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The Application of Sports Tourism-Based Physical Activity to Reduce Sedentary Lifestyles in the Community

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Abstract Physical inactivity and sedentary behavior have increasingly been recognized as critical global health challenges, contributing to the development of chronic diseases and diminishing overall quality of life. This study was designed to evaluate the effectiveness of a sports tourism–based physical activity program in reducing sedentary lifestyles among adults in Palembang. A quasi-experimental method with a non-equivalent control group design was employed, involving 100 purposively selected participants aged 18–45 years. The experimental group (n = 50) engaged in a 12-week program at the Jakabaring Sport Center, which consisted of walking, cycling, water-based exercises, and group gymnastics, while the control group (n = 50) continued their routine daily activities. Sedentary behavior was measured using a modified Adolescent Sedentary Activity Questionnaire (ASAQ) at both the pre-test and post-test stages. Findings indicated that the experimental group experienced a significant decrease in sedentary time, from an average of 8.21 ± 1.32 hours/day at baseline to 6.45 ± 1.21 hours/day after the intervention ($p < 0.001$), with a large effect size (Cohen's d = 1.17). In contrast, no significant changes were observed in the control group ($p = 0.312$). These results demonstrate that integrating physical activities into sports tourism programs not only reduces sedentary behavior but also enhances motivation through recreational and social engagement. In conclusion, sports tourism–based physical activity is an effective and innovative approach to encourage active lifestyles, decrease sedentary patterns, and strengthen public health in urban communities. Future research is suggested to assess the sustainability of these benefits and to explore the incorporation of local cultural elements into sports tourism initiatives.

Keywords Physical Activity, Sedentary Lifestyle, Sports Tourism

1. Introduction

Low levels of physical activity are now a serious global health issue. Reports show that around 27.5% of the world's population does not meet physical activity recommendations, with the figure even higher in high-income countries at 42.3%. This situation demonstrates how modern passive lifestyles and sedentary behavior contribute to an increased risk of chronic disease and a reduced quality of life [1]. This lack of physical activity is now recognized as a significant public health problem, as it not only triggers chronic diseases and premature death, but also increases the burden on the healthcare system. Therefore, structured physical activity

plays an important role in improving physical fitness and physiological body function [2][3]. Technological and digital economic developments in developed countries have exacerbated the situation, as many people spend more time indoors, limiting opportunities for physical activity and reinforcing sedentary lifestyles [4].

This type of behavior has been shown to increase the risk of various chronic diseases, including diabetes and cardiovascular disorders, which ultimately threaten long-term health [5][6][7]. Therefore, prevention strategies are needed to encourage people to be more active in their daily lives. Moreover, low physical activity, increased life expectancy, and widespread sedentary behavior reinforce each other's negative impact on public health, resulting in increased physical weakness, disability, and even death [8][9][10]. Therefore, this issue is not merely an individual concern, but a major challenge for public health as a whole, requiring serious attention and early prevention efforts.

In Indonesia, this phenomenon is becoming increasingly evident with the rise in digital technology use, urbanization, and the prevalence of jobs that require prolonged sitting, leading to a decline in physical activity among the population. However, regular exercise and physical activity have been proven to maintain heart health and control blood sugar levels [11]. They also promote healthier aging [12][13]. Consistent physical activity not only maintains physical fitness but also strengthens muscles, improves digestive function, and delays the decline in bodily functions [14].

On the contrary, lack of movement actually accelerates health decline, especially in individuals with a history of chronic diseases [15]. In the context of public health, moderate to vigorous physical activity (MVPA) is very important to support physical and mental health [16]. This activity basically consists of body movements that result in energy expenditure [17]. Various health guidelines emphasize that physical activity programs should be tailored to the needs and motivations of each individual to be more effective, safe, and sustainable [18][19][20]. In addition to physical benefits, these activities are also an evidence-based approach that can support mental and psychosocial health, especially when integrated with local cultural values [21][22].

The problem is that despite the proven benefits of physical activity, community participation rates remain low due to modern lifestyles that are increasingly practical and sedentary. Therefore, a new, more engaging approach is needed. One potential strategy is sports tourism, which integrates physical activity with recreational activities. This concept not only encourages community involvement in sports, but also strengthens mental well-being, reduces sedentary lifestyles, and provides an enjoyable tourist experience. As a rapidly growing sector, sports tourism can deliver multiple benefits: enriching tourism products while expanding opportunities for community participation in physical activity [23].

