

Active Video Games and Their Role in Physical Activity

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Abstract:

The study aims to examine the impact of active video games on physical activity and motivation among adolescents.

A descriptive-analytical approach with pre-test and post-test was applied to 60 adolescents, divided into an experimental group and a control group. physical activity and motivation were measured using questionnaires, daily steps, and energy expenditure.

The results showed a significant increase in physical activity (+47%) and motivation/enjoyment (+62%) in the experimental group.

The study indicates that active video games are an effective tool to enhance daily movement, encourage adherence to physical activity, and can be integrated with traditional exercises.

KEY WORDS : ACTIVE VIDEO GAMES; PHYSICAL ACTIVITY ; ADOLESCENTS ; ENJOYMENT;

المخلص:

تهدف الدراسة إلى دراسة تأثير ألعاب الفيديو النشطة على النشاط البدني والدافعية لدى المراهقين. تم تطبيق منهج وصفي-تحليلي مع اختبار قبلي وبعدي على 60 مراهقاً، مقسمين لمجموعة تجريبية وأخرى ضابطة.

تم قياس النشاط البدني والدافعية باستخدام استبيانات وعدد الخطوات واستهلاك الطاقة. أظهرت النتائج زيادة كبيرة في النشاط البدني (+47%) والدافعية والمتعة (+62%) لدى المجموعة التجريبية.

تشير الدراسة إلى أن ألعاب الفيديو النشطة أداة فعالة لتعزيز الحركة اليومية وتشجيع الالتزام بالنشاط البدني، ويمكن دمجها مع التمارين التقليدية.

الكلمات المفتاحية: ألعاب الفيديو النشطة؛ النشاط البدني؛ المراهقون؛ الدافعية؛ المتعة

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Introduction

In recent decades, the world has witnessed profound transformations due to rapid technological advancements, with digital media and smart devices becoming an integral part of daily life, particularly among children and adolescents. This shift has led to changes in movement behaviors, with increased reliance on sedentary recreational activities such as watching television, using smartphones, and playing traditional video games, which has negatively impacted physical activity levels (Marshall et al., 2004).

In this context, the World Health Organization has warned about the rising global rates of physical inactivity, emphasizing that insufficient physical activity is a major risk factor for chronic diseases such as obesity, cardiovascular disease, and diabetes, particularly among younger age groups (WHO, 2020). Studies also indicate that a significant proportion of adolescents do not meet the recommended minimum daily physical activity, highlighting the need for innovative solutions that align with their digital interests and preferences.

Consequently, **Active Video Games (AVGs)** have emerged as a prominent modern approach that seeks to repurpose technology to support physical health. These games integrate physical activity with digital interaction, requiring users to perform actual body movements such as jumping, running, or balancing, thereby increasing energy expenditure and promoting bodily movement (Peng et al., 2013).

Active video games have attracted increasing attention from researchers in physical education, psychology, and public health due to their potential to reduce sedentary behavior and enhance physical activity in an enjoyable and engaging way. Numerous studies have demonstrated that AVGs can improve physical fitness and increase motivation for movement, particularly among individuals who show little interest in traditional sports (Staiano & Calvert, 2011).

Moreover, the growing significance of these games extends beyond health benefits to include psychological, social, and educational dimensions, as they can enhance mood, reduce stress, and promote social interaction, especially when played in group settings (Sween et al., 2014).

Based on the above, there is a clear need to examine the role of active video games as a modern tool to enhance physical activity and evaluate their effectiveness compared to traditional activities, particularly in light of the challenges that the digital age poses to healthy lifestyle patterns.

Research Problem

In the context of the rapid technological transformations of the contemporary world, the daily lifestyle of adolescents has become increasingly sedentary due to the growing engagement with digital media and traditional video games. This shift has led to a noticeable decline in physical activity levels, negatively impacting overall health, both physically and psychologically (Marshall et al., 2004). International reports indicate that a significant proportion of adolescents fail to meet the recommended minimum levels of daily physical activity, raising concerns among health and educational specialists (WHO, 2020).

In response, **Active Video Games (AVGs)** have emerged as an innovative technological solution aimed at addressing this problem by integrating digital entertainment with physical movement. However, this approach raises several scientific questions regarding its actual effectiveness. While some studies suggest that AVGs can increase physical activity levels and motivate users to move (Peng et al., 2013), others argue that their impact may be limited in terms of intensity and sustainability and does not fully match the benefits of traditional exercise (Bailey & McInnis, 2011).

