International Journal of
Disabilities Sports and Health Sciences
e-ISSN: 2645-9094

REVİEW ARTICLE

Accessibility Technologies in Esports and Their Impact on Quality of Life in People with Physical Disabilities

Mehmet KARTAL[1*]

[1]Adiyaman University, Faculty of Sports Sciences, Physical Education and Sports Teaching, Adiyaman, Turkey
*Corresponding author: m.kartal@adiyaman.edu.tr

Abstract
This study addresses the multifaceted challenges faced by individuals with physical disabilities, encompassing health, economic, and social aspects. The sustainable development of societies hinges on the collective contributions of both disabled and healthy individuals. Esports has recently emerged as a promising avenue for the integration of individuals with physical disabilities into societal life, primarily due to its capacity to transcend physical and demographic constraints. This research therefore aimed to explore the impact of accessibility technologies employed in esports on the quality of life for individuals living with physical disabilities. For this purpose, a literature review was conducted to examine the effect of accessibility technologies currently used in esports on the quality of life of physically disabled individuals. A comprehensive review of the literature suggests that esports, coupled with diverse software and hardware technologies designed to enhance the accessibility of individuals with physical disabilities to esports, yields positive outcomes, which encompass improved socialization, enhanced career opportunities within esports, heightened cognitive and intellectual skills, ultimately leading to an elevated quality of life. As a result, it can be said that these technologies, in addition to widening accessibility to esports, hold the potential to facilitate the organization of tailored esports tournaments and events for disabled individuals, thereby encouraging greater participation in the esports realm.

Keywords
Esports, Physically Disabled, Accessibility Technologies, Quality of Life

INTRODUCTION

Individuals grappling with physical disabilities often confront a multitude of economic, social, and psychological challenges that are contingent upon their specific disability status (Okhabska et al. 2022; Shakespeare, 2017). Consequently, they require a tool that can alleviate this arduous process and offer them both social support and extend that support to their caregivers. Although the ever-evolving landscape of internet technologies is at times branded as an 'addiction' among the general populace (Fekih-Romdhane et al. 2023), it can be contended that these technologies serve as a crucial social supportmechanism, akin to a "necessary addiction," particularly when it comes to enhancing the quality of life for individuals confronting the manifold challenges posed by physical disabilities.

It is imperative for individuals with disabilities to actively participate in social life, be able to articulate their ideas, emotions, and thoughts, and, more importantly, assume an active and constructive role in the dynamics of their social milieu in terms of improving their quality of life and, consequently, fostering social development. In essence, the concept of quality of life underscores four fundamental principles. The first of these principles asserts that quality of life

Received: 04 September.2023 ; **Accepted:** 17 October 2023; **Online Published:** 25 October 2023
[1]**ORCID:** 0000-0003-3153-0496

How to cite this article: Kartal, M. (2023). Accessibility Technologies in Esports and Their Impact on Quality of Life in People with Physical Disabilities. *Int J Disabil Sports Health Sci*;2023;Special Issue 1:464-474. https://doi.org/10.33438/ijdshs.1355037

encompasses the same factors and relationships for all individuals. Second, it can only be realized when an individual's needs are met, providing them with the opportunity to enrich their own lives. Third, it is a dynamic process comprising both objective and subjective components. The fourth principle underscores that quality of life possesses a multifaceted nature, susceptible to influences from personal and environmental factors (Verdugo et al. 2012). In this regard, esports, which renders physical and demographic characteristics inconsequential, emerges as a potential tool to bolster the productivity of individuals with physical disabilities, enrich their lives in social and economic dimensions, and offer them career prospects. This is because esports allows participation without necessitating face-to-face interaction. Technologies specific to esports are now finding applications in fields such as medicine, education, and even international exchange. Moreover, the classification of esports as a disability sport, facilitating disability-themed exchanges, has elevated it to a position where lifelong participation can be ensured. It is noteworthy that this positioning of esports holds a significant role in advancing the sustainable development goals of nations (Komatsu et al. 2021). Physical disabilities can, at times, confine individuals to a specific physical area, limiting their mobility. Esports, on the other hand, offers the potential to create a 'digital realm' where disabled individuals, particularly those facing such limitations, can navigate freely, engage in social interactions, and uncover employment prospects.