Sports and tourism are essentially ideal forms of recreation because they not only provide enjoyment but also have a positive impact on health, fitness, and mental well-being [24][25]. With the support of adequate public facilities, the development of sports tourism has the potential to be an effective strategy for shaping a healthy and active lifestyle. Its implementation can take the form of cycling, leisurely walks, jogging, gymnastics, and even water sports at tourist destinations. This approach provides holistic benefits, both physically and mentally, while creating additional motivation for people to be more active and reduce their tendency to live a sedentary lifestyle [26]. The implementation of sports tourism can be realized by combining physical activities with recreational and tourist activities, such as cycling, leisurely walks, jogging, gymnastics, and water sports in various destinations. This model not only has a positive impact on physical health but also contributes to improving mental well-being and quality of life for the community. In addition, these enjoyable activities can foster additional motivation to be physically active, thereby reducing sedentary habits.

Based on the above description, the purpose of this study is to determine the effect of implementing tourism-based physical activities on reducing sedentary lifestyles in the community. This research is expected to identify an effective and enjoyable model of physical activity implementation that can increase public participation in sports activities while decreasing sedentary behavior levels. The hypothesis of this study is that the implementation of tourism-based physical activities has a significant effect on reducing sedentary lifestyles in the community.

2. Materials and Methods

This study used a quasi-experimental design (non-equivalent control group design) with two groups. Experimental Group (n = 50): participated in physical literacy through a sports tourism program based on physical activities at the Jakabaring Sport Center (JSC) for 12 weeks. Control Group (n = 50): did not receive any special intervention (continued their routine activities/daily activities or standard community fitness curriculum).

The total sample consisted of 100 respondents. The groups were divided as closely as possible based on matching characteristics such as age, gender, and employment status to reduce initial bias. The purpose of the study was to determine the effect of implementing physical activity in sports tourism on reducing sedentary lifestyles in the community.

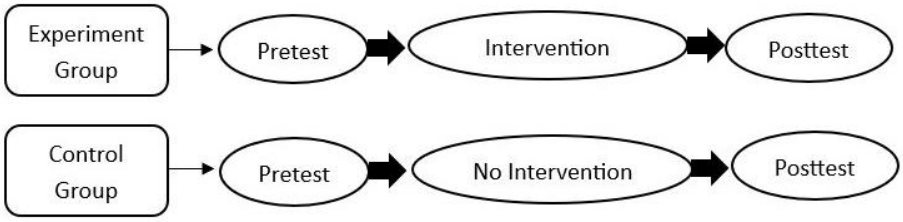

Figure 1. Research Design

Figure 1 illustrates a quasi-experimental design using the pretest-posttest control group model. In this design, both the experimental and control groups take a pretest to measure their initial condition. The experimental group then receives a specific intervention or treatment, while the control group does not receive any intervention and continues normal activities. After the intervention period, both groups take a posttest to assess changes. The comparison between pretest and posttest results helps determine whether the intervention has a significant effect on the measured variable.

Independent Variable (X): Sports tourism intervention (structured physical activity program at Jakabaring Sport Centre (JSC): walking, cycling, water sports, gymnastics). Dependent Variable (Y): Level of sedentary lifestyle, measured using the ASAQ (Adolescent Sedentary Activity Questionnaire) adapted for adults, namely the total score of sedentary hours/day and sub-scores (television, social media/computer, reading, etc.). Control/Covariate Variables: age, gender, occupation, baseline physical activity status, and chronic health conditions.

The intervention given to the experimental group was carried out over a period of 12 weeks, starting from April to June 2025, with a frequency of two sessions per week, where each session lasted approximately 75 minutes with moderate intensity. The intervention program was designed in the form of sports tourism-based physical activities in the Jakabaring Sport Center (JSC) area, including healthy walking or brisk walking on the JSC track, safe cycling routes, and mixed activities such as light water sports (if facilities were available) or group fitness exercises in open spaces. Each activity session included a warm-up, main activity, and cool-down tailored to the participants' conditions. The intervention was implemented progressively with a gradual increase in intensity every few weeks, was inclusive, and took into account individual abilities and the local cultural context. Participant attendance is also an important aspect, with participation considered compliant if at least 75% of the total intervention sessions are attended. To ensure that the intervention is implemented as designed, this study uses a fidelity instrument as a measure of program implementation consisting of 16 items in five domains: adherence, exposure, quality of delivery, participant responsiveness, and program differentiation:

Table 1. Fidelity Instrument for Exercise Program Implementation

Domain / Component	Brief Assessment Item Description
Adherence	Activities in accordance with the program guidelines
	Exercise sequence in line with the plan
	Exercise duration in compliance with the schedule
	No modification to exercise content
Exposure	Number of exercise sessions in accordance with the schedule
	Effective exercise time achieved
	No delayed sessions
Quality of Delivery	Trainer's instructions are clear and accurate
	Technique examples in line with standards
	Trainer provides motivation & feedback
Participant Responsiveness	Participants engage in exercises enthusiastically
	Participants exert maximum effort
	Participants comply with instructions
Program Differentiation	Program distinct from routine activities
	Exercise objectives aligned with the intervention
	No integration with other programs

Each item is rated on a scale of 0–2; the total score is then converted to a fidelity percentage. Trained observers fill out the instrument for each session, and inter-rater reliability is tested on 10% of sessions to ensure the reliability of the assessment. This instrument serves to assess the extent to which the treatment implementation follows the established protocol, thereby maintaining the internal validity of the study. The use of fidelity in intervention research is in line with the recommendations of the studies [27][28], which emphasize the importance of monitoring program implementation to ensure the effectiveness and consistency of interventions.

