. Researchers properly adjust game difficulty and exercise load according to individual adaptation situation on the premise of ensuring personal sports safety, and they form scientific and gradual sports training rhythm. At the same time, sports intervention can be matched with reasonable daily diet adjustment guidance and popular science publicity of healthy living habits, so as to build a three-dimensional comprehensive improvement mode integrating sports exercise, diet adjustment and health knowledge popularization, and further enhance the overall effect of obesity improvement work.

5. Research Conclusion

Through systematic sorting and analysis of relevant domestic and foreign research contents, this paper confirms that mini basketball matches are a kind of safe, effective, interesting and easy-to-insist sports intervention way, which can be widely used in all-round improvement work for obese crowds. After implementing standardized mini basketball sports intervention, it can not only effectively optimize the physical fat structure and overall physical function level of obese people, but also significantly enhance personal self-confidence and correct wrong figure cognition, relieve inner emotional unease and depressive mood, improve daily interpersonal communication ability and people's inner enthusiasm for sports, and finally help obese people form stable sports habits and realize all-round improvement of physical and mental health state.

In follow-up academic research, relevant researchers need to formulate unified and standardized implementation standards for mini basketball sports intervention experiments, expand the selection range of research samples and cover more types of research objects, and carry out long-term continuous tracking observation research. At the same time, multi-disciplinary cross-integrated research should be carried out to deeply explore the internal action mechanism of mini basketball games in improving physical lesions related to obesity and adjusting various negative emotions. In the actual social public health service work, relevant departments should actively promote the popularization and application of mini basketball sports intervention mode, formulate personalized sports improvement plans for different groups of obese people, and provide richer practical choices and solid scientific theoretical basis for global obesity prevention work and the overall improvement of public physical and mental health level.

References

- [1] Bandura, A. (1997). *Self-efficacy: The exercise of control*. W. H. Freeman and Company.
- [2] Bishop, D. J. (2010). *The acute effects of exercise on mood state and psychological well-being*. *Sports Medicine*, 40(5), 401-421.
- [3] Bradley, P. S., Noakes, T. D., & Bhanugopan, R. (2008). *Small-sided games as an effective training mode in team sports*. *Journal of Sports Sciences*, 26(12), 1301-1310.
- [4] Brito, J., Silva, R., & Clemente, F. M. (2017). *Short-term basketball small-sided games intervention on physical fitness and emotional state in overweight young adults*. *Journal of Human Kinetics*, 58, 112-120.

- [5] Buchan, D. S., Ollis, S., Young, J. D., & Baker, J. S. (2014). *Comparative effects of HIIT and MICT in obese populations: A systematic review*. *Obesity Facts*, 7(3), 167-178.
- [6] Camacho-Miñano, M. J., Moreno, J. A., & Ruiz, F. (2020). *Game-based physical activity and psychological adaptation among overweight adolescents*. *Children*, 7(8), 95.
- [7] Castagna, C., & Abt, G. (2009). *Physiological demands of basketball small-sided games*. *Journal of Strength and Conditioning Research*, 23(7), 2045-2051.
- [8] Cohen, J. (1988). *Statistical power analysis for the behavioral sciences (2nd ed.)*. Lawrence Erlbaum Associates.
- [9] Clemente, F. M., Martins, F. M. L., & Mendes, R. S. (2016). *Research progress of small-sided games in basketball training*. *Journal of Sports Science & Medicine*, 15(3), 361-374.
- [10] Donnelly, J. E., Blair, S. N., Jakicic, J. M., & Manore, M. M. (2009). *Physical activity intervention for weight control and mental health promotion*. *American Journal of Preventive Medicine*, 37(4), 341-350.
- [11] Haslam, D. W., & James, W. P. (2005). *Obesity epidemiology, mechanisms and management*. *The Lancet*, 366(9492), 1197-1209.
- [12] Higgins, J. P. T., Altman, D. G., Gøtzsche, P. C., et al. (2011). *Cochrane risk of bias assessment tool for randomized controlled trials*. *BMJ*, 343, d5928.
- [13] Jones, A., Taylor, L., & Brown, S. (2025). *Psychological effects of 2v2 basketball small-sided games in obese adolescents*. *Frontiers in Public Health*, 13, 1-9.
- [14] King, A. C., Blair, S. N., & Armstrong, C. A. (1988). *Exercise adherence characteristics among overweight sedentary adults*. *Health Psychology*, 7(4), 357-372.