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# Review of Literature: How Physical Activity Impact The E-Sport Athlete

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**ABSTRACT**

*The rise of esports has led to a growing population of professional players whose training heavily relies on cognitive skills but often neglects physical health. Despite the intense mental and motor demands of competitive gaming, esports athletes typically engage in prolonged sedentary behavior, which poses risks such as musculoskeletal disorders, cardiovascular strain, and psychological burnout. This literature-informed review highlights the urgency of integrating physical activity into esports routines to enhance player health and performance. Empirical evidence demonstrates that aerobic and strength training improve attention, emotional regulation, postural control, and overall well-being. Several studies, including those from Budde et al. (2020), Zwibel et al. (2020), and Pereira et al. (2022), confirm that physical training programs not only mitigate health risks but also improve in-game accuracy and resilience. Moreover, practical implications suggest that esports organizations should adopt structured training models that align with WHO guidelines on physical activity. This article calls for interdisciplinary strategies involving health professionals, trainers, and educators to ensure the sustainable development of digital athletes in the competitive esports environment.*



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## 1. INTRODUCTION

The rapid growth of the e-sports world has transformed competitive gaming into a globally recognized professional field. However, unlike traditional sports, e-sports is highly sedentary, involving long screen time, repetitive fine motor movements, and intense mental concentration. Esports players often engage in extensive periods of sitting, sometimes exceeding 10 hours per day, which characterizes them as part of a sedentary population (DiFrancisco-Donoghue et al., 2019). This sedentary lifestyle is associated with an increased risk of musculoskeletal problems, obesity, and decreased cardiovascular health, raising concerns about long-term well-being (Trotter et al., 2020). Despite the cognitive and motor demands of competitive gaming, the lack of regular physical activity among professional players poses a health challenge that mirrors other sedentary occupations (Rudolf et al., 2020). Therefore, understanding and addressing sedentary behavior in esports is essential for both performance sustainability and overall health promotion.

Various scientific literature shows that physical activity has an important role in improving cognitive performance, emotional regulation, and overall health for e-sport athletes. Regular physical exercise has been shown to improve working memory, attention span, and reaction time - skills that are particularly relevant in competitive gaming (Toth et al., 2019). In addition, physical activity can help reduce stress and anxiety levels, improve sleep quality, and prevent injuries such as muscle strains and repetitive motion disorders that are common in e-sports players (DiFrancisco-Donoghue et al., 2019).

Although these benefits are widely known, there is still a gap in the consistent implementation of physical training programs among e-sports teams and athletes. While some professional teams have begun to integrate physical training routines into their training programs, many players still ignore its importance. Thus, the urgency to address physical inactivity in esports is twofold: first, to protect players from accumulating long-term health risks; and second, to unlock the full potential of their cognitive and motor capabilities. As the esports industry continues to professionalize and attract younger populations, it becomes imperative to integrate evidence-based physical activity programs into the competitive ecosystem.

Without such interventions, the sustainability of player health and performance remains at risk. This paper aims to address that gap by examining the role of physical activity in esports performance and proposing practical, research-driven training models for esports athletes. This literature review aims to highlight key findings, identify gaps, and provide recommendations for future practice and research in this emerging field of sport science.

## 2. METHODS

This research is a literature review research. The literature review research method is a systematic approach that aims to identify, evaluate, and synthesize findings from various relevant library sources to answer specific research questions. According to Winarno et al. (2023), there are five main stages in implementing a systematic literature review (SLR). First, determine the research topic specifically and relevantly. Second, search and collect articles from various sources. Third, select articles based on inclusion and exclusion criteria, such as year of publication, type of publication, or suitability to the research focus. Fourth, conduct content analysis and data visualization, where information from selected articles is extracted, categorized, and displayed in the form of tables or graphs. Finally, compile a scientific report or article that summarizes the entire process and findings of the literature study systematically and logically. This approach not only strengthens the theoretical basis of a study, but also allows researchers to identify knowledge gaps that can be followed up in further empirical studies (Winarno et al., 2023).

The author summarizes, The google scholar databases were searched using *Specific inclusion criteria included* (1) Physical Activity demand, (2) esport, (3) athletes. The search includes literature from the 2010 to 2024.