Over recent years, the literature has seen a growing but still limited body of research that bridges the topics of disability and esports. One illustrative study by Hak-Jun et al. (2022) delved into eleven scientific journals featuring publications related to esports and disability. Their analysis revealed that a majority of the scientific research published in these journals primarily centered on examining the disparities in how disabled individuals perceive esports. Meanwhile, other studies explored various facets of esports, including the overall esports experience, policies, and practices. Yeo (2022) undertook research aimed at outlining a blueprint for the advancement of esports for disabled individuals in Korea. This research underscored that esports activities for people with disabilities are currently quite limited, emphasizing the necessity of tailoring esports activities according to the specific types of disabilities and advocated for the development of new esports games designed to enhance accessibility based on the different disability types. Similarly, Choi (2021) conducted a study to assess the level of interest and knowledge among disabled individuals regarding esports, revealing that the majority of participants possessed knowledge about esports, regarded it as a novel form of sport, and actively engaged in esports. The primary platform utilized by participants for esports involvement was smartphones, and many initiated their esports journey on the recommendation of friends. On top of that, the study reported that participants primarily participated in esports as a means to alleviate stress, and one prominent concern raised by participants was the limited availability of esports programs tailored to individuals with disabilities.

Empirical evidence suggests that people with disabilities are just as motivated and inclined towards esports as their non-disabled peers. However, they often face unique challenges in accessing and actively participating in esports, such as inaccessible equipment, lack of accommodations, and social stigma. The active participation of individuals with disabilities, regardless of their gender, is of greater significance in terms of potential positive contributions to their quality of life as compared to their passive participation (as spectators). These contributions encompass financial, social, psychological, and cultural dimensions, surpassing the benefits of passive participation as mere spectators in esports events. The technological software and hardware tools capable to enable this active participation and bolstering the incentive for people with disabilities to engage in esports are the accessibility technologies already utilized in the realm of esports and digital gaming. In this context, the primary objective of this study is to scrutinize the technologies that can render esports accessible for individuals with physical disabilities. The study aimed to explore the potential impacts of such technologies on the quality of life experienced by these individuals, ultimately aspiring to make a valuable contribution to the existing literature in this evolving field.

Physical Disability And Quality of Life in People With Physical Disabilities

Physical disability is defined as a condition resulting from either congenital factors or acquired

diseases or traumas, leading individuals to contend wirewiwth enduring physical limitations lasting at least one year (Liou et al. 2005). Shakespeare (2017) posits that disability should be viewed as a societal construct, highlighting that it primarily reflects how societies respond to these bodies rather than being solely a matter of personal bodily disorders. This perspective underscores the far-reaching social implications of disability. Consequently, it is well-established that individuals with disabilities encounter a range of challenges and situations in their interactions with others, contingent upon the prevailing social structures and their specific disability statuses (Okhabska et al. 2022). Particularly, those who are unemployed, possess lower levels of education, have recently acquired their disability, or experience poor health may endure heightened levels of psychological distress. This is often attributed to their perception of being subjected to discrimination and receiving inadequate social support. Thus, it is imperative to raise awareness among individuals with disabilities about their rights and the array of social opportunities and services available to them. Equally crucial is providing the necessary psychological assistance and taking proactive measures to eradicate discrimination, which may prove instrumental in enhancing the overall quality of life for individuals with disabilities (Kagan et al. 2018).

The World Health Organization (WHO) has defined the concept of quality of life as "the individual's perception of their position in life about to their goals, expectations, standards, and concerns, within the context of the culture and value systems of their society" (WHO, 2012). This definition underscores that disability is not solely an inherent condition but rather something that can affect anyone, leading to a sudden change in their quality of life. In this regard, it is worth noting that another social group susceptible to experiencing physical disabilities and a dramatic alteration in their quality of life, particularly at a young age, is military personnel serving in the armed forces. In the existing literature, there are notable scientific studies that delve into the challenges faced by individuals who undergo the process of becoming veterans at an early stage of their lives, as well as the adverse consequences of these challenges on their the quality of life (Abraham et al. 2021; Burdett et al. 2021; Hamilton et al. 2015). For instance, Keeling et al. (2018) shed light on the economic difficulties encountered by veterans, highlighting that while some US veterans successfully transition into civilian life and secure employment, others confront various obstacles during this transition that can lead to mental health issues. Similarly, Ikin et al. (2009) found that Korean War veterans exhibited significantly lower levels of life satisfaction and quality of life scores across the four domains of the World Health Organization Quality of Life (WHOQOL-Bref) scale when compared to Australian men of similar age.

Another social group where the experience of disability significantly impacts quality of life is the parents of individuals with disabilities. For instance, Savari et al. (2023) emphasized that raising a child with a disability can be highly stressful for parents, exerting a negative influence on their quality of life. Consequently, they highlighted the importance of resilience as a coping mechanism for parents to mitigate these challenges and difficulties.

