

Appendix A

Ethical Approval

Approval of Medical Research Ethics Review Committee of Fujian Third People's Hospital

Project name	Effects of Competitive Exergames on body composition, psychosocial well-being, and self-perceptions among overweight and obese male adolescents in Fujian, China				Ethical numbering	2024-185	
Project leader	Liu Chunqing	Title		Contact number	+8618370774883	Departments	
Person in charge of research Unit		Universiti Putra Malaysia Faculty of Educational Studies					
Cooperative research unit		<input checked="" type="checkbox"/> One					
Research time	10.2024		To	12.2024			
Does it involve digital medicine (3D printing-related technology)?					<input type="checkbox"/> Yes <input checked="" type="checkbox"/> None		
Are stem cell and regenerative medicine involved?					<input type="checkbox"/> Yes <input checked="" type="checkbox"/> None		
Source of the research project:							
<input type="checkbox"/> Longitudinal research (government support) <input type="checkbox"/> Association/Foundation <input type="checkbox"/> Company <input type="checkbox"/> Cross-sectional research							
<input type="checkbox"/> Multicentre research <input checked="" type="checkbox"/> Autonomy <input type="checkbox"/> Other							
Research funding assistance unit		<input checked="" type="checkbox"/> None					
Test object	<input type="checkbox"/> Company <input type="checkbox"/> Test object <input type="checkbox"/> Animals <input type="checkbox"/> Cell <input type="checkbox"/> Medical imaging data						
	<input type="checkbox"/> Human tissue specimens and samples <input checked="" type="checkbox"/> Other						
Review opinion							
<input checked="" type="checkbox"/> In line with ethical requirements, tests can be carried out in accordance with this protocol.							
<input type="checkbox"/> If it does not meet the ethical requirements, please modify it before submitting it to the ethics committee for review.							
Informed consent				<input checked="" type="checkbox"/> Yes <input type="checkbox"/> None			
Method for obtaining informed consent				<input checked="" type="checkbox"/> Appropriate <input type="checkbox"/> Inappropriate			
Attachment upload	<div> Fujian Third People's Hospital Medical Research Ethics Review Committee</div>						
Informed consent				<input checked="" type="checkbox"/> Yes			
Test method				Focus on the eight-week Exergames intervention among the two experimental groups and one control group with different Exergame modes			
Slide PPT				<input checked="" type="checkbox"/> Yes			

公 证 书

(2024)鄂尚诚证字第14004号

申请人：刘春青，女，一九九五年三月十七日出生，公民身份号码：360722199503175726。

代理人：李天明，男，1989年7月10日出生，公民身份号码：421083198907102117。

公证事项：医学科研伦理审查委员会批准书

兹证明前面的福建省第三人民医院出具给刘春青的《福建省第三人民医院医学科研伦理审查委员会批准书》的原件属实。

中华人民共和国湖北省咸宁市尚诚公证处

公证员

李 格

2024年4月18日



I V48079517

NOTARIAL CERTIFICATE

(2024) E.S.C.Z.Zi.No.14004

Applicant: Liu Chunqing, female, was born on March 17,1995, ID Card NO. 360722199503175726.

Agent:Li Tianming, male, was born on July 10,1989,ID Card No. 421083198907102117.

Issue under notarization: Approval of Medical Research Ethics Review Committee

This is to certify that the original Approval of Medical Research Ethics Review Committee of Fujian Third People's Hospital issued by Fujian Third People's Hospital to Liu Chunqing is actual.

Shangcheng Notary Public Office,

Xianning City, Hubei Province

The People's Republic of China

Notary Public: Li Ge

April 18,2024

I V48079518

Appendix B

Registration of Trial Protocol

ClinicalTrials.gov **PRS**
Protocol Registration and Results System

[Contact](#)
Org: UPutra
Email: gs62555@stu

Quick Links

[New Record](#)
[Quick Start Guide](#)
[Problem Resolution Guide](#)

Records ▾

Accounts ▾

Help ▾

The Modernized PRS is now the primary website for Protocol Registration.

Return to Modernized PRS

Record List

Showing: 1 record

	Protocol ID ▾	ClinicalTrials.gov ID ▾	Brief Title ▾	Record Status ▾	Last Update ▾	Responsible Party ▾
Open	Liu Chunging	NCT06579495	Effects of Competitive Exergame on Weight Loss, Mental Health, and Social-emotional	Public	08/27/2024 13:18	Liu Chunging gs62555@student.upm.edu.my

KEY: R Results DR Delayed Results D Study Documents PR PRS Review
U XML Upload NP No longer public PRC PRS Review Comments

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Appendix C

Respondent's Information Sheet and Informed Consent Form

RESPONDENT'S INFORMATION SHEET AND INFORMED CONSENT FORM

Please read the following information carefully and do not hesitate to discuss any questions you may have with the researcher.

1. STUDY TITLE:

EFFECTS OF COMPETITIVE EXERGAMES ON BODY COMPOSITION, PSYCHOSOCIAL WELL-BEING, AND SELF-PERCEPTIONS AMONG OVERWEIGHT AND OBESE MALE ADOLESCENTS IN FUJIAN, CHINA

2. INTRODUCTION:

With the rapid development of society and the continuous advancement of science and technology, the world economy is moving towards a higher quality and more stable direction. In this process, economic development has brought about significant improvements in material living standards, educational resources, medical security, etc., and people's quality of life has been significantly improved. However, the improvement of living conditions is also accompanied by major changes in dietary structure and leisure and entertainment methods. In China, especially in urban areas, problems such as increased frequency of fast food consumption and reduced physical activity have become increasingly prominent, which has led to a serious public health challenge: overweight and obesity. Obesity is not only an external manifestation of lifestyle, but also a major social problem closely related to chronic diseases, mental health problems, and the physical and mental development of adolescents. Its causes are complex, involving multiple dimensions such as unbalanced nutritional intake, lack of exercise, and social and psychological factors, and it is urgent to attract widespread attention in the fields of public health and education.