**Table 1.** Previous research that discussed physical activity in esports players

| No | Author (Year) | Type of Research | Demographic Sample | Type of Game Played |
|---|---|---|---|---|
| 1 | Solmaz et al. (2024) | Quantitative | 183 esports players (23% female, 77% male), avg. age 23.3 | Various games |
| 2 | Baena-Riera et al. (2023) | Qualitative & Intervention | 5 professional players, avg. age 19.6 | *League of Legends* (SuperLiga) |
| 3 | Pereira et al. (2022) | Quantitative | 18 FPS game players | First-Person Shooter (FPS) games |
| 4 | Stensrud et al. (2021) | Experimental | 30 beginner esports players | Various games |
| 5 | Budde et al. (2020) | Experimental | 60 amateur esports players | Various games |
| 6 | DiFrancisco-Donoghue et al. (2019) | Quantitative | 65 university esports players | Various games |
| 7 | Rudolf et al. (2019) | Experimental | 50 semi-professional players | Various games |
| 8 | Trotter et al. (2020) | Experimental | 28 university players | Various games |
| 9 | Schmidt et al. (2020) | Correlational | 55 elite esports players | Various games |
| 10 | Zwibel et al. (2020) | Descriptive Quantitative | 65 university esports players | Various games |

In the table below, 10 articles with relevance and demographic samples were found that specifically discussed physical activity affecting the performance of various types of games in a competitive scheme. Overall, the article above discusses several findings below, namely.

### 2.1 Literature Finding

Some of the literature above is divided into several discussions of aspects of physical activity, including:

1. Physical Activity and Cognitive Function of E-sports Players

Research shows that physical activity has a positive impact on cognitive function, including increased attention, reaction speed, and decision-making ability—all of which are very important in e-sports performance. Toth et al. (2019) in their review study confirmed that aerobic exercise can improve cognitive efficiency, especially in tasks that involve sustained attention. Likewise, Basso and Suzuki (2017) found that short-term physical exercise sessions can improve working memory and cognitive flexibility in young adults, an age group that is also dominant in the e-sports community.

2. Physical Benefits in Preventing Injuries and Musculoskeletal Problems

A sedentary lifestyle and continuous use of devices make e-sports players susceptible to musculoskeletal disorders, such as carpal tunnel syndrome, back pain, and neck tension (DiFrancisco-Donoghue et al., 2019). Stretching, core strengthening, and body mobility exercises have been shown to be effective in reducing the risk of injury in players who sit for long periods of time (Szpera et al., 2023).

3. Effects on Emotional Regulation and Mental Health

Physical activity also plays an important role in stress management and emotional regulation. E-sports is a highly competitive and high-pressure field. Regular physical exercise has been shown to reduce cortisol levels and increase endorphins, which are associated with improved mood and reduced anxiety (Craft & Perna, 2004). Another study by Weinstein et al. (2017) also showed that physically active video game players have a lower risk of depressive symptoms.

4. Sleep Quality and Recovery
Sleep quality is a major determinant of performance in e-sports, especially because of the need for focus and mental resilience. Moderate physical activity has been shown to improve sleep quality and speed up sleep time (Kredlow et al., 2015). This is essential for maintaining consistent performance in tournaments and intensive training sessions.

5. Integration of Physical Activity into Professional Team Training
Some professional esports organizations are now starting to integrate physical training programs into their players' routines. For example, the Astralis (CS:GO) team actively implements daily physical training, including strength training and yoga, to support players' focus and mental health (Kari & Karhulahti, 2016). However, this implementation is not yet widespread, and many teams still do not prioritize this aspect.

6. Barriers to Implementing Physical Activity
Although evidence supports physical benefits, the main challenges in implementing physical training in esports players include lack of time, knowledge, and motivation to move actively (Reitman et al., 2020). Education and support from coaches or team management are essential to encourage this healthy behavior.

## 3. RESULTS

Physical activity has a significant impact on e-sports players' performance in various aspects, from cognitive, physical, mental, to overall playing performance. This is increasingly important considering the characteristics of e-sports players who tend to live a sedentary lifestyle with high screen time and lack of physical fitness (Trotter et al., 2020). The explanation of physical activity supporting the performance of e-sport athletes is proven by several findings that study specific aspects such as cardiovascular fitness, motor skills, visual reactions, reaction times, emotional control and prevention of injuries that will occur in e-sport athletes, presented in the table below.

