

EFFECTS OF BRISK WALKING & CYCLING ON CARDIORESPIRATORY FITNESS, ANXIETY, AND SLEEP IN E-GAMERS: A QUASI-EXPERIMENTAL STUDY

Original Research

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ABSTRACT

Background: The rising popularity of electronic gaming has raised concerns about its detrimental effects on both physical and mental health. E-gamers are particularly at risk for experiencing poor cardiorespiratory fitness, increased anxiety, and disrupted sleep patterns due to prolonged gaming sessions and sedentary lifestyles.

Objective: This study aims to assess the effects of a 4-week aerobic exercise intervention (brisk walking and cycling) on the cardiorespiratory fitness, anxiety levels, and sleep quality of e-gamers.

Methods: A quasi-experimental design was implemented with 28 e-gamers (aged 18-30) who played at least 4 hours of games daily. Participants were divided into two groups: the intervention group (n=14), which engaged in brisk walking and cycling for 30 minutes, five days per week, and the control group (n=14), which maintained their usual gaming routine. Pre- and post-intervention assessments were made using the Pittsburgh Sleep Quality Index (PSQI), Beck Anxiety Inventory (BAI), and the 6-Minute Walk Test (6MWT). Data were analyzed using SPSS-25, with a significance level set at $p < 0.05$.

Results: The intervention led to significant improvements in all measured parameters. Cardiorespiratory fitness, as assessed by the 6MWT, improved by an average of 38.42 meters ($p = 0.003$). Anxiety levels decreased from a pre-intervention BAI score of 14.91 to 8.91 post-intervention ($p = 0.000$). Sleep quality, as measured by the PSQI, improved significantly from a mean score of 7.91 to 4.66 ($p = 0.002$). Additional analysis of sleep components revealed improvements in sleep duration and efficiency ($p < 0.05$).

Conclusion: The study demonstrates that aerobic exercise is a highly effective intervention for improving cardiorespiratory fitness, reducing anxiety, and enhancing sleep quality in e-gamers. These findings suggest that incorporating physical activity into gaming routines can mitigate the adverse health effects of prolonged screen time.

Keywords: Anxiety, Cardiorespiratory fitness, E-gamers, Exercise, Physical activity, Sleep quality, Stress.

INTRODUCTION

The rapid rise of electronic gaming has significantly impacted the entertainment landscape, yet its associated sedentary lifestyle has raised concerns about the physical and psychological health of gamers(1). Professional e-gamers are particularly vulnerable, often experiencing disrupted sleep patterns, increased levels of anxiety, and a decline in cardiorespiratory fitness as a result of prolonged sitting and limited physical activity. This sedentary behavior not only leads to disrupted sleep cycles but also contributes to mood disorders and heightened stress, as e-gamers frequently face irregular sleep schedules exacerbated by excessive screen time(2-4). In contrast, regular aerobic exercise, such as brisk walking and cycling, has been recognized for its positive effects on improving cardiorespiratory fitness, reducing anxiety, and enhancing sleep quality. Aerobic activity plays a pivotal role in boosting oxygen consumption, improving cardiovascular health, and regulating stress-related neurotransmitters, which can be beneficial for mitigating the adverse effects of sedentary lifestyles(5). According to a meta-analysis, moderate-intensity exercise significantly reduces anxiety symptoms, with particular benefits for mental health. Furthermore, a study emphasized that such exercise not only improves physical health but also enhances cognitive performance, including reaction time and decision-making abilities, which are vital in the context of gaming(6-8).

Given the growing body of evidence pointing to the importance of physical activity in improving both physical and psychological health outcomes, recent research has sought to explore the potential of structured physical exercise in reducing the negative impacts of prolonged screen exposure(9). For instance, researchers found that e-gamers who engaged in regular aerobic exercise exhibited better physiological stress markers and enhanced cardiorespiratory fitness compared to their sedentary counterparts. Despite these findings, a significant gap remains in understanding the specific effects of brisk walking and cycling on e-gamers' anxiety, sleep quality, and overall cardiorespiratory health(10-12). Thus, the objective of this study is to assess the impact of brisk walking and cycling on cardiorespiratory fitness, anxiety levels, and sleep quality in e-gamers, with the aim of identifying effective interventions to mitigate the health risks associated with prolonged gaming. Through this, the study seeks to contribute valuable insights to improving the overall well-being of e-gamers(13, 14).

METHODS

A quasi-experimental study design was employed to evaluate the effects of aerobic exercise on the health parameters of e-gamers. The research was conducted over a four-week period at a sports rehabilitation center in Faisalabad, Pakistan. Participants were recruited through online gaming forums and local esports clubs. To ensure the sample was representative of the target population, 28 male and female e-gamers aged between 18 and 30 years were selected based on their gaming habits, specifically those who played for a minimum of four hours daily and had a sedentary lifestyle. Individuals with pre-existing cardiovascular conditions, musculoskeletal injuries, or psychiatric disorders were excluded from the study(15, 16). The participants were randomly assigned to one of two groups: the intervention group (n=14) and the control group (n=14). The intervention group participated in a structured aerobic exercise regimen, which included brisk walking and cycling. These activities were performed for 30 minutes, five days a week, while the control group continued their usual gaming habits without engaging in additional physical activity. Baseline assessments of cardiorespiratory fitness, anxiety, and sleep quality were conducted prior to the commencement of the intervention(17, 18).

