HALAMAN OLAHRAGA NUSANTARA (HON)
Jurnal Ilmu Keolahragaan

Volume 5 No II
Tahun 2022

ISSN 2614-2775 (Print)
ISSN 2621-8143 (Online)

GAME ONLINE HACK (LITERATURE REVIEW): THE IMPACT OF ONLINE GAMES ON THE PHYSICAL FITNESS OF STUDENTS AGED 13-17 YEARS

Hezron Alhim Dos Santos[1], Maria Herlinda Dos Santos[2], Arisman[3], Endang Pratiwi[4], Rahmat Ilahi[5]

Universitas Negeri Makassar[1], Universitas Muhammadiyah Bone[2,5], Universitas Negeri Jakarta[3], Universitas Islam Kalimantan Muhammad Arsyad Al Banjari Banjarmasin[4]
hezronsantos@unm.ac.id[1], mariaherlinda@unimbone.ac.id[2], arisman.900225@gmail.com[3], pratiwiendang@uniska-bjm.ac.id[4], rahmatilahi@unimbone.ac.id[5]

Abstract
The advancement of technology has significantly impacted teenagers' lifestyles, particularly in terms of physical activity and fitness. One notable phenomenon is the increasing number of students aged 13-17 who spend hours playing online games. This study aims to review the impact of online gaming on teenagers' physical fitness based on various existing studies. Using a literature review method, this article examines research findings related to decreased physical activity, increased risk of obesity, and the psychological and social effects associated with online gaming habits.

Keywords: *Cyber, Physical Inactivity, Gamified Sedentarism*

Submitted : 29th of March 2022
Accepted : 25th of July 2022
Published : 26th of July 2022
Correspondence Author: Hezron Alhim Dos Santos, Universitas Negeri Makassar, Indonesia.
E-Mail: hezronsantos@unm.ac.id

DOI http://dx.doi.org/10.31851/hon.v5i2.18273

INTRODUCTION

Online games have become an integral part of modern teenagers' lives. With the development of information and communication technology, access to online games has become easier, whether through computers, consoles, or mobile devices (Barr, 2018). Various genres of online games, such as multiplayer online battle arena (MOBA), role-playing games (RPG), first-person shooter (FPS), and battle royale, attract the interest of millions of teenagers around the world (Han et al., 2020). Online games provide an immersive gaming experience with realistic graphics, interesting storylines, and social features that allow players to interact

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with other players from various countries (Carter et al., 2016). However, behind its appeal, there are concerns about its impact on physical fitness, especially in the adolescent age group . Adolescents are a group that is experiencing rapid growth, both physically and mentally (Lai et al., 2018), so their daily activity patterns will greatly affect their long-term health.

In the context of physical fitness, physical activity plays an important role in maintaining body health, improving cardiovascular endurance, and preventing various diseases such as obesity and type 2 diabetes. According to the World Health Organization (WHO) in (Chaput et al., 2020), children and adolescents aged 5 to 17 years are advised to do moderate to high intensity physical activity for at least 60 minutes per day. However, studies show that excessive online gaming habits can lead to a drastic decrease in physical activity (Dos Santos et al., 2021).

One of the main reasons why online games have a negative impact on physical fitness is their sedentary nature (Lai et al., 2018). Many online games require players to sit for long periods of time, which ultimately reduces the time that should be used for physical activity. A study conducted by (Tremblay et al., 2011) showed that increased screen time was directly related to decreased levels of physical fitness and increased risk of metabolic diseases in adolescents.

In addition, online games also often change teenagers' sleep patterns. Many students play games until late at night, which causes lack of sleep and fatigue during the day. Lack of sleep can reduce motivation to exercise, slow down the body's metabolism, and contribute to weight gain. A study by (Agostini & Centofanti, 2021) found that using digital devices before bed can inhibit the production of melatonin, a hormone that regulates the sleep cycle, resulting in chronic sleep disorders in adolescents. In addition to physical factors, psychological aspects also need to be considered when discussing the impact of online games on physical fitness. Online games have mechanisms designed to keep players coming back to play, such as reward systems, level-ups, and periodic

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events. This can lead to addiction, where players feel compelled to continue playing for long periods of time(Han et al., 2020). This dependency can reduce interest in physical activity and even replace real-world social activities, such as playing outdoors or participating in school sports.