Among adolescents, the problem of overweight and obesity is particularly prominent among male adolescents. According to data from multiple domestic epidemiological surveys in recent years, the overall overweight and obesity rates of Chinese adolescents have continued to rise, and the obesity rate of male adolescents is significantly higher than that of their female peers. This gender difference may be related to factors such as the high energy intake of males during adolescence, the single way of participating in sports, and the lack of ability to regulate physical and

mental stress. Adolescence is a critical stage of rapid physical and mental development. Obesity not only increases the risk of chronic diseases such as hypertension, diabetes, and abnormal lipid metabolism, but also brings a series of psychosocial problems, such as decreased self-esteem, social anxiety, depression, and reduced life satisfaction.

In recent years, with the development of virtual reality technology and somatosensory interactive devices, Exergames have emerged as a new type of intervention method that organically integrates physical exercise with game entertainment. In particular, Competitive Exergames (CE) can not only stimulate adolescents' interest in sports and intrinsic motivation but also enhance their self-efficacy, social skills, and emotional regulation abilities through mechanisms such as real-time feedback and peer confrontation, thereby improving their body composition and psychosocial health. CE has the potential to serve as an alternative to traditional exercise, helping overweight and obese adolescents improve their physical and mental health, and cultivating healthy concepts, lifelong physical education, and active lifestyles among this special population.

3. WHAT WILL YOU HAVE TO DO?

Using competitive exergames to improve body composition, psychosocial well-being, and self-perceptions among overweight and obese male adolescents in Fujian, China. The intervention was conducted over 8 weeks, with three sessions per week, each lasting 45 **exclusion criteria**

4. WHO SHOULD NOT PARTICIPATE IN THE STUDY?

The exclusion criteria of this study include the following five aspects:

- (1) Male adolescents not living in boarding schools.
- (2) Male adolescents who take weight loss pills or a diet.
- (3) Participants who reported having a physical and/or mental disability diagnosis.
- (4) Subjects participated in extracurricular sports activities.
- (5) Subjects with contraindications to physical activity were identified based on the PARQ-C questions.

5. WHAT WILL BE THE BENEFITS OF THE STUDY:

(a) TO YOU AS THE SUBJECT?

Participants in this experiment will help improve body composition, psychosocial well-being, and self-perceptions among overweight and obese male adolescents in Fujian, China.

(b) TO THE INVESTIGATOR?

To explore the impact of Nintendo Switch on the physical and mental health of overweight and obese adolescents in China, as a supplement and alternative to traditional sports.

6. WHAT ARE THE POSSIBLE RISKS?

Since this study used a competitive video game intervention based on somatosensory interaction, participants needed to hold the Joy-Con controller and interact with the game system through body movements. Therefore, mild muscle soreness, joint fatigue, or temporary sports discomfort may occur during the training process. In order to minimize the risk of injury, the research team arranged warm-up activities before each training session and stretched the training session after each training session. In addition, all intervention activities were carried out under the full supervision and guidance of physical education teachers and trained research assistants to ensure standardized movements and safe operations during the training process. The experimental site is equipped with the necessary safety equipment to ensure that physical discomfort can be dealt with in a timely manner. Therefore, participants do not need to worry too much about adverse reactions during the training process.

7. WILL THE INFORMATION THAT YOU PROVIDE AND YOUR IDENTITY REMAIN CONFIDENTIAL?

All your personal and health information will be kept at Universiti Putra Malaysia. The researchers, research institutions and ethics committees will be allowed to access your health records. Your personal identity will not be revealed in any public reports of the results of this study. We will make every effort to protect your personal privacy to the extent permitted by law. When you sign this informed consent form, you agree to the use of your personal and health information in the circumstances described above.

8. WHO SHOULD YOU CONTACT IF YOU HAVE ADDITIONAL QUESTIONS DURING THE COURSE OF THE RESEARCH?

If you have various questions about this study, please contact the researcher immediately

Researcher's name: Liu Chunqing

Tel: 60174033890 Email: lcqpe2021@gmail.com

If you have any questions about your rights as a participant in this study, please contact:
The Secretariat, JKEUPM, at email address jkeupm@upm.edu.my

Please initial here if you have read and understood the contents of this page_____

9. CONSENT

I Identity Card No.
address.....
.....hereby voluntarily agree to take
part in the research with my child stated above *(clinical /drug trial/video recording/
focus group/interview-based/ questionnaire-based).

I have been informed about the nature of the research in terms of methodology,
possible adverse effects and complications (as written in the Respondent's
Information Sheet).

I understand that I have the right to withdraw from this research at any time without
giving any reason whatsoever. I also understand that this study is confidential, and all
information provided with regard to my identity will remain private and confidential.

I* wish / do not wish to know the results related to my participation in the research

I agree/do not agree that the images/photos/video recordings/voice recordings related
to me be used in any form of publication or presentation (if applicable)

* Delete where necessary

Signature..... Signature
(Respondent)

(Witness)

Date:..... Name:.....

I/C No. :.....

I confirm that I have explained to the respondent the nature and purpose of the
above-mentioned research.

Date Signature

(Researcher)

Appendix D

PAR-Q & YOU

Physical Activity Readiness
Questionnaire - PAR-Q
(revised 2002)

PAR-Q & YOU

(A Questionnaire for People Aged 15 to 69)

Regular physical activity is fun and healthy, and increasingly more people are starting to become more active every day. Being more active is very safe for most people. However, some people should check with their doctor before they start becoming much more physically active.

If you are planning to become much more physically active than you are now, start by answering the seven questions in the box below. If you are between the ages of 15 and 69, the PAR-Q will tell you if you should check with your doctor before you start. If you are over 69 years of age, and you are not used to being very active, check with your doctor.

Common sense is your best guide when you answer these questions. Please read the questions carefully and answer each one honestly: check YES or NO.