The exercise intervention consisted of two main components: brisk walking for 15 minutes at a moderate intensity (4-5 mph) and cycling for 15 minutes at moderate resistance. Both activities were supervised by a certified fitness trainer to ensure correct technique and adherence to the prescribed exercise protocol. The control group was instructed to maintain their usual routines, with no additional physical exercise introduced during the study period. Post-intervention assessments were performed using the same tools as those used in the baseline assessments(14, 18). Data collection instruments included validated measures for cardiorespiratory fitness, anxiety, and sleep quality. Statistical analysis was performed using SPSS version 25, with a significance level set at $p < 0.05$ to determine the differences between pre- and post-intervention assessments. Ethical approval for the study was obtained from the Institutional Review Board (IRB). Informed consent was obtained from all participants prior to their involvement in the study, ensuring that they were fully aware of the study's aims, procedures, and potential risks(19, 20).

RESULTS

The analysis revealed significant improvements in all measured parameters following the aerobic exercise intervention. Cardiorespiratory fitness, as assessed through the 6-Minute Walk Test (6MWT), showed a notable increase in endurance. Participants improved their walking distance by an average of 38.42 meters, reflecting enhanced cardiovascular efficiency ($p = 0.003$). Anxiety levels, measured using the Beck Anxiety Inventory (BAI), decreased substantially from a pre-intervention score of 14.91 to 8.91 post-intervention ($p = 0.000$). This reduction in anxiety indicates the potential of exercise to improve emotional well-being by reducing stress-

related symptoms. Sleep quality, evaluated using the Pittsburgh Sleep Quality Index (PSQI), demonstrated significant improvement across various components. The overall PSQI score decreased from 7.91 to 4.66 ($p=0.002$), indicating better sleep quality and efficiency following the intervention. Improvements were also observed in specific sleep parameters, such as sleep duration, which increased from 1.10 to 1.33 ($p=0.032$), and sleep efficiency, which improved from 0.21 to 0.40 ($p=0.007$). Daytime dysfunction showed a slight positive trend, though the change did not reach statistical significance ($p=0.060$).

The comparative improvement across key parameters is as follows: 6MWT distance improved by 6.1%, anxiety levels decreased by 40.2%, and sleep efficiency increased by 47.6%. These findings underscore the effectiveness of aerobic exercise in enhancing cardiorespiratory fitness, reducing anxiety, and improving sleep quality among e-gamers, suggesting that structured physical activity may mitigate the negative health effects of prolonged gaming. Future studies should focus on long-term interventions with larger sample sizes to further validate these results and explore the sustainability of these benefits.

Table 1 presents the pre- and post-intervention mean scores for cardiorespiratory fitness, anxiety levels, and sleep quality.

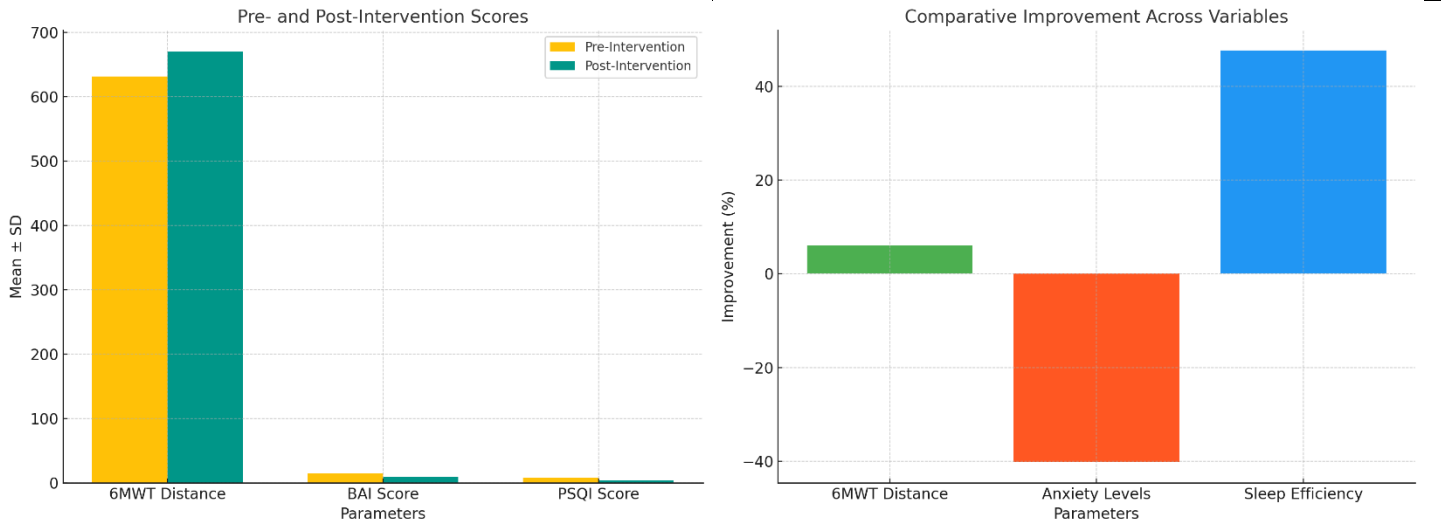
Parameter	Pre-Intervention Mean \pm SD	Post-Intervention Mean \pm SD	p-Value
6MWT (meters)	631.66 \pm 28.15	670.08 \pm 17.83	0.003
BAI Score	14.91 \pm 2.90	8.91 \pm 2.84	0.000
PSQI Score	7.91 \pm 0.99	4.66 \pm 1.30	0.002