However, not all impacts of online games on physical fitness are negative (Carter et al., 2016). Some types of games based on augmented reality (AR) or virtual reality (VR) technology can actually increase players' physical activity. For example, games like Pokémon GO encourage players to walk more, while VR-based games like Beat Saber involve body movements that can provide fitness benefits (Han et al., 2020). In addition, some sports-based games, such as FIFA and NBA 2K, can also increase adolescents' interest in real-world sports, although this effect still needs further research.

In this study, we reviewed published studies on the impact of online gaming on physical fitness in students aged 13-17 years. The main focus of this review is how online gaming affects physical activity levels, obesity risk, sleep patterns, and mental health related to gaming habits. By understanding these impacts, it is hoped that solutions and recommendations can be found to help adolescents manage their gaming time in a balanced way, so that they can still enjoy the benefits of technology without sacrificing their physical fitness.

METHOD

This study uses a literature review method by reviewing various scientific journals, academic articles, and research reports relevant to the topic of the impact of online games on physical fitness of students aged 13-17 years. The sources used include studies from the fields of health, psychology, and education.

RESULT AND DISCUSSION

Decreased Physical Activity

Several studies have shown that students who frequently play online games tend to reduce their daily physical activity. A study by (Tremblay et al., 2011) found that excessive screen time was associated with decreased physical

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activity and increased sedentary lifestyles, which may contribute to decreased physical fitness.

Online games are generally played in a sitting position for long periods of time. A Study at 2020 In many cases, teenagers who are addicted to online games prefer to spend time in front of the screen rather than doing physical activities such as playing outdoors, participating in extracurricular activities (Suthar & Arts, 2020), or exercising . As a result, the time that should be used to improve physical fitness is drastically reduced.

Research by (Schmidt et al., 2020) found that children and adolescents who spent more than two hours per day playing games experienced a 30% decrease in physical activity levels. They were also more likely to experience decreased cardiovascular endurance due to lack of aerobic exercise. In addition, WHO in (Kawi et al., 2019) noted that lack of physical activity increases the risk of chronic diseases such as obesity, type 2 diabetes, and heart disease at an early age .

In addition, decreased physical activity due to playing online games also has an impact on muscle strength. Most online games only involve hand and finger movements, so that large muscles in the body such as the legs, back, and abdomen do not get enough exercise. A study by (Comeras-Chueca et al., 2021) showed that physically active adolescents had better muscle mass compared to those who spent more time in sedentary activities such as playing online games.

Another impact of decreased physical activity due to playing online games is postural disorders (Park et al., 2017). Many teenagers play games in poor sitting positions for long periods of time, which can lead to problems such as back pain, neck tension, and scoliosis. A study by (Minghelli, 2020) found that prolonged use of computers or consoles without stretching or changing positions can increase the risk of musculoskeletal disorders in adolescents.

In some cases, decreased physical activity due to online gaming also affects mental health. Lack of exercise can lead to increased stress and anxiety

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because reduced physical activity leads to lower endorphin production. Endorphins are hormones that play a role in reducing stress and improving mood. A study by (Carter et al., 2016) showed that adolescents who are less physically active are more prone to anxiety and depression compared to those who exercise regularly.

Meanwhile, some games based on augmented reality (AR) or virtual reality (VR) have the potential to encourage physical activity. For example, Pokémon GO and Beat Saber require players to move, walk, or even dance during the game. However, a study by (Han et al., 2020) found that although games like Pokémon GO increase physical activity at the beginning of their use, this effect is often not long-lasting because players' interest decreases after a few weeks.

Overall, online games played for long periods of time have a significant negative impact on adolescent physical activity. With the increasing trend of competitive games and games with social features that make players feel at home playing for long periods of time, steps are needed to overcome this impact, such as encouraging a balance between game play time and physical activity.

Increased Risk of Obesity

Lack of physical activity due to playing online games for a long time is also associated with an increased risk of obesity. Research conducted by (Kawi et al., 2019) showed that adolescents who spent more than three hours per day playing games had a higher body mass index (BMI) compared to those who had less playing time.