The studies presented in the literature underscore that individuals with physical disabilities, spanning various age groups and irrespective of gender, encounter a range of social and psychological challenges in their social lives. These challenges, as documented in the research, have a detrimental impact on their overall quality of life. It is crucial to recognize and address these difficulties to improve the well-being and inclusion of individuals with physical disabilities in society (Byra and Gabryś, 2023; Holm et al. 2022). Individuals struggling to overcome similar challenges often find themselves entering a cycle of social and psychological isolation, which over time may lead to addiction issues, such as gambling and alcohol dependency, further exacerbating the negative impact on their quality of life (Grant and Chamberlain, 2023; Heilig, 2023). Despite the fact that a significant portion of individuals with disabilities engage in gaming, inaccessible interfaces and gaming consoles can act as barriers, preventing them from fully participating in this form of entertainment. We should note that research dating back to 2008 reveals that an impressive 92% of disabled gamers persist in playing games, even in the face of these obstacles (Ellis and Kao, 2019).

In this sense, esports, which has gained popularity over recent years alongside the growing interest in digital games, serves as a technological

tool and process capable of positively influencing the participation of individuals with physical disabilities in social life. Esports eliminates barriers related to demographic and physical characteristics, offering a platform where these individuals can unleash their productivity potential, potentially turning it into a career path, and consequently enhancing their overall quality of life.

Esports And Its Characteristics

Esports, arising from the digitalization wave and captivating the attention of the younger generation, can be described as a form of sport in which amateur or professional players engage in competitive gameplay using computers or game consoles (Kartal, 2020). As digital and online games gain prominence in this era of digitalization, it has become increasingly important to assess their role in the cognitive development of individuals, given the growing interest in enhancing cognitive abilities. A concept often categorized alongside mind-intensive sports like chess, esports revolves around the organization of tournaments and competitions, whether individual or team-based, within a digital environment encompassing various types of games. What sets esports apart from traditional sports competitions is the shift from the physical arena to the digital realm (Campbell et al. 2018; Hollist, 2015). This transition has reshaped the landscape of competitive gaming, making it accessible and appealing to a global audience.

The history of esports can be traced back to the early stages of computer and digital game development (Pizzo et al. 2018). However, it was during the 1980s that the interest in digital games began to surge, notably with the involvement of major multinational corporations like Atari and Nintendo, which introduced game and entertainment systems. The pivotal turning point came in the early 2000s when personal computers and internet technologies became widely adopted. It was during this period that the modern iteration of esports took shape, and it has since evolved into a rapidly growing industry (Scholz, 2019).

At its core, esports revolves around competition and encompasses a wide array of digital game genres. In general, popular esports game genres can be classified into categories such as Multiplayer Online Battle Arena (MOBA), First-Person Shooter (FPS), Real-Time Strategy (RTS), Card Collecting Games, Combat Games, and Sports Games (Ströh, 2017). The diverse range of game genres within esports caters to a broad audience of gaming enthusiasts and has contributed to the industry's widespread appeal and success.

Esports has now evolved into a global phenomenon and a significant facet of popular culture, thanks to the presence of global esports organizations, tournaments, and live broadcasting platforms (Butcher and Teah, 2023;Lin et al. 2023; Newman et al. 2022). The expansive esports ecosystem has attracted scholarly attention, resulting in research that examines its multifaceted social, economic, and cultural impacts. More recently, health-related studies have started to explore the effects of esports on public health, with a particular focus on potential negative consequences. However, one should recognize that esports also carries the potential to promote physical activity and health, serving as a novel avenue for providing access to social engagement, especially for often marginalized groups like people with disabilities (Ketelhut et al. 2021). Many individuals with disabilities are actively participating in esports games today, sharing their experiences and gameplay with thousands of followers through live streaming platforms. This not only allows them to establish a social environment but also provides an opportunity to transcend their disabled identities through their engagement in esports (Johnson, 2019; Ringland, 2019). Esports has thus proven to be an empowering medium for individuals with disabilities, enabling them to connect with others, showcase their talents, and contribute to the broader gaming community.

Accessibility Technologies in Esports

Technological advancements have led to the development of specialized hardware and software designed specifically to assist individuals with physical disabilities in accessing esports games, and such technologies are continuously improved based on user feedback and experiences (Lin et al. 2014). Several prominent private companies, particularly major multinational players in the gaming and software technology industry like Sony and Microsoft, have taken initiatives to produce special controllers aimed at enhancing the accessibility of individuals with physical disabilities to the digital games that underpin esports. Some notable examples of adaptive game

controllers developed for this purpose include the following.

Quadstick:

The Quadstick represents a specialized gaming controller tailored to individuals with paralysis, offering a hands-free mechanism for engaging in digital gaming across gaming consoles and personal computers. Notably, an esports competitor using the pseudonym 'RockyNoHands', who experienced paralysis due to an unfortunate accident, employs a mouth-operated Quadstick controller to participate in esports gaming seamlessly. Despite substantial physical limitations, including the inability to move all four limbs, this esports athlete maintains a noteworthy presence in the esports arena, securing diverse sponsorships and competing alongside able-bodied counterparts within a professional esports organization (Anderson and Johnson, 2022).