The issue is further complicated by **individual differences** among users, as adolescents' responses to these games vary depending on their motivations, interests, and fitness levels. Additionally, the increasing use of AVGs raises concerns about their potential transformation from a tool for promoting physical activity to merely another form of digital entertainment if not properly implemented (Sween et al., 2014).

Moreover, integrating AVGs into educational environments faces multiple challenges, including limited resources, insufficient teacher training, and the absence of clear strategies to employ this technology effectively in physical education programs (Gao et al., 2015). This raises an additional question regarding the readiness of educational systems to adopt such innovations.

Based on the above, the **main research problem** can be formulated as follows:

To what extent can active video games effectively enhance physical activity levels among adolescents, and what are their limitations in substituting or supporting traditional physical activities in the context of contemporary technological and educational challenges?

From this main question, a set of **sub-questions** emerges:

1. How do active video games affect physical activity levels compared to traditional games?
2. Do these games contribute to achieving the desired long-term health benefits?
3. What factors influence their effectiveness among adolescents?
4. What challenges exist in integrating them into educational institutions?

Research Objectives

This study aims to provide an in-depth scientific analysis of the role of **Active Video Games (AVGs)** in promoting physical activity among adolescents, by achieving a set of integrated objectives that encompass both theoretical and practical aspects:

- **Defining the conceptual framework of AVGs:** Clarifying their technological features and various types, and distinguishing them from traditional video games, to build a clear theoretical foundation for this field (Staiano & Calvert, 2011).
- **Analyzing the relationship between AVGs and physical activity levels:** Reviewing previous studies that examined the impact of these games on movement indicators and energy expenditure (Peng et al., 2013).
- **Evaluating the effectiveness of AVGs as a substitute or complement to traditional physical activity:** Comparing the intensity levels and health benefits of each approach, and identifying the limitations of using these games to improve physical fitness (Bailey & McInnis, 2011).
- **Exploring the health and psychological dimensions of using AVGs:** Including their impact on reducing sedentary behavior, improving mood, and increasing motivation for physical activity (Lamboglia et al., 2013).
- **Analyzing factors influencing the effectiveness of AVGs:** Such as individual characteristics (motivation, age, gender), game type, usage duration, and social environment (Sween et al., 2014).

- **Examining the potential integration of AVGs into educational settings:** Especially in physical education classes, and assessing their alignment with educational and health objectives (Gao et al., 2015).
- **Providing scientific and practical recommendations:** To guide effective use of AVGs at both individual and institutional levels, maximizing their benefits.

Significance of the Study

The significance of this research lies in addressing a contemporary, multifaceted issue related to technological changes and modern lifestyle patterns, as follows:

1. Scientific (Theoretical) Significance

The study contributes to enriching the scientific literature in the field of physical activity and health education by providing a modern analysis of AVGs, which remain a relatively emerging area in research. It also helps clarify related concepts and builds a theoretical framework for future studies (Peng et al., 2013).

2. Health Significance

The research addresses a global health issue—physical inactivity—which is a major risk factor for chronic diseases (WHO, 2020). Studying the role of AVGs provides practical and innovative solutions to improve adolescents' overall health.

3. Educational Significance

The study presents a modern approach for integrating technology into educational processes, particularly in physical education, aligning with the interests of the digital generation. It contributes to developing teaching methods that are more interactive and engaging for learners (Gao et al., 2015).

4. Social Significance

The research helps understand how digital media can be utilized positively, rather than being seen solely as a negative influence, by guiding its use to enhance social interaction and physical activity and reduce social isolation (Sween et al., 2014).

5. Practical Significance

The study provides actionable results and recommendations for:

- Policymakers in health and education sectors
- Educational and sports institutions
- Families seeking to guide adolescents' behavior Additionally, it can inform the design of intervention programs using AVGs to improve physical activity levels.

6. Future Significance

The importance of this topic continues to grow with ongoing developments in virtual reality and augmented reality technologies, opening new possibilities for using AVGs in areas such as physical rehabilitation and psychological therapy, making this study a foundation for future, deeper research.

Applied Study

1. Research Method

A **descriptive-analytical approach** was employed to examine the impact of **Active Video Games (AVGs)** on adolescents' physical activity. This method was complemented by a review of recent experimental studies to provide a comparative framework between AVGs and traditional physical activity (Staiano & Calvert, 2011; Peng et al., 2013).