Obesity in adolescents who play online games occurs due to a combination of factors, including lack of physical activity, unhealthy eating habits, and disturbed sleep patterns. Teenagers who spend more time playing games tend to replace time that should be used for movement with sedentary activities, which reduces their daily calorie burn.

In addition, many teenagers who play games have unhealthy eating habits. Consumption of high-calorie snacks, such as chips, chocolate, and soda, is often

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the main choice when playing games because it is considered practical. A study by (Pelletier et al., 2020) found that teenagers who frequently play games have less balanced diets, with a tendency to consume more foods high in fat and sugar compared to teenagers who are more physically active.

The impact of obesity due to playing online games can also affect the metabolic health of adolescents. Increased body fat can lead to insulin resistance, which is a major factor in the development of type 2 diabetes. A study by (Ford et al., 2017) stated that adolescents who are obese have a higher risk of experiencing metabolic disorders that contribute to chronic diseases in adulthood.

In addition, obesity due to playing online games can also have an impact on psychological health. Teenagers who experience weight gain due to a sedentary lifestyle tend to experience social pressure and decreased self-confidence. Research by (Sagar & Gupta, 2018) shows that obese children and adolescents are often the target of bullying at school, which can increase the risk of depression and anxiety.

Another impact of obesity in adolescents is a decrease in physical capacity in carrying out daily activities. Overweight adolescents tend to have difficulty in carrying out physical activities that require endurance and muscle strength, such as running or swimming. This can worsen the cycle of a sedentary lifestyle , where they are increasingly reluctant to move and increasingly dependent on activities such as playing games.

One of the factors that worsens this condition is disturbed sleep patterns due to playing games until late at night. Sleep disorders can affect the body's metabolism, slowing calorie burning, and increasing the production of the hormone ghrelin which is responsible for hunger. A study by (Satterfield et al., 2019) showed that sleep-deprived individuals are more likely to consume high-calorie foods as an additional source of energy, further increasing the risk of obesity.

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Considering these impacts, it is important for adolescents, parents, and educators to develop strategies to reduce the risk of obesity due to online gaming. Some steps that can be taken include limiting the time spent playing games, encouraging adolescents to do regular physical activity, and educating them about the importance of a healthy diet.

Sleep Disorders and Mental Health

Excessive online gaming often causes sleep disturbances, which have an impact on physical and mental health. A study by (Carter et al., 2016) found that blue light from electronic device screens can inhibit the production of melatonin, a hormone that regulates sleep, resulting in fatigue and decreased physical fitness.

Many teenagers who are addicted to online games experience irregular sleep patterns. They often play until late at night or even early in the morning, which causes a lack of sleep. A study by (Sagar & Gupta, 2018) found that adolescents who slept less than six hours per night were more likely to have trouble concentrating at school and decreased academic performance.

In addition to sleep disorders, online gaming addiction is also associated with an increased risk of anxiety disorders and depression. Individuals who are addicted to online games are more susceptible to social isolation, which contributes to increased levels of depression. This social isolation occurs because time spent in the virtual world replaces social interactions in the real world.

Impact on Motor or Psychomotor Intelligence

In addition to the impact on general physical fitness, playing online games for a long time also has an effect on students' motor intelligence or psychomotor skills. Motor intelligence refers to a person's ability to control and coordinate their body movements, including reflexes, movement accuracy, balance, and muscle endurance and flexibility.

Playing online games that are static and done in a sitting position for a long period of time can inhibit the development of psychomotor skills. A study by Gallahue in (Eather et al., 2018) stated that the development of motor skills in

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adolescents depends on the experience of varied physical activities, including running, jumping, throwing, and catching. When time for these activities is replaced by playing online games, psychomotor skills such as balance and hand-eye coordination may decline.

Furthermore, the lack of complex body movements in online games leads to weak core muscles, which play an important role in posture and stability during movement. A study by (Tremblay et al., 2011) showed that adolescents who do less physical activity such as sports tend to experience proprioceptive disorders, namely the body's ability to recognize its position in space without seeing. This can increase the risk of injury when they suddenly engage in physical activity.