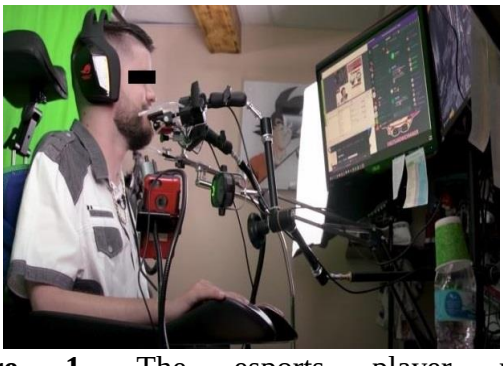

Figure 1. The esports player named RockyNoHands and Quadstick technology
(Source: https://www.thedad.com/rockynohands-pro-esports/)

Microsoft Xbox Adaptive Controller:

This adaptive controller represents a groundbreaking innovation aimed at facilitating access to digital esports games for individuals with disabilities. Its development stemmed from a collaborative effort involving individuals with disabilities and organizations in the United States. A streamer known as 'Blink,' who was born without hands, recently showcased a unique utilization of the Xbox adaptive controller, deviating from the typical approach employed by healthy gamers. This distinctive approach allowed Blink to compete alongside regular players in mainstream esports titles (Ellcessor and Kirkpatrick, 2017; Godineau, 2018). In a similar vein, a physically disabled athlete, bearing the digital identity 'Brolylegs', has achieved professional esports status on an equal footing with nondisabled individuals. Brolylegs is also celebrated as the author of the book titled "*My Life Beyond the Floor"*.

Figure 2. Professional esports player called Brolylegs and an adaptive Xbox controller
(Source: https://www.gamingdose.com/tag/ps4/page/2/)

Playstation's Project Leonardo:

A product of collaborative efforts involving accessibility experts, community members, and game developers, it represents a customizable player controller designed to enhance accessibility for numerous disabled gamers. Its primary objective is to facilitate easier access to digital esports games and provide a more comfortable gaming experience (Nishino, 2023).

While the above-mentioned technological tools and devices are structured to require physical interaction, facilitating disabled individuals' access to esports (Taheri et al. 2021), we can mention existence of new technological software and hardware solutions that offer the capability to control these tools and devices through brain activity. For example, Vidal (1973) characterized electroencephalographic (EEG) signals obtained from the human scalp as continuous fluctuations in electrical potential, reflecting corresponding changes in the upper layers of the cerebral cortex beneath the scalp's surface. He then posed the following question from his inner world to the readers: "*Could these observable electrical brain signals be used as information carriers in human-computer communication or to control external devices such as prosthetic devices or spaceships?*". Vidal's (1973) inquiry remains relevant today, as advancements in technologies such as the Brain-Computer Interface (BCI) have provided answers to this question.

Brain-Computer Interface (BCI):

The BCI is characterized as an alternative means of communication and control connecting the human brain with computers, finding applications in areas like neuroprosthetics,

brainwave-controlled computer games, and related fields (Thomas et al. 2013). Real-time monitoring of brain activity presents a range of opportunities, including support for physical health, mental well-being, and methods of interaction controlled by thought. Moreover, these technological tools have the potential to facilitate the exploration of experiences among disabled individuals, particularly those with an interest in esports, ultimately enhancing their overall gaming experiences (Knierim et al. 2021).

Figure 3. Mind control in a VR game through Brain-Computer Interface

(Source: https://www.bbc.com/news/technology-64720533)

Impacts of Esports on The Quality of Life in People With Physical Disabilities

The rapid advancement of information and communication technologies holds significant potential as a pivotal tool for enhancing the economic well-being of individuals with physical disabilities while simultaneously mitigating social exclusion and isolation (Kim and Zhu, 2023). This potential is particularly potent when complemented by the support of both family and the broader social environment (Nota et al. 2007; Wehmeyer and Palmer, 2003), leading to a positive impact on the overall quality of life of those with physical disabilities. While the assistance of the social environment and stakeholders plays a crucial role in addressing the challenges faced by individuals with disabilities, the primary objective remains the enhancement of their capacity and overall quality of life.

Given the ease of access and effectiveness of today's internet technologies, they represent a versatile tool capable of generating diverse solutions, particularly for individuals with physical disabilities. One noteworthy internet-based solution is esports, which has experienced a surge in popularity, especially during the COVID-19 pandemic. Esports allows for removing accessibility barriers and fostering inclusivity at the highest level, allowing participants to communicate and interact with others independently of their physical environment.