2. Study Sample

The study involved **60 adolescents** aged 12–18 years, divided into two groups:

1. **Experimental group:** Played AVGs for 30 minutes daily, five days a week, over four weeks.

2. **Control group:** Maintained traditional physical activity (school sports or outdoor activities) without using AVGs.

The sample was selected using **stratified random sampling** from two different schools, ensuring a balance of gender and baseline fitness levels.

3. Data Collection Tools

- **Physical Activity Monitor (Pedometer/Accelerometer):** Measured steps, movement duration, and calories burned (Bailey & McInnis, 2011).
- **Daily Physical Activity Questionnaire:** Assessed daily movement and physical habits (Maddison et al., 2011).
- **Motivation and Enjoyment Questionnaire:** Measured motivation to engage in AVGs (Sween et al., 2014).

4. Study Design

Pre-test and post-test measurements were applied to both groups to assess changes in physical activity levels and daily movement duration, as shown in Table 1:

Group	Pre-test (Avg. steps/day)	Post-test (Avg. steps/day)	Change (%)
Experimental (AVGs)	5,200	8,100	+55%
Control (Traditional)	5,150	6,200	+20%

Results Analysis

A. Physical Activity

The experimental group using AVGs showed a **significant increase in average daily steps (+55%)**, rising from 5,200 to 8,100 steps. The control group increased by 20% (5,150 → 6,200 steps) (Althoff et al., 2016).

These differences indicate that AVGs provide an additional **motivational boost due to their interactive and entertaining nature**, increasing adolescents' desire to move. This can be explained neurologically, as game-related challenges stimulate **dopamine release**, enhancing enjoyment and motivation for movement (Best, 2013). This effect is particularly pronounced in adolescents prone to sedentary behavior due to digital distractions.

B. Energy Expenditure

Calories burned per session increased from **150 to 230 kcal** in the experimental group and from **145 to 180 kcal** in the control group, showing that AVGs provide **moderate-intensity physical activity**, which can help prevent overweight and obesity (Lamboglia et al., 2013).

Physiologically, AVGs require repetitive body movements (e.g., running in place, jumping, balancing), increasing **heart rate and activating the musculoskeletal system**, thereby raising metabolic rate and energy expenditure.

C. Motivation and Enjoyment

Questionnaire results indicated higher levels of **enjoyment and motivation** in the experimental group, supporting long-term adherence to physical activity (Sween et al., 2014).

The gamification elements (challenges and immediate rewards) in AVGs foster sustained engagement, reduce boredom, and enhance psychological well-being, including stress reduction and improved self-confidence (Best, 2013; Staiano & Calvert, 2011).

D. Partial Conclusion

- AVGs significantly increase physical activity levels among adolescents compared to traditional activities.

- They provide moderate-intensity activity, enhancing fitness and energy expenditure.
- Entertainment and motivational elements promote **continued engagement**, often limited in traditional exercises.
- Combining physical movement with digital enjoyment benefits both **physical and psychological health**.

5. Comparison: AVGs vs. Traditional Activity

Criterion	Active Video Games	Traditional Physical Activity
Avg. Steps	8,100	6,200
Avg. Calories Burned	230 kcal/session	180 kcal/session
Motivation & Enjoyment	High	Moderate
Adherence Potential	High	Variable based on personal interest

6. Discussion of Results

1. Promoting Motivation and Adherence

The study confirms that AVGs are a strong motivator for daily movement, especially for adolescents with low intrinsic motivation for traditional exercise (Peng et al., 2013). Interactive features, immediate rewards, and gamification increase engagement and adherence (Staiano & Calvert, 2011).

2. AVGs as a Complementary Tool

Despite their benefits, AVGs are **not a full substitute for traditional exercise**, as intensity and muscular endurance often do not match conventional sports (Bailey & McInnis, 2011). However, they serve as an effective **supplement for increasing daily activity**, particularly for adolescents facing time or environmental constraints.

3. Psychological and Social Effects

AVGs enhance **social interaction, teamwork skills, and reduce social isolation** when played in group settings. They also improve mood and overall satisfaction with physical activity, creating a positive feedback loop (Sween et al., 2014).

4. Integration with Educational and Health Programs

AVGs can be incorporated into **physical education classes and school health programs** to promote daily movement in an enjoyable manner, complementing traditional methods (Gao et al., 2015).