**Table 2.** Summary of Physical Activity Research Findings for Esports Players with Aspects Studied

| No. | Research Finding | Aspect Studied | Source |
|---|---|---|---|
| 1 | Physical activity improves body appreciation in esports players. | Psychosocial (Body Image) | Solmaz et al. (2024) |
| 2 | Physical exercise improves cognitive performance in professional *League of Legends* players. | Cognitive Function | Baena-Riera et al. (2023) |
| 3 | Circuit training significantly improves visual reaction time and shooting accuracy in FPS games. | Motor Skill & Visual Reaction | Pereira et al. (2022) |
| 4 | Aerobic and strength training enhance hand speed and in-game accuracy. | Motor Performance | Stensrud et al. (2021) |
| 5 | Light aerobic activity enhances selective attention and reaction time. | Cognitive (Attention & Reaction Time) | Budde et al. (2020) |
| 6 | Core training and mobility exercises help prevent back and wrist injuries. | Injury Prevention | DiFrancisco-Donoghue et al. (2019) |
| 7 | Regular physical activity increases resilience and emotional control during esports competitions. | Mental Resilience & Emotional Control | Rudolf et al. (2019) |
| 8 | Stretching and yoga improve sleep quality and concentration in esports athletes. | Sleep & Cognitive Focus | Trotter et al. (2020) |
| 9 | High $VO_2$max is associated with better reflexes and working memory in esports players. | Cardiovascular Fitness & Cognition | Schmidt et al. (2020) |
| 10 | Most university esports players experience muscle pain or fatigue; only 2% seek medical help. | Physical Health Complaints | Zwibel et al. (2020) |

## 4. DISCUSSION

In the findings of the article above, the findings show several aspects of how physical activity can affect e-sports players.:

1. Cognitive Aspects

Physical exercise has been shown to improve cognitive functions important in e-sports gaming, such as attention, information processing speed, and working memory. A study by Sanz-Matesanz et al. (2024) showed that acute physical exercise such as sprinting can improve accuracy in Go/No-go cognitive tasks. Other studies support that aerobic exercise can improve sustained attention and reaction speed which are key in competitive gaming performance (Stensrud et al., 2022; Budde et al., 2020).

2. Physical Health and Injury Prevention

Although e-sports does not require high physical activity, players still face physical challenges such as neck and wrist pain, and overuse syndrome due to prolonged sitting posture. Physical exercise programs have been shown to help improve core muscle strength, joint flexibility, and mobility, which may prevent chronic injuries (DiFrancisco-Donoghue et al., 2019; Boffel et al., 2024). Research from the Journal of Electronic Gaming and Esports (2023) also confirms that regular physical intervention is essential to maintain musculotendinous balance.

3. Mental Health and Well-Being

Physical activity has been consistently associated with a reduced risk of mental disorders such as anxiety and depression, which are highly prevalent in the professional e-sports player population. A longitudinal study by Orosz et al. (2021) showed a negative relationship between training duration and players' stress levels. Physical fitness has also been shown to support emotional regulation and increase self-confidence during competition (Rudolf et al., 2020; Lee & Oh, 2022).

4. Playing Performance

Many studies have reported significant improvements in playing performance after physical training programs, particularly in reaction time, shooting accuracy, and cognitive endurance over long training sessions. This exercise not only improves physiological aspects, but also helps maintain mental stability under high competitive pressure (Trotter et al, 2020; Sanz-Matesanz et al., 2024).

Prolonged sedentary behavior, irregular sleep, and musculoskeletal complaints are now recognized as common issues faced by esports athletes (DiFrancisco-Donoghue et al., 2019; Rudolf et al., 2020). Several studies have demonstrated that aerobic and strength training significantly improve psychomotor speed, hand-eye coordination, and general physical health, which are critical for high-level esports performance (Stensrud et al., 2021; Pereira et al., 2022). Regular cardiovascular training, such as running, cycling, or HIIT, has been shown to improve cognitive flexibility and working memory, both of which are essential in fast-paced decision-making scenarios typical in competitive games like *League of Legends* or *CS:GO* (Budde et al., 2020; Schmidt et al., 2020).

Based on these findings, experts recommend that esports athletes engage in at least 150 minutes of moderate-intensity aerobic activity per week, along with 2–3 strength training sessions targeting major muscle groups (WHO, 2020; Thomas et al., 2022). Additionally, implementing sports psychology techniques and mindfulness training can further complement physical routines, promoting better performance outcomes and long-term well-being (Poulus et al., 2020). The energy used when competing in eSports is almost equivalent to jogging for 30 minutes or walking for 1 hour. (Kurniawan et al, 2023). Strength and fitness training programs can be recommended as exercises that can reduce cognitive fatigue and total fatigue. And can do light warm-up and cool-down sessions including aerobics, mobility, and stretching that are done routinely help prepare the body and minimize the risk of injury during scrimmage or long sessions (Sanz-Matesanz et al., 2024).