Physical education and sports are widely acknowledged for their positive influence on the quality of life for individuals with disabilities (Özkan and Kale, 2023). In contrast to traditional sports, esports is centered on digital gaming and presents unique advantages for individuals with physical disabilities. Within this context, the literature indicates that digital games contribute positively to cognitive and emotional development (Sana and Sosso, 2017;Shams et al. 2015; Pallavicini et al. 2018), foster socialization (Chen et al. 2021; Raith et al. 2021; Vari, 2021;Wiederhold, 2021), support foreign language learning (Pinto et al. 2021; Toh and Lim, 2021), and even exhibit potential in rehabilitating certain psychological and mental disorders, as evidenced by various scientific studies. Digital games have garnered attention for their potential preventive and therapeutic roles in medicine. Colder Carras et al. (2018), for example, highlighted that these games offer preventive and therapeutic aspects, suggesting their potential as tools for addressing mental and other health issues. Furthermore, research examining the Body Mass Index (BMI) of esports players found that traditional sports training had limited effects on the body composition of professional players. Cognitive and fine motor skills emerged as critical factors influencing performance and decision-making in esports (Giakoni-Ramírez et al. 2021), underscoring the significance of esports activities in this regard. Viana and De Lira (2020) also noted the potential of online digital games in combating psychological issues stemming from social isolation. In contrast, Etter et al. (2017) discovered that veterans who engaged in first-person shooter games exhibited higher levels of traumatic stress disorder as compared to those who did not partake in such games, emphasizing the complex relationship between gaming and mental health. Complementing these findings, recent research has demonstrated that video games in general can enhance motivation and compliance in individuals who have undergone upper limb amputation (Hashim et al. 2021). Additionally, video games have been shown to positively influence the motivation of children and adolescents with motor dysfunction, encouraging them to engage in

necessary exercises while enjoying gaming (Eckert et al. 2017).

Geleta and Hirpa (2023) conducted a study to examine how literacy skills contribute to the livelihoods of people with physical disabilities, concluding that literacy skills could improve the economic conditions of people with disabilities. Horowitz (2019) investigated the relationship between the amount of time university students in Puerto Rico spend playing online esports games and their concerns about learning English as a second language. The findings revealed that students who played online multiplayer video games had increased self-confidence and decreased anxiety about foreign language learning. Dae-Won and Hyun-Woo (2022) examined the motivations of individuals with physical disabilities to visit esports event venues, revealing that among the motivating factors of event viewers, escape from daily life was found to be one of the most important factors, and this situation had a significant positive effect on happiness. Yamazaki et al. (2022) stated that the standard controllers used in esports games could hinder the participation of disabled individuals in esports. They suggested that using Brain-Computer Interface, which allows disabled people to play esports games without the need for a controller, might be an alternative solution to this problem. Cairns et al. (2021) have also noted that there are games that help gamers with disabilities to feel active or to be at the same level as people with no disabilities. They argue that the value of accessible digital games lies not just in playing or having fun, but in playing the same games with everyone. This means that ensuring accessibility through adaptation of games is an important approach to ensure the socialization that games provide and the active and equal participation of people with disabilities. Relevant research in the field emphasizes that disabled gamers should be given the opportunity to become professional esports players or athletes, and that they should not be deprived of the potential to compete in national and international esports tournaments and organizations that may be organized in the near future (Dinansyah et al. 2022).

A common theme in all previous research in the relevant literature is the shared objective of enhancing the quality of life for individuals with disabilities. As such, esportsstands out as a versatile tool that transcends physical limitations and knows no “physical barriers.” Its potential to empower and engage individuals with disabilities underscores its value as a means to promote inclusivity, improve mental and physical well-being, and foster a sense of belonging in the digital realm.

Conclusion

Over recent years, there has been a notable surge in scientific research spotlighting the growing interest of individuals with physical disabilities in digital gaming and esports (Anderson and Johnson, 2022; Johnson, 2019;Dae-Won & Hyun-Woo, 2022; Ringland, 2019). Rooted in digital gaming, esports holds significant potential for providing employment and career prospects, particularly for individuals with physical disabilities (Tjokrodinata et al. 2022).

The comprehensive literature review in this study reveals that esports, along with advancements in software and hardware technologies aimed at enhancing accessibility for people with physical disabilities, can profoundly impact the socialization, career development, cognitive and intellectual growth, and overall quality of life of disabled individuals. Such technologies facilitate access to esports for people with physical disabilities, actively contribute to the organization of esports events tailored to disabled participants, and promote greater involvement of disabled individuals in esports. Individuals with physical challenges aspiring to capitalize on such opportunities may require software and hardware solutions enabling them to participate in esports. Prominent figures in the esports realm, recognized by their digital personas, including Rockynohands, Blink, and Brolylegs, exemplify how access to esports through these technological tools not only enables competition with healthy individuals but also paves the way for successful professional careers. This phenomenon underscores the potential of esports as a promising avenue for people with physical disabilities.