YES	NO	
<input type="checkbox"/>	<input type="checkbox"/>	1. Has your doctor ever said that you have a heart condition <u>and</u> that you should only do physical activity recommended by a doctor?
<input type="checkbox"/>	<input type="checkbox"/>	2. Do you feel pain in your chest when you do physical activity?
<input type="checkbox"/>	<input type="checkbox"/>	3. In the past month, have you had chest pain when you were not doing physical activity?
<input type="checkbox"/>	<input type="checkbox"/>	4. Do you lose your balance because of dizziness or do you ever lose consciousness?
<input type="checkbox"/>	<input type="checkbox"/>	5. Do you have a bone or joint problem (for example, back, knee or hip) that could be made worse by a change in your physical activity?
<input type="checkbox"/>	<input type="checkbox"/>	6. Is your doctor currently prescribing drugs (for example, water pills) for your blood pressure or heart condition?
<input type="checkbox"/>	<input type="checkbox"/>	7. Do you know of <u>any other reason</u> why you should not do physical activity?

If
you
answered

YES to one or more questions

Talk with your doctor by phone or in person BEFORE you start becoming much more physically active or BEFORE you have a fitness appraisal. Tell your doctor about the PAR-Q and which questions you answered YES.

- You may be able to do any activity you want — as long as you start slowly and build up gradually. Or, you may need to restrict your activities to those which are safe for you. Talk with your doctor about the kinds of activities you wish to participate in and follow his/her advice.
- Find out which community programs are safe and helpful for you.

NO to all questions

If you answered NO honestly to all PAR-Q questions, you can be reasonably sure that you can:

- start becoming much more physically active — begin slowly and build up gradually. This is the safest and easiest way to go.
- take part in a fitness appraisal — this is an excellent way to determine your basic fitness so that you can plan the best way for you to live actively. It is also highly recommended that you have your blood pressure evaluated. If your reading is over 144/94, talk with your doctor before you start becoming much more physically active.

DELAY BECOMING MUCH MORE ACTIVE:

- if you are not feeling well because of a temporary illness such as a cold or a fever — wait until you feel better; or
- if you are or may be pregnant — talk to your doctor before you start becoming more active.

PLEASE NOTE: If your health changes so that you then answer YES to any of the above questions, tell your fitness or health professional. Ask whether you should change your physical activity plan.

Informed Use of the PAR-Q: The Canadian Society for Exercise Physiology, Health Canada, and their agents assume no liability for persons who undertake physical activity, and if in doubt after completing this questionnaire, consult your doctor prior to physical activity.

No changes permitted. You are encouraged to photocopy the PAR-Q but only if you use the entire form.

NOTE: If the PAR-Q is being given to a person before he or she participates in a physical activity program or a fitness appraisal, this section may be used for legal or administrative purposes.

"I have read, understood and completed this questionnaire. Any questions I had were answered to my full satisfaction."

NAME _____

SIGNATURE _____

DATE _____

SIGNATURE OF PARENT _____
or GUARDIAN (for participants under the age of majority)

WITNESS _____

Note: This physical activity clearance is valid for a maximum of 12 months from the date it is completed and becomes invalid if your condition changes so that you would answer YES to any of the seven questions.



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Appendix E

Patient Health Questionnaire

PATIENT HEALTH QUESTIONNAIRE-9 (PHQ-9)

Over the last 2 weeks, how often have you been bothered by any of the following problems?
(Use "✓" to indicate your answer)

	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself — or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead or of hurting yourself in some way	0	1	2	3

FOR OFFICE CODING 0 + + +
=Total Score:

If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?

Not difficult at all <input type="checkbox"/>	Somewhat difficult <input type="checkbox"/>	Very difficult <input type="checkbox"/>	Extremely difficult <input type="checkbox"/>
--	--	--	---

Appendix F

Social Phobia and Anxiety Inventory Brief Form

The following entries correspond to your level	Never happen 1	Rarely happens 2	Sometimes happens 3	Very often happens 4	Always happens 5
1. When I am the center of attention in social situations, I feel anxious.					
2. In social situations, I get anxious if someone expects me to participate in something.					
3. I feel anxious when giving a presentation in front of an audience.					
4. I feel anxious when attending small gatherings.					
5. I feel anxious when attending large gatherings.					
6. When I disagree with others, I feel anxious worried and not knowing what to do.					
7. When discussing with others what intimacy is, I feeling anxious.					
8. I feel anxious when I give advice to others consider.					
9. When discussing work or study with others, I feel to anxiety.					
10. When I approach someone or start a conversation with someone Sometimes, I feel anxious.					
11. When I am criticized or rejected, I feel anxiety.					
12. I try to avoid social situations.					

13. I feel anxious when entering an unfamiliar social situation.					
14. When I speak in a social situation, my voice is out of control.					
15. In certain social situations, I have strange thoughts, such as					
(1) I wish I could leave or escape all love conditions					
(2) If I mess up again, I will really Loss of self-confidence.					
(3) What impression have I left on others?					
(4) No matter what I say, it sounds stupid.					
16. I have had the following experiences in social situations:					
(1) sweating					
(2) blush					
(3) tremble					
(4) Frequent urination					
(5) Palpitations					

Appendix G

Multidimensional Students' Life Satisfaction Scale (MSLSS)

Student: _____ Date: _____

Teacher: _____

Instructions: We would like to know what thoughts about life you've had *during the past several weeks*. Think about how you spend each day and night, and then think about how your life has been during most of this time. Here are some questions that ask you to indicate your satisfaction with life. In answering each statement, circle a number from **1** to **6**, where **1** indicates you **strongly disagree** with the statement and **6** indicates you **strongly agree** with the statement.

	Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
1. My friends are nice to me.	1	2	3	4	5	6
2. I am fun to be around.	1	2	3	4	5	6
3. I feel bad at school.*	1	2	3	4	5	6
4. I have a bad time with my friends.*	1	2	3	4	5	6
5. There are lots of things I can do well.	1	2	3	4	5	6
6. I learn a lot at school.	1	2	3	4	5	6
7. I like spending time with my parents.	1	2	3	4	5	6
8. My family is better than most.	1	2	3	4	5	6
9. There are many things about school I don't like.*	1	2	3	4	5	6
10. I think I am good-looking.	1	2	3	4	5	6
11. My friends are great.	1	2	3	4	5	6
12. My friends will help me if I need it.	1	2	3	4	5	6
13. I wish I didn't have to go to school.*	1	2	3	4	5	6
14. I like myself.	1	2	3	4	5	6
15. There are lots of fun things to do where I live.	1	2	3	4	5	6
16. My friends treat me well.	1	2	3	4	5	6
17. Most people like me.	1	2	3	4	5	6
18. My family gets along well together.	1	2	3	4	5	6
19. I look forward to going to school.	1	2	3	4	5	6

(continued)

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Multidimensional Students' Life Satisfaction Scale (MSLSS) (page 2 of 3)

	Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
20. My parents treat me fairly.	1	2	3	4	5	6
21. I enjoy being at home with my family.	1	2	3	4	5	6
22. I like being in school.	1	2	3	4	5	6
23. My friends are mean to me.*	1	2	3	4	5	6
24. I wish I had different friends.*	1	2	3	4	5	6
25. School is interesting.	1	2	3	4	5	6
26. I enjoy school activities.	1	2	3	4	5	6
27. I wish I lived in a different house.*	1	2	3	4	5	6
28. Members of my family talk nicely to one another.	1	2	3	4	5	6
29. I have a lot of fun with my friends.	1	2	3	4	5	6
30. My parents and I do fun things together.	1	2	3	4	5	6
31. I like my neighborhood.	1	2	3	4	5	6
32. I wish I lived somewhere else.*	1	2	3	4	5	6
33. I am a nice person.	1	2	3	4	5	6
34. This town is filled with mean people.*	1	2	3	4	5	6
35. I like to try new things.	1	2	3	4	5	6
36. My family's house is nice.	1	2	3	4	5	6
37. I like my neighbors.	1	2	3	4	5	6
38. I have enough friends.	1	2	3	4	5	6
39. I wish there were different people in my neighborhood.*	1	2	3	4	5	6
40. I like where I live.	1	2	3	4	5	6

Student, please stop here, thank you!

(continued)

Appendix H

Self-Confidence Scale

The following entries correspond to your level	Strongly Disagree 1	Disagree 2	Not sure 3	Agree 4	Strongly Agree 5
1. I can generally achieve the goals I set for myself.					
2. I feel that my life is positive and full of energy.					
3. As long as I try hard, I can always find the answer to a problem.					
4. When classmates have different opinions from mine, I start to doubt whether I am right.					
5. I can face new environments and problems with ease and confidence.					
6. I feel that all my classmates are not as good as me.					
7. Whatever I do, I feel others do it better than me.					
8. I believe I can change others' negative impressions of me.					
9. Deep down, I look down on the people around me.					
10. When someone says I look nice today, I feel uneasy and wonder if they're joking.					
11. It is hard for others to change my point of view.					
12. I am good at learning new knowledge.					

13. I believe I have the ability to create a bright future.					
14. I believe I can achieve my goals as long as I work hard.					
15. If good friends break up with me, I consider it their loss.					
16. I often feel like I'm a failure.					
17. Even the nicest clothes don't look good on me.					

Appendix I

Rosenberg Self-Esteem Scale

The following entries correspond to your level	Strongly Disagree 1	Disagree 2	Agree 3	Strongly Agree 4
1. On the whole, I am satisfied with myself.				
2.* At times, I think I am no good at all.				
3. I feel that I have a number of good qualities.				
4. I am able to do things as well as most other people.				
5.* I feel I do not have much to be proud of.				
6.* I certainly feel useless at times.				
7. I feel that I'm a person of worth, at least on an equal plane with others.				
8.* I wish I could have more respect for myself.				
9.* All in all, I am inclined to feel that I am a failure.				
10. I take a positive attitude toward myself.				

Appendix J

Physical Activity Self-Efficacy Scale

The following entries correspond to your level	Strongly Disagree 1	Disagree 2	Not sure 3	Agree 4	Strongly Agree 5
1. I exercise on most days of the week					
2. I can ask my parents or other adults to exercise with me					
3. Even if I can watch TV or play video games, I can still exercise in most of the free time of the week					
4. Even if it's very hot or cold outdoors, I can still exercise on most of days of the week					
5. I can ask my best friend to exercise with me for most of the days of the week					
6. Even at home, I can still exercise.					
7. I can exercise because I know how to exercise.					
8. No matter how busy I am, I can still exercise in most of the free time of the week					

Appendix K

Content Validity of Intervention and Instruments

Table 1: Relevancy and Clarity Agreement of the Intervention Items

Contents	Number of Agreement	Relevance		Number of Agreement	Clarity	
		I-CVI	KAPPA		I-CVI	KAPPA
Frequency	6	1	1	6	1	1
Intensity	5	0.833	0.816	6	1	1
Time	6	1	1	6	1	1
Type of Games Selected	6	1	1	6	1	1
Duration	5	0.833	0.816	5	0.833	0.816
Risk	6	1	1	5	0.833	0.816
Overall evaluation of the program	6	1	1	6	1	1

Table 2: Relevancy and Clarity Agreement of the Instruments Items (PHQ-9)

Type	Sub type	Number of experts	Agreement	Relevance		Clarity	
				I-CVI	KAPPA	I-CVI	KAPPA
Patient Health Questionnaire (PHQ-9)				I-CVI	KAPPA	I-CVI	KAPPA
	Q1	6	6	1	1	1	1
	Q2	6	6	1	1	1	1
	Q3	6	6	1	1	1	1
	Q4	6	6	1	1	1	1
	Q5	6	6	1	1	1	1
	Q6	6	6	1	1	1	1
	Q7	6	5	0.833	0.816	1	1
	Q8	6	6	1	1	1	1
	Q9	6	5	1	1	0.833	0.816