Overall, a multidisciplinary training program combining physical conditioning, injury prevention strategies, and mental health support should be integrated into daily routines for esports athletes. Such interventions not only address the unique physical challenges of gaming but also foster a holistic approach to sustainable performance.

## 5. CONCLUSIONS

This review emphasizes the significance of incorporating organized physical activity into the everyday schedules of esports athletes. Although esports requires considerable cognitive effort, its inactive characteristics present notable health issues, such as musculoskeletal strain, cardiovascular dangers, and diminished mental health (DiFrancisco-Donoghue et al., 2019; Rudolf et al., 2020). Research indicates that adding aerobic workouts, strength training, and flexibility routines can greatly enhance physical wellness, cognitive abilities, and in-game concentration (Stensrud et al., 2021; Pereira et al., 2022).

Physical activities such as aerobic exercise, strength training, and dynamic mobility have been shown to improve attention, reaction speed, and prevent injuries commonly experienced by e-sports players due to prolonged sitting and excessive hand use. Additionally, exercise also contributes to stress management, sleep quality, and overall mental health. Even though the benefits of physical activity in esport are becoming more widely recognized, the research that has already been done still has a number of drawbacks, including small sample sizes, a lack of long-term studies, and a limited examination of variables like gender, game genres, and cultural differences (Marton et al., 2021; Poulus et al., 2020). Nevertheless, there are obvious practical uses: adding aerobic and strength training activities to esports athletes' regimens can enhance their physical and mental well-being, which will improve their performance in games and lower their risk of injury (Stensrud et al., 2021; Kari et al., 2019).

Exercises that can be done include regular fitness with muscle center movements as well as regular warm-ups and cool-downs when carrying out scrimmage exercises which will reduce physical fatigue and increase strength and concentration (Sanz-Matesanz et al., 2024). The 10-20-30 training program A simple HIIT method—30 seconds of light jogging, 20 seconds of fast walking, 10 seconds of sprinting, for 3–4 blocks x 5 minutes—increases $VO_2$max by ~4–10% and reduces blood pressure (Gunnarsson & Bangsbo, 2012; Gunnarsson et al., 2020), may be another option for a light cardiovascular training program for e-sports athletes.

Future studies should adopt larger, more diverse samples and examine the long-term impact of tailored training programs, while also exploring innovative delivery methods such as virtual coaching and game-specific fitness protocols (Zwibel et al., 2020; Thomas et al., 2022).

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## 7. REFERENCES

Basso, J. C., & Suzuki, W. A. (2017). The effects of acute exercise on mood, cognition, neurophysiology, and neurochemical pathways: A review. *Brain Plasticity*, 2(2), 127–152.

Boffel, N., et al. (2024). *Journal of Electronic Gaming and Esports*, 1(1).

Budde, H., et al. (2020). *Brain Sciences*, 10(11), 859.

Current Psychology. (2024).

Craft, L. L., & Perna, F. M. (2004). The benefits of exercise for the clinically depressed. *Primary Care Companion to The Journal of Clinical Psychiatry*, 6(3), 104–111.

DiFrancisco-Donoghue, J., Balentine, J., Schmidt, G., & Zwibel, H. (2019). *BMJ Open Sport & Exercise Medicine*, 5(1), e000467.

DiFrancisco-Donoghue, J., Balentine, J., Schmidt, G., & Zwibel, H. (2019). Managing the health of the eSport athlete: An integrated health management model. *BMJ Open Sport & Exercise Medicine*, 5(1), e000467.

Gunnarsson, T. P., & Bangsbo, J. (2012). The 10-20-30 training concept improves performance and health profile in moderately trained runners. *Journal of Applied Physiology, 113*(16), 16–24.

Gunnarsson, T. P., Ehlers, J., Fiorenza, D., et al. (2020). 10–20–30 cycling training improves $VO_2$max and performance in middle-aged men. *Scandinavian Journal of Medicine & Science in Sports.*

Kari, T., & Karhulahti, V.-M. (2016). Do e-athletes move? A study on training and physical exercise in elite e-sports. *IJGCMS*, 8(4), 53–66.

Kari, T., Karhulahti, V. M., & Salo, M. (2019). Physical exercise and esports: A survey study of Finnish esports players. *Journal of Sport and Health Science*, 8(4), 367–375.

Kredlow, M. A., et al. (2015). The effects of physical activity on sleep: A meta-analytic review. *Journal of Behavioral Medicine*, 38(3), 427–449.