This research highlights that esports is a multifaceted tool with the potential to reintegrate persons with physical disabilities into the societies they inhabit or even the global community. It can reestablish their social connections, bridging the gap created by their disabilities and reversing the process of social isolation, ultimately bringing them back “online” and enhancing their overall quality of life.

Conflict of Interest

There are no conflicts of interest for the contributing author.

Funding

No funding was received for conducting this study.

Author Contributions

The entire research plan was performed by the author (Study Design; Data Collection; Data Interpretation; Manuscript Preparation; Literature Search).

REFERENCES

Abraham, K.M., Chang, M.M., Van, T., Resnick, S.G.and Zivin, K. (2021). Employment After Vocational Rehabilitation Predicts Decreased Health Care Utilization In Veterans With Mental Health Diagnoses. *Military medicine; 186* (9-10): 850–857.

Anderson, S.L. and Johnson, M.R. (2022). Gamer Identities of Video Game Live Streamers With Disabilities. *Information, Communication & Society*; 25(13): 1900-1915.

Burdett, H., Fear, N.T., Wessely, S. and Rona, R.J. (2021). Military And Demographic Predictors of Mental Ill-Health And Socioeconomic Hardship Among UK Veterans. *BMC psychiatry;* 21(1):1-11.

Butcher, L. and Teah, K. (2023). Setting the Research Agenda of the eSports Revolution. *Journal of Global Sport Management*; 8(2): 455-459.

Byra, S. and Gabryś, A. (2023). Coping Strategies of Women With Long-Term Spinal Cord Injury: The Role of Beliefs About the World, Self-Efficacy, and Disability. *Rehabilitation Counseling Bulleti*n; 66(2): 136–148.

Cairns, P., Power, C., Barlet, M., Haynes, G., Kaufman, C.and Beeston, J. (2021). Enabled Players: The Value of Accessible Digital Games. *Games and Culture*; 16(2): 262–282.

Campbell, M.J., Toth, A.J., Moran, A.P., Kowal, M. and Exton, C. (2018). eSports: A New Window On Neurocognitive Expertise?. *Progress in Brain Research*; 240: 161–174.

Chen, H.J.H., Hsu, H.L., Chen, Z.H. and Todd, A. G. (2021). Investigating the Impact Of Integrating Vocabulary Exercises Into An Adventure Video Game On Second Vocabulary Learning. *Journal of Educational Computing Research*; 59(2): 318-341.

Choi, K.H. (2021). eSports Recognition And Difference Analysis For Physically Challenged. *eSports Studies;* 3(2): 24-35.

Colder Carras, M., Van Rooij, A.J., Spruijt-Metz, D., Kvedar, J., Griffiths, M.D., Carabas, Y. and Labrique, A. (2018). Commercial Video Games As Therapy: A New Research Agenda To Unlock The Potential Of A Global Pastime. *Frontiers in psychiatry*; 8:1-7.

Dae-Won, Y. and Hyun-Woo, K. (2022). The Effect Of Esports Event Spectators' Motives On Perceived Value And Happiness:For Disabled Visitors. *eSports Studies*; 4(2): 46-56.

Dinansyah, F., Tjokrodinata, C. and Bangun, C. (2022). The Role of Esports Organisations in Accessibility for Disability Players. *Ultimacomm: Jurnal Ilmu Komunikasi*; 14(1): 67-79.

Eckert, M.,Gómez-Martinho, I., Meneses, J.and Martínez, J.F. (2017). New Approaches to Exciting Exergame-Experiences for People with Motor Function Impairments. *Sensors*; 17(2): 1-22.

Ellcessor, E. and Kirkpatrick, B. (2017). *Disability Media Studies*, New York: NYU Press.ISBN: 978-1479849383

Ellis, K. and Kao, K. (2019).Who Gets To Play? Disability, Open Literacy, Gaming. *Cultural Science Journal*; 11(1): 111-125.

Etter, D., Kamen, C., Etter, K. and Gore-Felton, C. (2017). Modern Warfare: Video Game Playing and Posttraumatic Symptoms in Veterans. *Journal Of Traumatic Stress*; 30(2): 182–185.

Fekih-Romdhane, F., Jahrami, H., Away, R., Trabelsi, K., Pandi-Perumal, S.R., Seeman, M.V., Hallit, S. and Cheour, M. (2023). The Relationship Between Technology Addictions And Schizotypal Traits: Mediating Roles Of Depression, Anxiety, And Stress. *BMC Psychiatry*; 23(1):1-9.

Geleta, T.O. and Hirpa, D.A. (2023). Beliefs Of Adults With Disabilities About Literacy Skills' Roles On Their Livelihood As Well

As Quality Of Life And Their Influence On Becoming Literate In Ethiopia.*Cogent Education*; 10(1): 2201167.