Table 3: Relevancy and Clarity Agreement of the Instrument Items (SPAI-B)

Type	Sub type	Number of experts	Agreement	Relevance		Clarity	
Social Phobia and Anxiety Inventory – Brief Form (SPAI-B)				I-CVI	KAPPA	I-CVI	KAPPA
	Q1	6	6	1	1	1	1
	Q2	6	6	1	1	1	1
	Q3	6	6	1	1	1	1
	Q4	6	6	1	1	1	1
	Q5	6	6	1	1	1	1
	Q6	6	6	1	1	1	1
	Q7	6	6	1	1	1	1
	Q8	6	6	1	1	1	1
	Q9	6	6	1	1	1	1
	Q10	6	6	1	1	1	1
	Q11	6	5	0.833	0.816	0.833	0.816
	Q12	6	6	1	1	1	1
	Q13	6	6	1	1	1	1
	Q14	6	5	0.833	0.816	0.833	0.816
	Q15	6	6	1	1	1	1
	Q16	6	6	1	1	1	1

Table 4: Relevancy and Clarity Agreement of the Instrument Items (MSLSS)

Type	Sub type	Number of experts	Agreement	Relevance		Clarity	
Multidimensional Students' Life Satisfaction Scale (MSLSS)				I-CVI	KAPPA	I-CVI	KAPPA
	Q1	6	6	1	1	1	1
	Q2	6	6	1	1	1	1
	Q3	6	6	1	1	1	1
	Q4	6	6	1	1	1	1
	Q5	6	6	1	1	1	1
	Q6	6	6	1	1	1	1
	Q7	6	6	1	1	1	1
	Q8	6	6	1	1	1	1
	Q9	6	6	1	1	1	1
	Q10	6	5	0.833	0.816	0.833	0.816
	Q11	6	6	1	1	1	1
	Q12	6	6	1	1	1	1
	Q13	6	6	1	1	1	1
	Q14	6	6	1	1	1	1

	Q15	6	6	1	1	1	1
	Q16	6	6	1	1	1	1
	Q17	6	6	1	1	1	1
	Q18	6	6	1	1	1	1
	Q19	6	6	1	1	1	1
	Q20	6	5	0.833	0.816	0.833	0.816
	Q21	6	6	1	1	1	1
	Q22	6	6	1	1	1	1
	Q23	6	6	1	1	1	1
	Q24	6	6	1	1	1	1
	Q25	6	6	1	1	1	1
	Q26	6	6	1	1	1	1
	Q27	6	6	1	1	1	1
	Q28	6	6	1	1	1	1
	Q29	6	6	1	1	1	1
	Q30	6	5	0.833	0.816	0.833	0.816
	Q31	6	6	1	1	1	1
	Q32	6	6	1	1	1	1
	Q33	6	6	1	1	1	1
	Q34	6	6	1	1	1	1
	Q35	6	6	1	1	1	1
	Q36	6	6	1	1	1	1
	Q37	6	6	1	1	1	1
	Q38	6	6	1	1	1	1
	Q39	6	6	1	1	1	1
	Q40	6	5	0.833	0.816	0.833	0.816

Table 5: Relevancy and Clarity Agreement of the Instrument Items (SCS)

Type	Sub type	Number of experts	Agreement	Relevance		Clarity	
Self-Confidence Scale (SCS)				I-CVI	KAPPA	I-CVI	KAPPA
	Q1	6	6	1	1	1	1
	Q2	6	6	1	1	1	1
	Q3	6	6	1	1	1	1
	Q4	6	6	1	1	1	1
	Q5	6	6	1	1	1	1
	Q6	6	6	1	1	1	1
	Q7	6	6	1	1	1	1
	Q8	6	6	1	1	1	1
	Q9	6	6	1	1	1	1

	Q10	6	6	1	1	1	1
	Q11	6	5	0.833	0.816	0.833	0.816
	Q12	6	6	1	1	1	1
	Q13	6	6	1	1	1	1
	Q14	6	5	0.833	0.816	0.833	0.816
	Q15	6	6	1	1	1	1
	Q16	6	6	1	1	1	1
	Q17	6	6	1	1	1	1

Table 6: Relevancy and Clarity Agreement of the Instrument Items (RSES)

Type	Sub type	Number of experts	Agreement	Relevance		Clarity	
Rosenberg Self-Esteem Scale (RSES)				I-CVI	KAPPA	I-CVI	KAPPA
	Q1	6	6	1	1	1	1
	Q2	6	6	1	1	1	1
	Q3	6	6	1	1	1	1
	Q4	6	6	1	1	1	1
	Q5	6	6	1	1	1	1
	Q6	6	6	0.833	0.816	0.833	0.816
	Q7	6	6	1	1	1	1
	Q8	6	6	1	1	1	1
	Q9	6	6	0.833	0.816	0.833	0.816
	Q10	6	6	1	1	1	1

Table 7: Relevancy and Clarity Agreement of the Instrument Items (PASE)

Type	Sub type	Number of experts	Agreement	Relevance		Clarity	
Physical Activity Self-Efficacy Scale (PASE)				I-CVI	KAPPA	I-CVI	KAPPA
	Q1	6	6	1	1	1	1
	Q2	6	6	1	1	1	1
	Q3	6	6	1	1	1	1
	Q4	6	6	1	1	1	1
	Q5	6	6	1	1	1	1
	Q6	6	6	1	1	1	1
	Q7	6	6	0.833	0.816	0.833	0.816
	Q8	6	6	1	1	1	1

Table 8: Relevancy and Clarity Agreement of the Instrument Items (Body Composition)

Sub type	Measurement Method	Number of experts	Agreement	Relevance		Clarity	
				I-CVI	KAPPA	I-CVI	KAPPA
zBMI	BIA Stable stadiometer	6	5	0.833	0.816	0.833	0.816
Body fat percentage	BIA	6	6	1	1	1	1
Waist to hip ratio	Tape ruler [Waist (cm) / hips (cm)]	6	6	1	1	1	1

Note: zBMI: Body Mass Index z-score; BIA: Bioelectrical Impedance Analysis; CM: centimetre.