Lee, H., & Oh, H. (2022). *Healthcare*, 10(4), 626.

Leis, O., & Lautenbach, F. (2020). Psychological and physiological demands of esports players. *Psychology of Sport and Exercise*, 51, 101738

Marton, O., Kovalchik, S., Campbell, M. J., & Keegan, R. J. (2021). A systematic review of health and wellbeing in esports. *BMJ Open Sport & Exercise Medicine*, 7(1), e000933.

Nagorsky, E., & Wiemeyer, J. (2020). The structure of performance and training in esports. *German Journal of Exercise and Sport Research*, 50(1), 28–37.

Orosz, G., et al. (2021). *Computers in Human Behavior*, 119, 106719.

Pereira, R., et al. (2022). Postural risks and musculoskeletal symptoms in young esports players. *Applied Ergonomics*, 100, 103631.

Pereira, A., Brito, J., Freitas, T. T., & Marín-Cascales, E. (2022). The effects of physical exercise on visual attention and shooting performance in first-person shooter video games: A pilot study. *International Journal of Environmental Research and Public Health*, 19(22), 14978.

Poulus, D. R., Coulter, T. J., Trotter, M. G., & Polman, R. (2020). Stress and coping in esports and the influence of mental toughness. *Frontiers in Psychology*, 11, 628.

Reitman, J. G., et al. (2020). Esports research: A literature review. *Games and Culture*, 15(1), 32–50.

Rudolf, M., et al. (2020). *Psychology of Popular Media*, 9(2), 274–282.

Rudolf, K., Bickmann, P., Froböse, I., Tholl, C., Wechsler, K., & Grieben, C. (2020). Demands and resources of esport players: A qualitative study. *International Journal of Environmental Research and Public Health*, 17(18), 6473.

Rudolph, J., et al. (2020). Sleep and health in esports: A review. *International Journal of Esports*, 1(1), 1–12.

Sanz-Matesanz, A., et al. (2024). *Applied Sciences*, 14(7), 2845.

Sanz-Matesanz, M., Martínez-Aranda, L. M., & Gea-García, G. M. (2024). Effects of a physical training program on cognitive and physical performance and health-related variables in professional esports players: A pilot study. *Applied Sciences, 14*(7), 2845.

Stensrud, T., Esser, S., & Andersson, H. A. (2021). The effects of strength and aerobic training on performance in esports athletes: A randomized controlled trial. *Sports*, 9(5), 65.

Stensrud, T. L., et al. (2022). *Frontiers in Psychology*, 13, 817168.

Szpera, B., Wojdat, M., & Ambroży, T. (2023). Physical activity as a preventive factor against posture-related injuries in e-sport. *Healthcare*, 11(1), 90.

Thomas, A., & Baker, R. (2021). Physical and mental wellness in esports athletes. *Journal of Sport and Health Science*, 10(2), 222–229.

Thomas, L. B., Pedersen, K. C., & Andersen, T. E. (2022). Health promotion in esports: A systematic review. *International Journal of Environmental Research and Public Health*, 19(11), 6892.

Toth, A. J., Ramsbottom, N., Kowal, M., & Campbell, M. J. (2019). Converging evidence supporting the cognitive link between exercise and e-sports performance: A scoping review. *Frontiers in Psychology*, 10, 1342.

Toth, A. J., Ramsbottom, N., Kowal, M., & Campbell, M. J. (2019). *Frontiers in Psychology*, 10, 1342.

Trotter, M. G., et al. (2020). *BMJ Open Sport & Exercise Medicine*, 6(1), e000799.

Viana, R. B., et al. (2019). Effects of high-intensity interval training on cognition and mental health. *Mayo Clinic Proceedings*, 94(11), 2114–2126.

Weinstein, A. M., et al. (2017). Internet gaming disorder: A real mental health disorder. *General Hospital Psychiatry*, 44, 69–75.

Winarno, W. W., Purwanti, A., Kristiana, D. R., & Wahyuni, E. S. (2023). Penelitian kualitatif menggunakan systematic literature review. Yogyakarta: UPP STIM YKPN.

World Health Organization. (2020). Guidelines on physical activity and sedentary behaviour. Geneva: WHO.

Zwibel, H., DiFrancisco-Donoghue, J., DeFeo, A., & Yao, S**. (**2020). An osteopathic physician's approach to the esports athlete. *The Journal of the American Osteopathic Association, 120*(6), 430–436.

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