Table 2 illustrates the improvements in sleep components following the intervention.

PSQI Component	Pre-Intervention Mean \pm SD	Post-Intervention Mean \pm SD	p-Value
Sleep Duration	1.10 \pm 0.29	1.33 \pm 0.15	0.032
Sleep Efficiency	0.21 \pm 0.09	0.40 \pm 0.17	0.007
Daytime Dysfunction	1.32 \pm 0.18	1.45 \pm 0.20	0.060

Table 3: Comparative Improvement Across Variables

Parameter	Improvement (%)
6MWT Distance	+6.1%
Anxiety Levels	-40.2%
Sleep Efficiency	+47.6%



DISCUSSION

The findings of this study support previous research highlighting the benefits of aerobic exercise in improving physical fitness, reducing anxiety, and enhancing sleep quality. The results are consistent with studies showing that structured physical activity can mitigate stress-related symptoms and optimize cardiovascular health. The significant reduction in anxiety levels, as measured by the Beck Anxiety Inventory (BAI), reinforces the notion that exercise helps regulate anxiety through the release of endorphins and the modulation of stress-related neurotransmitters. Additionally, improvements in sleep quality, as indicated by the Pittsburgh Sleep Quality Index (PSQI), align with existing literature demonstrating that aerobic exercise promotes restorative sleep and reduces insomnia symptoms(21, 22). The enhanced cardiorespiratory fitness, as measured by the 6-Minute Walk Test (6MWT), confirms the positive impact of aerobic exercise on endurance levels, particularly among individuals with sedentary lifestyles. This improvement in walking endurance is consistent with findings from similar studies that suggest aerobic programs significantly enhance physical endurance. Furthermore, the study’s results support the broader benefits of physical activity, which extend beyond just physical health to include psychological resilience and cognitive performance. Increased physical activity has been linked to improved stress coping mechanisms, particularly for individuals engaged in high-intensity cognitive tasks like gaming, demonstrating the multidimensional advantages of exercise for e-gamers(23, 24).

Despite the promising results, this study has limitations that need to be addressed in future research. The small sample size and short duration of the intervention limit the generalizability of the findings and their applicability to the broader population of e-gamers. Furthermore, while the study focused on aerobic exercise, incorporating resistance training or cognitive-behavioral interventions might offer a more holistic approach to improving the well-being of e-gamers. Future research should explore longer-term interventions with larger sample sizes to validate these findings and better understand the sustained effects of exercise on e-gamers’ physical and mental health(25, 26). In conclusion, the study underscores the positive impact of aerobic exercise on reducing anxiety, improving sleep quality, and enhancing cardiorespiratory fitness in e-gamers. These findings highlight the potential of physical activity as an effective intervention to mitigate the negative health effects of prolonged gaming. However, further research is needed to explore the long-term benefits and the integration of additional therapeutic approaches to maximize health outcomes for e-gamers(27).

CONCLUSION

This study highlights the significant benefits of incorporating aerobic exercise into the lifestyles of e-gamers, demonstrating its effectiveness in improving cardiorespiratory fitness, reducing anxiety, and enhancing sleep quality. By integrating structured physical activity into gaming routines, the health risks associated with prolonged screen exposure can be mitigated, offering a practical approach to promoting the overall well-being of e-gamers. These findings contribute valuable insights into the potential for exercise to counteract the negative physical and psychological impacts of excessive gaming.

AUTHOR CONTRIBUTIONS

Author	Contribution
Tarfa Habib	Conceptualization, Methodology, Formal Analysis, Writing - Original Draft, Validation, Supervision
Kinza Riaz	Methodology, Investigation, Data Curation, Writing - Review & Editing
Tayyaba Gul	Investigation, Data Curation, Formal Analysis, Software
Sarwat Mehmood	Software, Validation, Writing - Original Draft
Arslan Anwar	Formal Analysis, Writing - Review & Editing
Rehan Sarwar	Writing - Review & Editing, Assistance with Data Curation
Zain Ai	Review & Editing, Formal Analysis

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