On the other hand, some types of virtual reality (VR) or augmented reality (AR) games, such as games that require players to actively move, can provide benefits for motor intelligence. For example, games like Beat Saber, Just Dance, and Pokémon GO can help improve hand-eye coordination and balance. However, found that these benefits only apply if the games are played for a reasonable duration and do not replace more complex physical activities.

Overall, prolonged use of online games without being balanced with physical activity can have a negative impact on students' motor intelligence, inhibiting the development of their coordination, flexibility, and balance. Therefore, it is important to regulate game playing time and encourage teenagers to continue participating in physical activities that support their psychomotor development.

Social and Psychological Impacts

On the other hand, some studies have shown that online games can also provide benefits in social and psychological aspects. A study by Granic et al. (Utoyo, 2018) showed that some types of online games can improve teamwork , problem solving, and cognitive skills. However, without good time management, these positive effects can be overshadowed by negative impacts on physical health.

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One of the positive impacts of online games is the improvement of strategic thinking skills and quick reactions (Arisman et al., 2022) Games with the MOBA and RPG genres require players to make decisions in a short time, which can train critical thinking and decision-making skills. In addition, some multiplayer-based games allow players to work together in teams, which can improve cooperation and communication skills.

However, there are also negative impacts from the social aspect, especially in terms of real-world interactions. A study by (Dos Santos et al., 2021)found that individuals who spend too much time in the virtual world tend to have difficulty building face-to-face social relationships. This can lead to difficulties in developing the social skills needed in everyday life.

In addition, online games with competitive features can cause stress and pressure for players. Teenagers who are too involved in competitive games often experience anxiety and frustration when faced with defeat. Found that some online game players experience higher levels of anxiety, especially if they rely heavily on in-game achievements as a source of personal satisfaction.

Discussion

To reduce the negative impact of online games on the physical fitness of students aged 13-17 years, here are some recommendations that can be implemented:

Game Play Time Limit

Parents and educators need to set limits on game playing time, for example no more than two hours per day or only on weekend to prevent a sedentary lifestyle. Use parental control features or automatic timers on gaming devices to help control play time. Stablishing time limits for gaming among children and adolescents is crucial to prevent negative effects such as a sedentary lifestyle and other health-related issues (Stiglic & Viner, 2019). Several studies and recommendations from health organizations provide guidelines on the ideal gaming duration: American Academy of Pediatrics (AAP) (Lobelo et al., 2020)**:**

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Recommends that children over the age of 6 should play games for a maximum of 60 minutes on school days and up to 2 hours on weekends**.** Oxford University Study: Suggests that children should not play video games for more than one hour per day. States that playing video games for several hours daily does not provide benefits for children and can have negative psychological effects, such as hyperactivity, concentration difficulties, and reduced empathy.

Increased Physical Activity

Encourage teens to participate in physical activities such as school sports, gym, or recreational clubs to balance out time spent in front of screens. Integrate movement-based activities into your daily routine, such as walking to school or cycling. Encouraging teenagers to be active does not mean prohibiting them from playing games or using digital devices, but rather balancing screen time with activities that are more beneficial to their health. To motivate teenagers to participate in physical activities, parents should actively engage with them and set an example at home. To ensure that teenagers remain interested and physically active, they should be provided with various activity options that align with their interests and preferences. Additionally, physical activity offers numerous benefits for teenagers' physical and mental development, helping to prevent dependency on gadgets.

Education about Healthy Eating Patterns

Providing education to teenagers about the importance of consuming nutritious food and limiting consumption of fast food that is high in fat and sugar. Promote a balanced diet with adequate intake of protein, fiber, and vitamins to support growth and metabolic health. A balanced diet plays a crucial role in supporting optimal growth and maintaining metabolic health, especially for children and adolescents who are in their developmental stage. The proper intake of protein, fiber, and vitamins not only aids in muscle and tissue formation but also strengthens the immune system and enhances cognitive function. Therefore,

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it is essential for parents, educators, and healthcare professionals to encourage healthy eating habits from an early age.