Giakoni-Ramírez, F., Duclos-Bastías, D. and Yáñez-Sepúlveda, R. (2021). Professional Esports Players Are Not Obese: Analysis Of Body Composition Based On Years Of Experience. *International Journal of Morphology*; 39(4): 1081-87.

Godineau, C. (2018). The New Xbox Adaptive Controller, Another Step Towards Digital Inclusion? Retrieved August 28, 2023, from http://mastersofmedia.hum.uva.nl/blog/2018/09/23/the-new-xbox-adaptive-controller-another-step-towards-digital-inclusion/.

Grant, J.E. and Chamberlain, S.R. (2023). Gambling Disorder In Minority Ethnic Groups. *Addictive Behaviors*; 136: 1-5.

Hak-jun, L., Young-sun, K. and Yong-wook, K. (2022). Tasks and Current Status of eSports Research in Inclusive Physical Education. *Journal Of Special Education: Theory And Practice; 23*(1): 69-80.

Hamilton, A.B., Williams, L. and Washington, D.L. (2015). Military and Mental Health Correlates of Unemployment in a National Sample of Women Veterans. *Medical Care*; *53*(4): 32–38.

Hashim, N.A., Abd Razak, N.A., Gholizadeh, H. and Abu Osman, N.A. (2021). Video Game-Based Rehabilitation Approach for Individuals Who Have Undergone Upper Limb Amputation: Case-Control Study. *JMIR Serious Games*; 9(1): 1-10.

Heilig, M. (2023). Stress-Related Neuropeptide Systems As Targets For Treatment Of Alcohol Addiction: A Clinical Perspective. *Journal Of Internal Medicine*; 293(5): 559–573.

Hollist, K.E. (2015). Time To Be Grown-Ups About Video Gaming: The Rising Esports Industry And The Need For Regulation. *Arizona Law Review*; 57(3): 823-847.

Holm, M.E., Sainio, P., Suvisaari, J., Sääksjärvi, K., Jääskeläinen, T., Parikka, S. and Koskinen, S. (2022). Differences In Unfavorable Lifestyle Changes During The Covid-19 Pandemic Between People With And Without Disabilities In Finland: Psychological Distress As A Mediator. *International Journal of Environmental Research and Public Health*; 19(12):1-15.

Horowitz, K.S. (2019). Video Games And English As A Second Language: The Effect Of Massive Multiplayer Online Video Games On The Willingness To Communicate And Communicative Anxiety Of College Students In Puerto Rico. *American Journal of Play*; 11(3): 379-410.

Ikin, J.F., Sim, M.R., McKenzie, D.P., Horsley, K. W., Wilson, E.J., Harrex, W.K., Moore, M. R., Jelfs, P.L. and Henderson, S. (2009). Life Satisfaction And Quality In Korean War Veterans Five Decades After The War. *Journal Of Epidemiology And Community Health*; 63(5): 359–365.

Johnson, M.R. (2019). Inclusion And Exclusion In The Digital Economy: Disability And Mental Health As A Live Streamer On Twitch.Tv. *Information,Communication & Society*; 22(4): 506–520.

Kagan, M., Itzick, M. and Tal-Katz, P. (2018). Demographic, Psychosocial, And Health- And Disability-Related Factors Associated With Psychological Distress Among People With Physical Disabilities. *Rehabilitation Psychology*; 63(3): 392–399.

Kartal, M. (2020). *E-Sports in Turkey in the Context of Globalization*. Temel, C. (Ed.), Ankara: Gazi Bookstore. ISBN: 9786257727877.

Keeling, M., Kintzle, S. and Castro, C.A. (2018). Exploring U.S. Veterans' post-service employment experiences. *Military Psychology;* 30 (1): 63-69.

Ketelhut, S., Martin-Niedecken, A.L., Zimmermann, P. and Nigg, C.R. (2021). Physical Activity and Health Promotion in Esports and Gaming-Discussing Unique Opportunities for an Unprecedented Cultural Phenomenon. *Frontiers In Sports And Active Living*; *3*: 1-8.

Kim, H.C. and Zhu, Z.Y. (2023). A Gender Perspective On The Use Of Mobile Social Network Applications To Enhance The Social Well-Being Of People With Physical Disabilities: The Mediating Role Of Sense Of Belonging. *Behaviour & Information Technology*; 42(4): 444-457.

Knierim, M.T, Berger, C. and Reali, P. (2021). Open-Source Concealed EEG Data Collection For Brain-Computer-Interfaces-Neural Observation Through OpenBCI Amplifiers With Around-The-Ear Ceegrid

Electrodes. *Brain-Computer Interfaces*; 8(4): 161-179.

Komatsu, M., Matsumoto, T. and Prowant, C. (2021). Learning Through Esports in Innovation Practice on Electrical Technology. *Procedia Computer Science*; 192: 2550-2557.