2.1. Participant

The population in this study consisted of adults aged 18-45 years who live or are active around Jakabaring, Palembang, and have experience or interest in participating in tourism sports activities.

The sample consisted of 100 respondents selected purposively based on the following inclusion criteria:

1. Aged 18–45 years.
2. Willing to participate in the 12-week program (for the experimental group).
3. No serious medical contraindications to physical activity (assessed through a brief health questionnaire).
4. Not currently participating in another intensive structured fitness program.
5. Group Allocation: Quasi-random allocation with matching of key demographic variables.

Ethical considerations in this study include several important aspects to protect the rights and safety of participants. All participants were first asked to provide written consent (*informed consent*) after receiving an explanation of the objectives, procedures, and potential risks of the study. The risks that may arise are minimal, because the intervention consists of light to moderate physical activity, and each participant will undergo pre-intervention health screening to ensure adequate physical condition. The confidentiality of participants' identities and data was strictly maintained, and participants were given complete freedom to withdraw at any time without any consequences or penalties. In addition, this study also obtained official permission from the Jakabaring Sport Centre (JSC) management to use the facilities and ensured the availability of competent assistants or trainers in each intervention session.

The diagram illustrates the research procedure of a quasi-experimental study using a pretest-posttest control group design. The study began with the recruitment and screening of 100 participants, followed by non-random allocation and matching to form two equal groups: an experimental group (n = 50) and a control group (n = 50). Both groups completed a pre-test using the ASAQ instrument to measure their initial condition. The experimental group then participated in a 12-week intervention program consisting of walking, cycling, water sports, and gymnastics, while the control group continued their regular curriculum or routine activities. After the intervention period, both groups took a post-test using the same ASAQ instrument to measure changes. Finally, the collected data were analyzed using descriptive statistics and a t-test to determine whether the intervention had a significant effect compared to the control condition.

2.2. Data Collection

The data collection procedure in this study was designed systematically so that the results obtained were measurable, valid, and in accordance with the research objectives. Each stage of implementation was prepared by considering the readiness of the participants, the feasibility of the intervention, and the reliability of the instruments used. Participant readiness refers to the physical, mental, and motivational conditions of the students before participating in the study, ensuring they can engage optimally and provide accurate data. Intervention feasibility relates to how well the methods or treatments are suited to the characteristics of the participants, the environment, and the research objectives, allowing the intervention to be implemented smoothly without obstacles. Meanwhile, the reliability of the instruments used means that the measurement tools or data collection techniques have been tested for consistency, have validity aligned with the variables measured, and can produce stable and trustworthy data throughout the study.

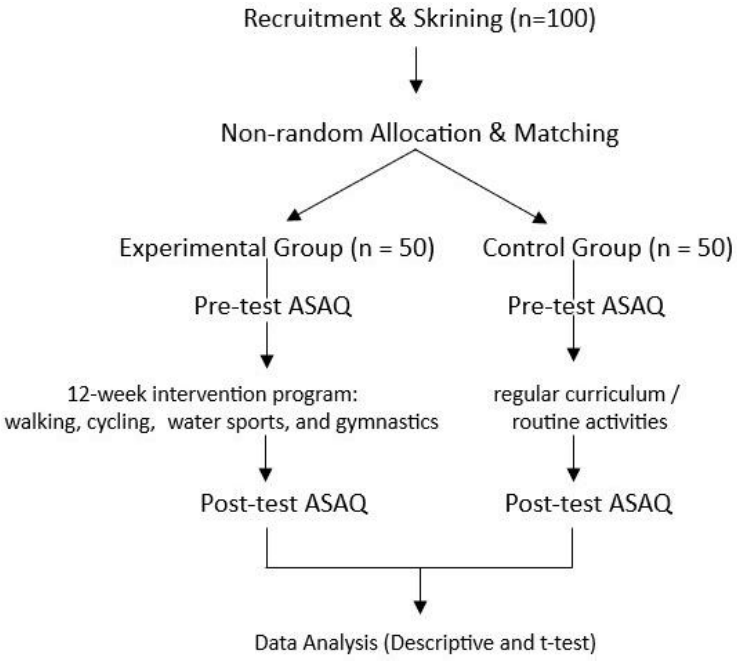

Figure 2. Simple Flowchart

Table 2 describes the stages and timeline of the research implementation. Activities began with the preparation and recruitment phase, which included socialization, health screening, and instrument testing. In the initial week, a pre-test using the ASAQ was administered to all participants. The intervention phase, conducted from week 1 to week 12, involved a sports tourism-based physical activity program for the experimental group, while the control group continued their routine activities. In week 13, a post-test ASAQ was administered to measure behavioral changes, and approximately three months later, a follow-up was conducted to assess the sustainability of the intervention effects.