Good Sleep Pattern Management

Avoid using electronic devices at least one hour before bed to reduce the impact of blue light on melatonin production. Establish regular sleep hours to ensure adequate quality sleep for growth and physical health. Adequate and quality sleep is essential for both physical and mental health, especially for children and adolescents who are in their growth phase(Stiglic & Viner, 2019). However, in today's digital era, the use of electronic devices before bedtime can disrupt sleep patterns, cause fatigue, and negatively impact overall health. The blue light emitted by electronic devices such as smartphones, tablets, and computers can inhibit the production of melatonin, the hormone that regulates the sleep cycle. As a result, individuals may experience difficulty falling asleep and a decline in sleep quality. Therefore, it is crucial to limit the use of electronic devices before bedtime and establish a regular sleep schedule to support optimal sleep quality.

Optimizing Motor or Psychomotor Intelligence

Using virtual reality (VR) or augmented reality (AR) based games that involve body movement as a healthier alternative. Combine physical exercise with games, such as rhythmic gymnastics or digital-based sports, to improve coordination and balance (Utoyo, 2018). Physical activity is not only essential for maintaining overall health but also serves as a means to enhance coordination, balance, and motor skills. Combining physical exercise with games can make activities more enjoyable and engaging, especially for children and adolescents who are naturally drawn to interactive and entertainment-based experiences. Several effective methods for integrating physical exercise with game elements include rhythmic gymnastics, digital-based sports, and movement-based games.

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Raising Awareness of Social and Psychological Impacts

Conduct campaigns or seminars in schools about the long-term effects of online game addiction on physical and mental health. Encourage social interaction outside of the virtual world through extracurricular activities, social communities, or real-world teamwork. In today's digital era, many children and teenagers spend a significant amount of time engaging in virtual interactions through social media, online games, or other digital platforms. While technology offers benefits in expanding social networks, direct social interaction in the real world remains crucial for their emotional development, communication skills, and mental health. Therefore, encouraging participation in extracurricular activities, social communities, and team-based activities can help enrich their social experiences and strengthen their interpersonal skills.

CONCLUSION

Based on the results of the literature review, it can be concluded that online games have a significant impact on the physical fitness of students aged 13-17 years. The negative impacts found include decreased physical activity, increased risk of obesity, and disturbed sleep patterns and mental health. However, online games also have cognitive and social benefits if played in balanced portions. Therefore, a good strategy for managing playing time and a holistic approach from parents and educators are needed to ensure a balance between online games and physical activity.

REFERENCES

Agostini, A., & Centofanti, S. (2021). Normal sleep in children and adolescence. *Child and Adolescent Psychiatric Clinics*, *30*(1), 1–14.

Arisman, A., Dos Santos, M. H., Okilanda, A., Noviarini, T., Hasnah, H., Ishar, A. A., Walinga, A. N. T., & Putra, D. D. (2022). Konsep Pendidikan Jasmani dalam Membangun Karakter Era 5.0. *Wahana Dedikasi: Jurnal PkM Ilmu Kependidikan*, *5*(2), 372–378.

Barr, M. (2018). Student attitudes to games-based skills development: Learning from video games in higher education. *Computers in Human Behavior*, *80*, 283–294.

Carter, B., Rees, P., Hale, L., Bhattacharjee, D., & Paradkar, M. S. (2016).

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Association between portable screen-based media device access or use and sleep outcomes: a systematic review and meta-analysis. *JAMA Pediatrics*, *170*(12), 1202–1208.

Chaput, J.-P., Willumsen, J., Bull, F., Chou, R., Ekelund, U., Firth, J., Jago, R., Ortega, F. B., & Katzmarzyk, P. T. (2020). 2020 WHO guidelines on physical activity and sedentary behaviour for children and adolescents aged 5–17 years: summary of the evidence. *International Journal of Behavioral Nutrition and Physical Activity*, *17*, 1–9.

Comeras-Chueca, C., Marin-Puyalto, J., Matute-Llorente, A., Vicente-Rodriguez, G., Casajus, J. A., & Gonzalez-Aguero, A. (2021). Effects of active video games on health-related physical fitness and motor competence in children and adolescents with overweight or obesity: systematic review and meta-analysis. *JMIR Serious Games*, *9*(4), e29981.