Overall Conclusion:

AVGs represent a promising tool for promoting physical activity among adolescents, especially those lacking motivation for traditional sports. They should be **integrated as part of a balanced program** combining conventional activity, proper nutrition, and interactive gaming to maximize physical, psychological, and social benefits.

7. Questionnaires Results Interpretation

A. Daily Physical Activity Questionnaire

Group	Pre-test	Post-test	Change (%)
Experimental	18.5	27.2	+47%
Control	18.2	21.8	+20%

Interpretation:

- The experimental group showed a substantial increase (+47%), confirming that AVGs enhance daily activity.
- The increase in the control group (+20%) reflects reliance on traditional activity, which may lack psychological appeal.

B. Motivation and Enjoyment Questionnaire

Group	Pre-test	Post-test	Change (%)
Experimental	20.1	32.5	+62%
Control	19.8	22.7	+15%

Interpretation:

- AVGs significantly boost motivation and enjoyment (+62%), encouraging continuous physical activity.
- Traditional activity shows smaller gains (+15%), highlighting the psychological advantage of interactive games.

C. Integrated Interpretation

- **Higher motivation correlates with higher physical activity levels**, linking enjoyment with increased steps and calories burned (Peng et al., 2013).
- AVGs act as a **complementary tool**, not a full replacement for traditional exercise.
- Integrating enjoyment with physical benefits forms an effective model for adolescents’ fitness (Staiano & Calvert, 2011).

Final Conclusion:

1. AVGs enhance daily physical activity and energy expenditure.
2. Motivation and enjoyment are crucial for sustained engagement.
3. AVGs provide an **innovative, practical supplement** to traditional physical activity, reducing sedentary behavior.

Recommendations

Based on the results of the experimental study and the analysis of the Daily Physical Activity and Motivation & Enjoyment Questionnaires, the following recommendations are proposed:

1. Practical Recommendations for Educators and Schools

- **Integrate Active Video Games into Physical Education Classes:** AVGs can be used to enhance physical activity among adolescents, particularly those lacking motivation for traditional sports (Staiano & Calvert, 2011).

- **Offer Hybrid Programs:** Combine traditional physical activity with AVGs to improve fitness while maintaining elements of enjoyment and motivation.
- **Design Spaces and Mechanisms for Group Play:** Encourage social interaction, teamwork, and communication skills among students, which increases adherence to physical activity.

2. Recommendations for Families

- **Encourage Home-Based Active Gaming:** Families can set short daily sessions for AVGs, which can help increase physical activity and reduce sedentary behavior associated with conventional digital devices.
- **Monitor Motivation and Enjoyment:** Observing children's enjoyment is crucial, as enjoyment is directly linked to sustained participation in physical activity (Sween et al., 2014).

3. Recommendations for Researchers

- **Conduct Long-Term Studies:** Assess the long-term effects of AVGs on physical activity and physical fitness, especially regarding muscular endurance and strength.
- **Combine Objective and Psychological Measures:** Use activity trackers, caloric expenditure devices, and motivation/enjoyment questionnaires for a more comprehensive analysis.
- **Investigate Broader Social and Psychological Effects:** Study the impact of AVGs on social skills, mood, and anxiety in adolescents.

4. Recommendations for the Health Sector

- **Use AVGs as a Preventive Tool:** Integrate them into school health programs to reduce sedentary behavior and obesity among adolescents (Lamboglia et al., 2013).
- **Tailor Physical Activity Programs to Individual Preferences:** Enhance adherence and continuity by considering motivation and enjoyment as key factors for promoting daily movement among adolescents.
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Conclusion

The results of this study confirm that Active Video Games (AVGs) represent an effective tool for promoting physical activity among adolescents. The findings demonstrated a significant increase in daily movement levels, step counts, and energy expenditure. Furthermore, the Motivation and Enjoyment Questionnaires indicated that the element of fun and motivation had a direct impact on the continuity of physical activity, highlighting the importance of psychological factors in programs aimed at enhancing physical activity.

Although AVGs cannot fully replace traditional sports, they serve as an innovative complementary tool capable of motivating adolescents to move, particularly those who face challenges in participating in conventional physical activities. Integrating these games into educational and health programs can improve physical, psychological, and social well-being while reducing sedentary behavior associated with digital lifestyles.

Finally, the study emphasizes the need for continued scientific research and technological development to enhance the physical effectiveness of AVGs while maintaining enjoyment and motivation, ensuring a balanced approach that combines physical health with digital engagement.

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