The research instruments used in this study consisted of several components. The main measurement was conducted using the ASAQ (Adolescent Sedentary Activity Questionnaire) [29], which had been adapted for adults and was completed as *a self-report* at the pre-test stage (week 0) and post-test stage (week 13), resulting in an average score of hours per day of sedentary activity. Before the intervention began, respondents also completed a brief demographic and health questionnaire as baseline data. During the intervention, the experimental group was asked to fill out a weekly daily activity log to record compliance and the types of physical activities performed. As an optional supplement, if resources were available, pedometers or smartphone applications were used to record the number of steps and physical activities as additional objective measures. In addition, this study also applied an intervention fidelity checklist filled out by trainers or facilitators to ensure that the program was implemented according to the design.

Table 3 presents Question 1 of the Adolescent Sedentary Activity Questionnaire (ASAQ), which measures the amount of time adolescents spend on various sedentary activities before and after school from Monday to Friday. Respondents record the duration of activities such as watching TV, using a computer, doing homework, reading, attending tutoring, traveling, engaging in hobbies, sitting and chatting, and playing musical instruments. This data is used to identify daily sedentary behavior patterns and total sedentary time among students.

Table 4 presents Question 2 of the Adolescent Sedentary Activity Questionnaire (ASAQ), which assesses the amount of time adolescents spend on sedentary activities during the weekend. Respondents record the duration of activities on Saturday and Sunday, such as watching TV, using a computer, doing homework, reading, attending tutoring, traveling, engaging in hobbies, sitting and chatting, playing musical instruments, and participating in religious activities. This data is used to identify patterns and total sedentary time during weekends.

2.3. Statistical Tests

Statistical tests in this study were conducted in stages. First, descriptive analysis was used to display the distribution of data in the form of mean values, standard deviations, minimums, maximums, and participant compliance percentages. Next, assumption tests were conducted using normality tests (Kolmogorov-Smirnov or Shapiro-Wilk) to examine data distribution, and homogeneity of variance tests (Levene's Test) to ensure variance uniformity between groups. Once the prerequisites were met, inferential analysis was performed using a paired sample t-test for each group (experimental and control) to determine the difference in sedentary scores between the pre-test and post-test.

To determine the extent of the intervention's effect on reducing sedentary lifestyles, the effect size was calculated using Cohen's d formula. The results of the analysis were then interpreted at a significance level of $\alpha = 0.05$, so that differences were considered significant if the p-value was < 0.05.

Table 2. Data Collection Procedures

Stage	Time of Implementation	Main Activities
Preparation & Recruitment	Week −2 to 0	Research information session, brief health screening, completion of demographic questionnaire, and instrument testing (pilot test).
Pre-test	Week 0	All respondents (experimental and control groups) complete the ASAQ and baseline questionnaire.
Intervention	Week 1–12	The experimental group participated in a sports tourism-based physical activity program; the control group continued their routine activities. Attendance and weekly logs were recorded.
Post-test	Week 13	All respondents completed the ASAQ again to measure changes in sedentary behavior.
Follow-up (optional)	± 3 months after the post-test	All respondents completed the ASAQ again to assess the sustainability of the intervention effects.

Table 3. Adolescent Sedentary Activity Questionnaire (ASAQ) Question 1

Think about a normal week. Write down how long you spend doing the following activities before and after school each day.

Activity	Monday (Hours/Minutes)	Tuesday (Hours/Minutes)	Wednesday (Hours/Minutes)	Thursday (Hours/Minutes)	Friday (Hours/Minutes)	Average
Watching TV						
Watching videos/DVDs						
Using the computer for fun						
Using the computer for homework						
Doing homework not on the computer						
Reading for fun						
Receiving tutoring						
Travel (car/bus/train)						
Doing crafts or hobbies						
Sitting around (chatting with friends/on the phone/chilling)						
Playing/practicing a musical instrument						

Table 4. Adolescent Sedentary Activity Questionnaire (ASAQ) Question 2

Think about a normal weekend. Write down how long you spend doing the following activities on Saturday and Sunday.