Appendix L

Rating of Perceived Exertion Scale and Permission

1. Borg RPE Scale (English version)

Borg RPE Scale®

Use this scale to tell how strenuous and tiring the work feels to you. The exertion is mainly felt as fatigue in your muscles and as breathlessness or possibly aches. When the exercise is hard it also becomes difficult to talk. It is your own feeling of exertion that is important. Don't underestimate it, but don't overestimate it either. For common exercise, such as cycling, running or walking, 11-15 is a good level. For strength and high-intensity interval training (HIIT), 15-19 is good. If you are sick follow your doctor's advice. Look at the scale and the descriptions and then choose a number. Use whatever numbers you want, even numbers between the descriptions.

6	No exertion at all	No muscle fatigue, breathlessness or difficulty in breathing.
7	Extremely light	Very, very light.
8		
9	Very light	Like walking slowly for a short while. Very easy to talk.
10		
11	Light	Like a light exercise at your own pace.
12	Moderate	
13	Somewhat hard	Fairly strenuous and breathless. Not so easy to talk.
14		
15	Hard	Heavy and strenuous. An upper limit for fitness training, as when running or walking fast.
16		
17	Very hard	Very strenuous. You are very tired and breathless. Very difficult to talk.
18		
19	Extremely hard	The most strenuous effort you have ever experienced.
20	Maximal exertion	Maximal heaviness.

Borg RPE Scale®
Ratings (R) of Perceived (P) Exertion (E).
© Gunnar Borg, 1970, 1998, 2017
English

2. Borg RPE Scale (Chinese version)

博格 RPE 量表®

使用此量表来表示你因体力活动而感受的辛苦和疲劳程度。这种用力的感觉主要是肌肉疲劳、呼吸困难或可能疼痛。当动作强度高时，说话也会变得困难。最重要的是你自己的用力感觉。不要低估它，但也不要高估它。对于骑自行车、跑步或步行等普通运动，11-15 是一个良好水平。对于力量和高强度间歇训练（HIIT）来说，15-19 是良好状态。如果你生病了，请听从医生的建议。请看量表和说明，然后选择一个数字。使用任何你想要的数字，甚至是两个说明之间的数字。

6	完全不用力	无肌肉疲劳、喘不上气或呼吸困难。
7	极轻	非常非常轻。
8		
9	很轻	如同慢慢地走了片刻。非常容易说话。
10		
11	轻	就像按自己的节奏而进行的轻量运动。
12	适度	
13	有些困难	相当吃力，气喘吁吁。没那么好说话
14		
15	困难	沉重而费力。健身训练的上限，如快跑或快走。
16		
17	很困难	非常吃力。你非常疲惫，上气不接下气。很难开口说话。
18		
19	极困难	你所经历过的最费劲的用力。
20	最大用力	最为沉重。

博格 RPE 量表®
感知(P)运动量(E)的评级(R)。
© Gunnar Borg, 1970, 1998, 2017
中文

3. Borg RPE Scale Permission

BorgPerception AB | c/o Elisabet Borg | Hantverkarsvagen 81 | SE-184 32 Akersberga | Sweden

<https://www.borgperception.se> | info@borgperception.se | +46 (0)70 4063758

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Appendix M

Validation of Experts for Intervention Program

Dear Experts,

I am a PhD student in Physical Education at Universiti Putra Malaysia. My research title is “Effects of Competitive Exergames on Body Composition, Psychosocial Well-Being, and Self-Perceptions among Overweight and Obese Male Adolescents in Fujian, China”. As you have good theoretical and practical experience in your professional field, I would like to invite you to participate in my research. Therefore, I sincerely invite you as an expert to give your opinions and suggestions for my research. All information you have entered will only be used for this study and not for any other purpose. This content does not require a signature, and all information you enter will be confidential. Please fill it out carefully.

Thank you for your help.

University Putra Malaysia

Supervisor committee: Prof. Dr. Soh Kim

Geok

Dr. Hazizi Abu Saad

1. Expert information

Name:	
Title	
Research Area:	
Work unit:	

2. Questionnaire information

The questionnaires are scored on a 4-point scale where 1 = not relevant, 2 = somewhat relevant, 3 = relevant, and 4 = highly relevant. Please rate the instrument for all variables on the appropriate scale and mark " ✓ ". If you have any further comments or suggestions, please make notes, and indicate them.

Table 1: Evaluation of the effectiveness of the intervention program

Contents	Relevance				Clarity				Comments
	4	3	2	1	4	3	2	1	
Frequency									
Intensity									
Time									
Type of Games Selected									
Duration									
Risk									
Overall evaluation of the									

3. Competitive Exergames Training Intervention Information

This protocol summarizes previous research and literature in related fields and designs a unique Competitive Exergames training program in combination with the

characteristics of Exergames. Previous studies have shown that a six-week Exergame intervention can effectively improve the waist-to-hip ratio of overweight and obese children, although no significant difference was found in the BMI percentiles between the somatosensory game group, the traditional game group, and the control group (van Biljon et al., 2021). However, some studies have also pointed out that after eight weeks of Active video game training, the subjects showed significant improvements in triceps skinfold thickness, waist circumference, and BMI values, which were statistically different from before the intervention (Duman et al., 2016). Therefore, the intervention period of this study was set at eight weeks, with three intervention training sessions per week, each lasting 45 minutes, which was consistent with the length of regular physical education classes for middle school students, ensuring the training effect while avoiding interference with students' normal learning progress. The subjects were overweight and obese male middle school students aged 12 to 15 in China. The experimental site was set in schools, and all experimental activities were carried out under the supervision and guidance of physical education teachers and assistants to ensure the safety of students and the standardization of training.