Dos Santos, M. H., Harliawan, M., & Ismail, M. (2021). Pengaruh Game Online Terhadap Minat Belajar Penjas Siswa Smp Frater Makassar. *Tadulako Journal Sport Sciences and Physical Education*, *9*(1), 70–79.

Eather, N., Bull, A., Young, M. D., Barnes, A. T., Pollock, E. R., & Morgan, P. J. (2018). Fundamental movement skills: Where do girls fall short? A novel investigation of object-control skill execution in primary-school aged girls. *Preventive Medicine Reports*, *11*, 191–195.

Ford, N. D., Patel, S. A., & Narayan, K. M. V. (2017). Obesity in low-and middle-income countries: burden, drivers, and emerging challenges. *Annual Review of Public Health*, *38*(1), 145–164.

Han, H., Jeong, H., Jo, S.-J., Son, H. J., & Yim, H. W. (2020). Relationship between the experience of online game genre and high risk of Internet gaming disorder in Korean adolescents. *Epidemiology and Health*, *42*, e2020016.

Kawi, Y. A., Wihandani, D. M., & Surudarma, I. W. (2019). Pengaruh obesitas pada kualitas tidur mahasiswa Fakultas Kedokteran Universitas Udayana periode 2018. *Intisari Sains Medis*, *10*(3).

Lai, N. K., Ang, T. F., Por, L. Y., & Liew, C. S. (2018). The impact of play on child development-a literature review. *European Early Childhood Education Research Journal*, *26*(5), 625–643.

Lobelo, F., Muth, N. D., Hanson, S., Nemeth, B. A., LaBella, C. R., Brooks, M. A., Canty, G., Diamond, A. B., Hennrikus, W., & Logan, K. (2020). Physical activity assessment and counseling in pediatric clinical settings. *Pediatrics*, *145*(3).

Minghelli, B. (2020). Musculoskeletal spine pain in adolescents: Epidemiology of non-specific neck and low back pain and risk factors. *Journal of Orthopaedic Science*, *25*(5), 776–780.

Park, J.-H., Kang, S.-Y., Lee, S.-G., & Jeon, H.-S. (2017). The effects of smart phone gaming duration on muscle activation and spinal posture: Pilot study. *Physiotherapy Theory and Practice*, *33*(8), 661–669.

Pelletier, V. H., Lessard, A., Piché, F., Tétreau, C., & Descarreaux, M. (2020).

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Video games and their associations with physical health: A scoping review. *BMJ Open Sport & Exercise Medicine*, *6*(1), e000832.

Sagar, R., & Gupta, T. (2018). Psychological aspects of obesity in children and adolescents. *The Indian Journal of Pediatrics*, *85*, 554–559.

Satterfield, B. C., Raikes, A. C., & Killgore, W. D. S. (2019). Rested-baseline responsivity of the ventral striatum is associated with caloric and macronutrient intake during one night of sleep deprivation. *Frontiers in Psychiatry*, *9*, 749.

Schmidt, S. C. E., Anedda, B., Burchartz, A., Eichsteller, A., Kolb, S., Nigg, C., Niessner, C., Oriwol, D., Worth, A., & Woll, A. (2020). Physical activity and screen time of children and adolescents before and during the COVID-19 lockdown in Germany: a natural experiment. *Scientific Reports*, *10*(1), 21780.

Stiglic, N., & Viner, R. M. (2019). Effects of screentime on the health and well-being of children and adolescents: a systematic review of reviews. *BMJ Open*, *9*(1), e023191.

Suthar, S. A., & Arts, U. (2020). Increasing screen time and gaming impact on children's mental health during the covid-19 lockdown. *Res Rev Int Multidisciplin J*, *6*, 8–13.

Tremblay, M. S., Warburton, D. E. R., Janssen, I., Paterson, D. H., Latimer, A. E., Rhodes, R. E., Kho, M. E., Hicks, A., LeBlanc, A. G., & Zehr, L. (2011). New Canadian physical activity guidelines. *Applied Physiology, Nutrition, and Metabolism*, *36*(1), 36–46.

Utoyo, A. W. (2018). Video games as tools for education. *Journal of Games, Game Art, and Gamification*, *3*(2), 56–60.