Activity	Saturday (Hours/Minutes)	Sunday (Hours/Minutes)	Average
Watching TV			
Watching videos/DVDs			
Using the computer for fun			
Using the computer for homework			
Doing homework not on the computer			
Reading for fun			
Receiving tutoring			
Travel (car/bus/train)			
Doing crafts or hobbies			
Sitting around (chatting with friends/on the phone/chilling)			
Playing/practicing a musical instrument			
Going to church or weekend religious school			

3. Results

There were 100 respondents who participated in this study, consisting of 50 people in the experimental group and 50 people in the control group. Basic characteristics such as age, gender, and employment status were relatively balanced between groups as a result of matching. The average age of respondents was 29.8 years (SD = 6.4) with a composition of 52% male and 48% female.

Descriptive analysis showed that at the pre-test stage, both groups had relatively similar levels of sedentary behavior. The average sedentary score for the experimental group was 8.21 hours/day (SD = 1.32), while the control group scored 8.09 hours/day (SD = 1.27). After the 12-week intervention, the experimental group experienced a decrease in sedentary scores to 6.45 hours/day (SD = 1.21), while the control group remained stable at 8.02 hours/day (SD = 1.34).

The Shapiro–Wilk normality test showed that the distribution of sedentary data in both groups was normal (p >

0.05). The homogeneity of variance test (Levene's Test) also showed that the variance between groups was homogeneous ($p > 0.05$). Thus, the analysis could be continued using parametric tests.

Table 5 shows the average daily sedentary time for the experimental and control groups before and after the intervention. The experimental group showed a decrease from 8.21 ± 1.32 hours to 6.45 ± 1.21 hours (a difference of −1.76 hours), while the control group showed almost no change, from 8.09 ± 1.27 hours to 8.02 ± 1.34 hours (a difference of −0.07 hours). This indicates that the intervention effectively reduced sedentary time in the experimental group.

Table 5. Average Daily Sedentary Score (Hours) by Group

Group	Pre-test (M ± SD)	Post-test (M ± SD)	Difference
Experimental (n=50)	8.21 ± 1.32	6.45 ± 1.21	−1.76
Control (n=50)	8.09 ± 1.27	8.02 ± 1.34	−0.07

In Table 6, the results of the Shapiro–Wilk normality test show that all groups, both pre-test and post-test of the experimental and control groups, are normally distributed ($p > 0.05$). In Table 7, the results of Levene's Test indicate that the variance of sedentary scores is homogeneous before and after the treatment ($p > 0.05$), allowing for the use of parametric analysis.

Table 6. Results of Normality Test (Shapiro–Wilk)

Group	Shapiro-Wilk (p)	Description
Experimental Pre-test	0.128	Normal
Post-test Experiment	0.094	Normal
Pre-test control	0.182	Normal
Post-test control	0.210	Normal

Table 7. Homogeneity Test Results (Levene's Test)

Variable	Levene's Test (p)	Description
Pre-test sedentary score	0.354	Homogeneous
Post-test sedentary score	0.427	Homogeneous

After the data was declared to be normally distributed and met the assumption of variance homogeneity, the analysis continued to test the difference in sedentary scores between the pre-test and post-test stages in each group. The test used was a paired sample t-test, with the aim of determining whether there were significant changes in the level of sedentary lifestyle after the intervention in the experimental group and the control group.

The results of *the paired sample t-test* in Table 8 showed a significant difference in the experimental group between the pre-test and post-test sedentary scores ($t(49) = 9.84$, $p < 0.001$). In contrast, no significant difference was found in the control group ($t(49) = 1.02$, $p = 0.312$).

Table 8. Results of the Paired Sample t-test

Group	T	df	p-value	Description
Experiment	9.84	49	< **0.001**	Significant
Control	1.02	49	0.312	Not significant

In addition to analyzing the difference in sedentary scores between the pre-test and post-test, this study also calculated the effect size to determine the extent to which the intervention had a real impact. The effect size was calculated using Cohen's d, which serves to describe the strength of the intervention's impact beyond mere statistical significance. The interpretation of Cohen's d values is usually categorized as small (0.2), medium (0.5), and large (≥0.8). Thus, the effect size can provide a clearer picture of the practical significance of the findings of this study. The calculation results show that in the experimental group, the reduction in sedentary activity had a large effect size ($d = 0.89$), while in the control group, the effect size was very small ($d = 0.10$).

The calculation of the effect size (Cohen's d) shows that the experimental group experienced a significant reduction in sedentary scores ($d = 1.17$, very large effect), while the control group showed minimal change ($d = 0.07$, very small effect). The difference in values between the experimental and control groups was 1.1 (Table 9). The results of the study indicate that the implementation of a sports tourism program at the Jakabaring Sport Centre (JSC) can reduce sedentary levels among adults. Participants in the experimental group experienced a significant decrease in daily sedentary scores, while the control group showed no significant difference. These findings indicate that physical activity packaged in the form of sports tourism can be an effective alternative to improving fitness while reducing the tendency toward a sedentary lifestyle in urban environments.