This study set up three groups in total, using an experimental group-control group design, including two experimental groups: peer involvement in CE play (PICE) and single-player CE play (SPCE), and a control group that took regular physical education classes (RPEC). In terms of training content, the design concept of interactive fitness video games such as Wii Active was borrowed. This type of

Exergame uses a controller to achieve large muscle group movements of the upper or lower limbs (Chapman, 2022). Players need to hold the remote control or fix it on their legs, and the sensor and display device will synchronously feed back the movement to achieve whole-body exercise. Each training session covers aerobic exercise, upper and lower limb strength training, and sports confrontation games (Staiano et al., 2013), and the game difficulty is gradually increased according to the intervention process, so as to effectively control the intensity of exercise.

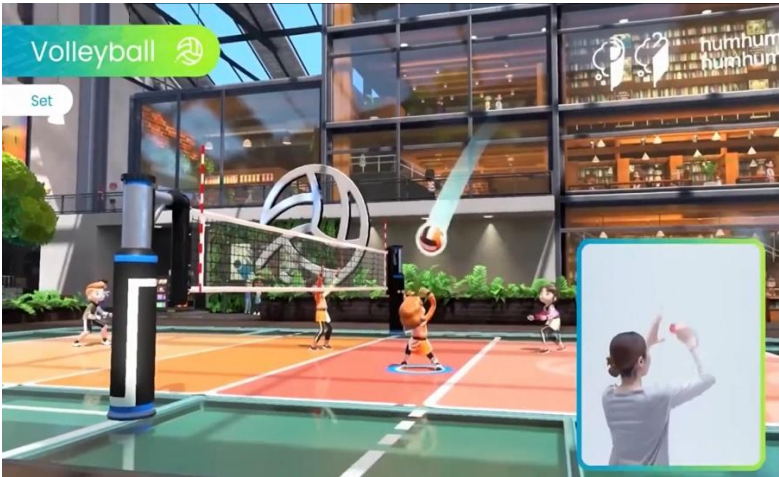


Table 2. AVG Training Protocol (experimental group)

Week	Duration& Frequency	Intensity	Exercise	Contents
Week 1-2	3 times/week 45 minute	55-60% HRmax; RPE 11-12	10-minute upper and lower body strength training + 20-minute sports games + 15-minute cardio	Bowling + Table tennis + Fencing
Week 3-5	3 times/week 45 minute	60-70% HRmax RPE 12-13	10-minute upper and lower body strength training + 20-minute sports games + 15-minute cardio	Basketball + Tennis + Bicycling
Week 6-8	3 times/week 45 minute	70-75% HRmax RPE 13-14	10-minute upper and lower body strength training + 20-minute sports games + 15-minute cardio	Volleyball + Boxing + Dance

Competitive Exergames -- Nintendo Switch Sports

Week	Duration	Content	Exergame
1-2	10min	Upper and lower body strength training (Bowling)	
	20min	Sports games (Table tennis)	
	15min	Cardio (Fencing)	

Week	Duration	Content	Exergame
3-5	10min	Upper and lower body strength training (Basketball)	
	20min	Sports games (Tennis)	
	15min	Cardio (Cycling)	

Week	Duration	Content	Exergame
6-8	10min	Upper and lower body strength training (Volleyball)	
	20min	Sports games (Boxing)	
	15min	Cardio (Dance)	

Appendix N

Validation of Experts for Instrument Contents

Dear Experts,

I am a PhD student in Physical Education at Universiti Putra Malaysia. My research title is “Effects of Competitive Exergames on Body Composition, Psychosocial Well-Being, and Self-Perceptions among Overweight and Obese Male Adolescents in Fujian, China”. As you have good theoretical and practical experience in your professional field, I would like to invite you to participate in my research. Therefore, I sincerely invite you as an expert to give your opinions and suggestions for my research. All information you have entered will only be used for this study and not for any other purpose. This content does not require a signature, and all information you enter will be confidential. Please fill it out carefully.

Thank you for your help.

University Putra Malaysia

Supervisor committee: Prof. Dr. Soh Kim

Geok

Dr. Hazizi Abu Saad

23. My friends are mean to me.*									
24. I wish I had different friends.*									
25. School is interesting.									
26. I enjoy school activities.									
27. I wish I lived in a different house.*									
28. Members of my family talk nicely to one another.									
29. I have a lot of fun with my friends.									
30. My parents and I do fun things together.									
31. I like my neighborhood.									
32. I wish I lived somewhere else.*									
33. I am a nice person.									
34. This town is filled with mean people.*									
35. I like to try new things.									
36. My family's house is nice.									
37. I like my neighbors.									
38. I have enough friends.									
39. I wish there were different people in my neighborhood.*									
40. I like where I live.									

Waist to hip ratio	Tape ruler Waist (cm) / hips (cm)									
Body fat percentage	Body composition analyzer (BIA)									

4. Instruments Information

The dependent variables in this study were Body Composition, Psychosocial Well-Being, and Self-Perceptions. Based on internationally recommended instruments. Body composition was measured using the Body Composition Analyser (BIA) and a tape measure. Psychosocial Well-Being (Depression, Social Anxiety, and Life Satisfaction)

were measured using the PHQ-9, SPAI-B, and MSLSS. Self-Perceptions (Self-Confidence, Self-Esteem, and PA Self-Efficacy) were measured using the SCS, RSES, and PASE.