Table 9. Effect Size Calculation Results (Cohen's d)

Group	Mean Pre-test	Mean Post-test	SD Pre-test	Post-test SD	Mean Difference	Pooled SD	Cohen's d	Description
Experiment	52.80	44.60	7.25	6.80	-8.20	7.03	1.17	Very large effect
Control	51.40	50.90	7.10	7.05	-0.50	7.07	0.07	Very small effect

4. Discussion

The results of this study show that the implementation of a physical activity-based sports tourism program at the Jakabaring Sport Centre (JSC) area was able to significantly reduce sedentary scores in the experimental group, while the control group did not experience any significant changes. These findings indicate that the integration of physical activity into sports tourism activities can be an effective alternative strategy for reducing sedentary lifestyles in urban communities.

The decrease in sedentary scores in the experimental group is in line with previous evidence that regular physical activity, especially of moderate intensity, plays an important role in maintaining cardiovascular health, improving functional capacity, and reducing the risk of chronic diseases [10][13][15]. Sports tourism-based programs involving brisk walking, cycling, gymnastics, and water sports have been shown to create a recreational atmosphere that not only encourages participant engagement but also increases motivation to stay active. Recreational factors and enjoyable social experiences also reinforce consistency of participation, as reported in other studies that a supportive environment and group-based activities can increase adherence to physical activity programs [20][21].

Additionally, these findings contribute new insights into the literature on strategies for preventing sedentary behavior. While conventional approaches to physical education or formal sports often face barriers to participation, tourism sports offer a more flexible, contextual, and recreation-oriented approach. By utilizing available public facilities, such as the JSC area, this intervention also contributes to optimizing the function of public spaces as a means of promoting public health.

From a public health perspective, it is important to note that the positive effects generated are not only statistically significant but also practically meaningful. The effect size (Cohen's d) shows a large effect in the experimental group, confirming that this program is truly relevant for widespread implementation in the prevention of sedentary behavior. This indicates that the tourism-based sports approach can be an intervention that is not only effective in the research context but also has the potential to be replicated in public health policies and regional tourism development.

Thus, the results of this study reinforce the argument that the implementation of sports tourism-based physical activity can be an innovative strategy for building an active lifestyle, reducing the negative impacts of sedentary behavior, and improving the quality of life of urban communities. For further research, it is recommended that follow-up measurements be conducted through long-term *follow-ups* to ensure the sustainability of the impact, as well as further exploration of the integration of local cultural values into the sports tourism model so that the results are more contextual and sustainable.

5. Conclusions

This study shows that physical activity-based sports tourism programs implemented at the Jakabaring Sport Center (JSC) area are effective in reducing sedentary lifestyles among adults. The experimental group that participated in the 12-week intervention experienced a significant decrease in daily sedentary scores, while the control group showed no significant changes.

These findings confirm that integrating physical activity with recreational activities through sports tourism can be an innovative strategy for promoting an active lifestyle, increasing motivation to participate, and providing physical and mental health benefits simultaneously. This program also has the potential to be implemented more widely in public health policies and regional tourism sector development.

For future research, long-term evaluation is needed to assess the sustainability of the intervention's impact, as well as exploration of more contextual sports tourism models that incorporate local cultural values to make the results more relevant and sustainable.

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REFERENCES

[1] R. Guthold, G. A. Stevens, L. M. Riley, and F. C. Bull, “Worldwide trends in insufficient physical activity from 2001 to 2016: a pooled analysis of 358 population-based surveys with 1·9 million participants,” *Lancet Glob. Heal.*, vol. 6, no. 10, pp. e1077–e1086, 2018, doi: 10.1016/S2214-109X(18)30357-7.

[2] Y. Z. Ling Yu, Xinling Zhao, Qing Long, Shujun Li, Huaxia Zhang, Zhaowei Teng, Jian Chen, Yunqiao Zhang, Xu You, Zeyi Guo, “Association between a changeable lifestyle, sedentary behavior, and suicide risk: A systematic review and meta-analysis,” *J. Affect. Disord.*, vol. 350, pp. 974–982, 2024, doi: 10.1016/j.jad.2024.01.193.

[3] N. C. Majid and Fauzi, “The effect of sprint training on vertical jump height of female youth volleyball players,” *Int. J. Hum. Mov. Sport. Sci.*, vol. 9, no. 2, pp. 334–339, 2021, doi: 10.13189/saj.2021.090222.

[4] I. D. Wyatt and D. E. Hecker, “Occupational changes during the 20th century,” *Mon. Labor Rev.*, vol. 129, no. 3, pp. 35–57, 2006.

[5] A. Biswas *et al.*, "Sedentary time and its association with risk for disease incidence, mortality, and hospitalization in adults a systematic review and meta-analysis," *Ann. Intern. Med.*, vol. 162, no. 2, pp. 123–132, 2015, doi: 10.7326/M14-1651.

[6] J. Apaflo, C. A. Meza, M. Amador, and S. Bajpeyi, "Time spent in lifestyle activities is associated with better insulin sensitivity and physical fitness in a sedentary Mexican American male population," *Adv. Exerc. Heal. Sci.*, vol. 2, no. 1, pp. 33–37, 2025, doi: 10.1016/j.aehs.2025.01.002.

[7] E. Kurniawan, Mujriah, Maulidin, and J. Irmansyah, "The Effectiveness of Traditional Game-Based Physical Literacy Model in Reducing Sedentary Lifestyle among Adolescents," *Int. J. Hum. Mov. Sport. Sci.*, vol. 13, no. 1, pp. 1–9, 2025, doi: 10.13189/saj.2025.130101.

[8] E. O. Hoogendijk, J. Afilalo, K. E. Ensrud, P. Kowal, G. Onder, and L. P. Fried, "Frailty: implications for clinical practice and public health," *Lancet*, vol. 394, no. 10206, pp. 1365–1375, 2019, doi: 10.1016/S0140-6736(19)31786-6.

[9] J. S. Da Silva, Venicius Dantas, Tribess Sheilla, Meneguci, Joilson Sasaki, Jeffer Eidi, Garcia-Meneguci, Cíntia Aparecida, Carneiro, José Ailton Oliveira, Virtuoso, "Association between frailty and the combination of physical activity level and sedentary behavior in older adults," *BMC Public Health*, vol. 19, no. 1, pp. 1–6, 2019, doi: 10.1186/s12889-019-7062-0.

[10] E. Rudnicka, P. Napierała, A. Podfigurna, B. Męczekalski, R. Smolarczyk, and M. Grymowicz, "The World Health Organization (WHO) approach to healthy ageing," *Maturitas*, vol. 139, pp. 6–11, 2020, doi: 10.1016/j.maturitas.2020.05.018.

[11] C. Boulé, Normand G, Weisnagel, S. John Lakka, Timo A.Tremblay, Angelo Bergman, Richard N. Rankinen, Tuomo, Leon, Arthur S. Skinner, James S. Wilmore, Jack H.Rao, D.C.Bouchard, "Effects of Exercise Training on Glucose Homeostasis," *Diabetes Care*, vol. 28, no. 1, pp. 108–114, 2005, doi: 10.2337/diacare.28.1.108.

[12] F. Battista, F. Duregon, M. Vecchiato, A. Ermolao, and D. Neunhaeuserer, "Sedentary lifestyle and physical inactivity: A mutual interplay with early and overt frailty," *Nutr. Metab. Cardiovasc. Dis.*, vol. 35, no. 6, p. 103971, 2025, doi: 10.1016/j.numecd.2025.103971.

[13] L. P. Fried, A. A. Cohen, Q. L. Xue, J. Walston, K. Bandeen-Roche, and R. Varadhan, "The physical frailty syndrome as a transition from homeostatic symphony to cacophony," *Nat. Aging*, vol. 1, no. 1, pp. 36–46, 2021, doi: 10.1038/s43587-020-00017-z.

[14] X. Chen, Jie Ruan, Xixian Fu, Tian Lu, Shiyuan Gill, Dipender He, Zixuan Burgess, Stephen Giovannucci, Edward L.Larsson, Susanna C.Deng, Minzi Yuan, ShuaiLi, "Sedentary lifestyle, physical activity, and gastrointestinal diseases: evidence from mendelian randomization analysis," *eBioMedicine*, vol. 103, p. 105110, 2024, doi: 10.1016/j.ebiom.2024.105110.

[15] M. Izquierdo *et al.*, "Global consensus on optimal exercise recommendations for enhancing healthy longevity in older adults (ICFSR)," *J. Nutr. Heal. Aging*, vol. 29, no. 1, p. 100401, 2025, doi: 10.1016/j.jnha.2024.100401.

[16] C. Schillemans, S. Castelein, K. L. de Vreede, H. J. R. Hoenders, and S. H. Booij, "Assessing physical activity and sedentary behavior in people with mental Illnesses: Do actigraphy and daily self-report measures agree?," *Ment. Health Phys. Act.*, vol. 29, p. 100699, 2025, doi: 10.1016/j.mhpa.2025.100699.

[17] M. Wang and A. R. B. Mohd Shariff, "Promoting Physical Activities: Strategies of Pre-school Teachers in Families and Communities," *Int. J. Hum. Mov. Sport. Sci.*, vol. 12, no. 2, pp. 423–437, 2024, doi: 10.13189/saj.2024.120217.