Appendix O

Data Collection Process

Phase 1: Pre-intervention Phase	
Recruiting participants	* Inclusion and exclusion criteria
	* Physical Activity Readiness Questionnaire (PAR-Q)
Cluster randomization	* Experimental group 1
	* Experimental group 2
	* Control group
Preliminary preparation	* Equipment installation
	* Familiarity with specialised classrooms and CE
	* Distribute training logs, attendance sheets, and game instruction manuals
	* Pilot study
Pre-test (0 th week)	* Body composition
	* Psychosocial Well-Being,
	* Self-Perceptions
Phase 2: Intervention Implementation Phase	
EG1: CE training with a peer	* PICE
EG2: CE training alone	* SPCE
CG: Regular training	* RPEC
Post-test (8 th week)	* Body composition
	* Psychosocial Well-Being,
	* Self-Perceptions

Appendix P

Training Protocol

Overview of Training Protocol

1. CE training Protocol (experimental group)

Week	Duration& Frequency	Intensity	Exercise	Contents
Week 1-2	3 times/week 45 minute	55-60% HRmax; RPE 11-12	10-minute upper and lower body strength training + 20-minute sports games + 15-minute cardio	Bowling + Table tennis + Fencing
Week 3-5	3 times/week 45 minute	60-70% HRmax RPE 12-13	10-minute upper and lower body strength training + 20-minute sports games + 15-minute cardio	Basketball + Tennis + Bicycling
Week 6-8	3 times/week 45 minute	70-75% HRmax RPE 13-14	10-minute upper and lower body strength training + 20-minute sports games + 15-minute cardio	Volleyball + Boxing + Dance

2. Regular Training Protocol (Control Group)

Week	Duration& Frequency	Intensity	Exercise	Contents
Week 1-2	3 times/week 45 minute	55-60% HRmax; RPE 11-12	10-minute warm-up + 20-minute sports activities + 15-minute cardio	Brisk walking + Jump rope + Jogging
Week 3-5	3 times/week 45 minute	60-70% HRmax RPE 12-13	10-minute warm-up + 20-minute sports activities + 15-minute cardio	Brisk walking + Jump rope + Easy running
Week 6-8	3 times/week 45 minute	70-75% HRmax RPE 13-14	10-minute warm-up + 20-minute sports activities + 15-minute cardio	Brisk walking + Jump rope + Running

3. Detailed training protocol

	EG1 & EG2					CG				
Week	Exergame	Types of games/Time	Frequency	Time	Intensity	Exercise	Contents	Frequency	Time	Intensity
1	Bowling	UAL/10min	3/wk	45min	55-60% HRmax RPE 11-12	Warm-up	Brisk walking /10min	3/wk	45min	55-60% HRmax RPE 11-12
	Table tennis	SG/20min				Sports activities	Jump rope/20min			
	Fencing	CA/15min				Cardio	Jogging /15min			
2	Bowling	UAL/10min	3/wk	45min	55-60% HRmax RPE 11-12	Warm-up	Brisk walking /10min	3/wk	45min	55-60% HRmax RPE 11-12
	Table tennis	SG/20min				Sports activities	Jump rope/20min			
	Fencing	CA/15min				Cardio	Easy running /15min			
	Basketball	UAL/10min			60-70%	Golf	Brisk walking			60-70%

3			3/wk	45min	HRmax RPE 12-13		/10min	3/wk	45min	HRmax RPE 12-13
	Tennis	SG/20min				Tennis	Jump rope/20min			
	Bicycling	CA/15min				Bicycling	Easy running /15min			
4	Basketball	UAL/10min	3/wk	45min	60-70% HRmax RPE 12-13	Golf	Brisk walking /10min	3/wk	45min	60-70% HRmax RPE 12-13
	Tennis	SG/20min				Tennis	Jump rope/20min			
	Bicycling	CA/15min				Bicycling	Easy running /15min			
5	Basketball	UAL/10min	3/wk	45min	60-70% HRmax RPE 12-13	Golf	Brisk walking /10min	3/wk	45min	60-70% HRmax RPE 12-13
	Tennis	SG/20min				Tennis	Jump rope/20min			
	Bicycling	CA/15min				Bicycling	Easy running /15min			
6	Volleyball	UAL/10min	3/wk	45min	70-75% HRmax RPE 13-14	Basketball	Brisk walking /10min	3/wk	45min	70-75% HRmax RPE 13-14
	Boxing	SG/20min				Boxing	Jump rope/20min			
	Dance	CA/15min				Dance	Running /15min			

7	Volleyball	UAL/10min	3/wk	45min	70-75% HRmax RPE 13-14	Basketball	Brisk walking /10min	3/wk	45min	70-75% HRmax RPE 13-14
	Boxing	SG/20min				Boxing	Jump rope/20min			
	Dance	CA/15min				Dance	Running /15min			
8	Volleyball	UAL/10min	3/wk	45min	70-75% HRmax RPE 13-14	Basketball	Brisk walking /10min	3/wk	45min	70-75% HRmax RPE 13-14
	Boxing	SG/20min				Boxing	Jump rope/20min			
	Dance	CA/15min				Dance	Running /15min			

NOTE: UAL: upper and lower body strength training; SG: sports games; CA: cardio; EG1: peer involvement in Competitive Exergames; EG2: single-player Competitive Exergames; CG: regular physical education class; 3/wk: 3 times/week.

Appendix Q

Training logs and Training Attendance Sheets

1. Training Log

(1) Physical Education Teacher Name: _____ Telephone Number: _____

(2) Physical Education Teacher Name: _____ Telephone Number: _____

If the participant has completed the prescribed training content, please tick “√” in the form; if not, please tick “x” in the form and record the reason.

Table1. Training Log

[illegible]

2. Training Attendance Sheets

(1) Research Assistant Name: _____ Telephone Number: _____

(2) Research Assistant Name: _____ Telephone Number: _____

If the participant has completed the prescribed training content, please tick “√” in the form; if not, please tick “x” in the form and record the reason.

Table2. Training Attendance Sheets

[illegible]