[18] R. Bendrik, M. Peterson, K. Bröms, M. Emtner, A. H. Ekman, L. V. Kallings, and B. Sundström, "Walking is the form of physical activity people with osteoarthritis in the hip or knee choose and maintain after two years," *Osteoarthritis and Cartilage Open*, vol. 7, no. 4, p. 100681, 2025, doi: 10.1016/j.ocarto.2025.100681.

[19] S. L. Kolasinski *et al.*, "2019 American College of Rheumatology/Arthritis Foundation Guideline for the Management of Osteoarthritis of the Hand, Hip, and Knee," *Arthritis & Rheumatology*, vol. 72, no. 2, 2020, doi: 10.1002/art.41142.

[20] R.R. Bannuru, M.C. Osani, E.E. Vaysbrot, N.K. Arden, K. Bennell, S.M.A. Bierma-Zeinstra, V.B. Kraus, L.S. Lohmander, J.H. Abbott, M. Bhandari, F.J. Blanco, R. Espinosa, I.K. Haugen, J. Lin, L.A. Mandl, E. Moilanen, N. Nakamura, L. Snyder-Mackler, T. Trojian, M. Underwood, T.E. McAlindon, "OARSI guidelines for the non-surgical management of knee, hip, and polyarticular osteoarthritis," *Osteoarthr. Cartil.*, vol. 27, no. 11, pp. 1578–1589, 2019, doi: 10.1016/j.joca.2019.06.011.

[21] A. Spaaij, Ramón Broerse, Jora Oxford, Sarah Luguetti, Carla McLachlan, Fiona McDonald, Brent Klepac, Bojana Lymbery, Lisa Bishara, Jeffrey Pankowiak, "Sport, Refugees, and Forced Migration: A Critical Review of the Literature," *Front. Sport. Act. Living*, vol. 1, Article 47, 2019, doi: 10.3389/fspor.2019.00047.

[22] Simon Rosenbaum, Anna Farello, Kathleen Latimer, Davy Vancampfort, Peter Ventevogel, Justin Richards, Ajwang' Warria, Alastair Ager, Maria Bray, Leslie Snider, Sabrina Hermosilla, Jadranka Stikovac Clark, Jojo Ferris, Gülşah Kurt, "Implementing sport and physical activity across each layer of the mental health and psychosocial support (MHPSS) pyramid for populations affected by displacement," *Ment. Health Phys. Act.*, vol. 29, p. 100701, 2025, doi: 10.1016/j.mhpa.2025.100701.

[23] J. Tian, W. Deng, and J. Yuan, "Evaluation of sports tourism competitiveness of urban agglomerations in Guangdong-Hong Kong-Macao Greater Bay Area," *Heliyon*, vol. 9, no. 12, p. e22780, 2023, doi: 10.1016/j.heliyon.2023.e22780.

[24] J. Kosmaczewska, "Should I stay or should I go out? Leisure and tourism consumption of geocachers under the existence of COVID restrictions and economic uncertainty in Poland," *Ann. Leis. Res.*, vol. 27, no. 1, pp. 105–123, 2024, doi: 10.1080/11745398.2022.2070515.

[25] Y. Zhang, X. Jin, R. Liu, Y. Wang, and Y. Jing, "Spatio-temporal variation and influencing factors of aero-sports tourism internet attention in Shaanxi Province, China," *Heliyon*, vol. 10, no. 14, p. e34246, 2024, doi: 10.1016/j.heliyon.2024.e34246.

[26] B. Berliana *et al.*, "The Benefits of Public Sports Facilities as Sport Tourism in Indonesia," *Int. J. Hum. Mov. Sport.*

Sci., vol. 12, no. 2, pp. 315–325, 2024, doi: 10.13189/saj.2024.120206.

[27] R. E. Gearing, N. El-Bassel, A. Ghesquiere, S. Baldwin, J. Gillies, and E. Ngeow, "Major ingredients of fidelity: A review and scientific guide to improving quality of intervention research implementation," *Clin. Psychol. Rev.*, vol. 31, no. 1, pp. 79–88, 2011, doi: 10.1016/j.cpr.2010.09.007.

[28] C. Carroll, M. Patterson, S. Wood, A. Booth, J. Rick, and S. Balain, "A conceptual framework for implementation fidelity," *Implement. Sci.*, vol. 2, no. 1, pp. 1–9, 2007, doi: 10.1186/1748-5908-2-40.

[29] L. L. Hardy, M. L. Booth, and A. D. Okely, "The reliability of the Adolescent Sedentary Activity Questionnaire (ASAQ)," *Prev. Med. (Baltim).*, vol. 45, no. 1, pp. 71–74, 2007, doi: 10.1016/j.ypmed.2007.03.014.