Lin, H.W., Aflatoony, L. and Wakkary, R. (2014). Design for One: A Game Controller for a Quadriplegic Gamer. CHI '14 Extended Abstracts on Human Factors in Computing Systems (CHI EA '14), 1243-1248.

Lin, S., Xu, Z. and Xie, Z. (2023). Cultural Diversity In Semi-Virtual Teams: A Multicultural Esports Team Study. Journal Of International Business Studies; 54(4): 718–730.

Liou, T.H., Pi-Sunyer, F.X. and Laferrère, B. (2005). Physical disability and obesity. *Nutrition Reviews*; *63*(10): 321–331.

Newman, J.I., Xue, H., Watanabe, N.M., Yan, G. and McLeod, C.M. (2022). Gaming Gone Viral: An Analysis of the Emerging Esports Narrative Economy.*Communication & Sport*; 10(2): 241–270.

Nishino, H. (2023). Introducing Project Leonardo For PlayStation 5, A Highly Customizable Accessibility Controller Kit. Retrieved August 28, 2023, from https://blog.playstation.com/2023/01/04/introducing-project-leonardo-for-playstation-5-a-highly-customizable-accessibility-controller-kit/.

Nota, L., Ferrari, L., Soresi, S. and Wehmeyer, M. (2007). Self-Determination, Social Abilities And The Quality Of Life Of People With Intellectual Disability. *Journal Of Intellectual Disability Research*; 51(11): 850–865.

Okhabska, I., Budzyn, V., Rybchych, I., Zyma, I. and Kalichak, Y. (2022). Management Of Medical Institutions On Context Of Provision Medical And Preventive Care In COVID-19 Condition. *International Journal of Health Sciences*; 6(1): 347–356.

Özkan, Z. and Kale, R. (2023). Investigation Of The Effects Of Physical Education Activities On Motor Skills And Quality Of Life In Children With Intellectual Disability. *International Journal of Developmental Disabilities*; 69(4): 578-592.

Pallavicini, F., Ferrari, A. and Mantovani, F. (2018). Video Games For Well-Being: A Systematic Review On The Application Of Computer Games For Cognitive And Emotional Training In The Adult Population. *Frontiers in Psychology*; 9: 1-16.

Pinto, R.D., Peixoto, B., Melo, M., Cabral, L. and Bessa, M. (2021). Foreign Language Learning Gamification Using Virtual Reality—A Systematic Review of Empirical Research. *Education Sciences*; 11(5):1-19.

Pizzo, A.D., Baker, B.J., Na, S., Lee, M., Kim, K. and Funk, D.C. (2018). eSport vs. Sport: A Comparison Of Spectator Motives. *Sport Marketing Quarterly*; 27(2): 45–60.

Raith, L., Bignill, J., Stavropoulos, V., Millear, P., Allen, A., Stallman, H.M., Mason, J., De Regt, T., Wood, A. and Kannis-Dymand, L. (2021). Massively Multiplayer Online Games and Well-Being: A Systematic Literature Review. *Frontiers In Psychology*; 12: 1-13.

Ringland, K.E. (2019). Do You Work For Aperture Science?: Researching And Finding The Gamer Identity In A Minecraft Community For Autistic Children, p. 1-8,Proceedings of the 14th International Conference on the Foundations of Digital Games, August 2019.

Sana, R. and Sosso, F.A.E. (2017). Cyberpsychology: Video Games As A Perspective For Cognitive Training. *Mental Health and Addiction Research*; 2(3): 1-2.

Savari, K., Naseri, M. and Savari, Y. (2023). Evaluating the role of perceived stress, social support, and resilience in predicting the quality of life among the parents of disabled children, *International Journal of Disability, Development and Education*; 70(5): 644-658.

Scholz, T.M. (2019). Esport *Is Business: Management In The World Of Competitive Gaming*, London: Palgrave Macmillan. ISBN: 3030111989.

Shakespeare, T. (2017). The Social Model Of Disability. In Davis, L.J. (ed.), *The Disability Studies Reader*, (5th Edition). Newyork: Routledge.ISBN 9781315680668 (e-book).

Shams, T.A., Foussias, G., Zawadzki, J.A., Marshe, V.S., Siddiqui, I., Müller, D.J. and Wong, A.H. (2015). The Effects Of Video Games On Cognition And Brain Structure:

Potential Implications For Neuropsychiatric Disorders. *Current Psychiatry Reports*;17(9): 71.

Ströh, J.H.A. (2017). *The Esports Market And Esports Sponsoring*, (1st Edition), Tectum Verlag Marburg. ISBN: 978-3828838918.

Taheri, A., Weissman, Z. and Sra, M. (2021). Exploratory Design of a Hands-free Video Game Controller for a Quadriplegic Individual, p. 1-16, In Augmented Humans Conference 2021 (AHs'21), February 22–24, 2021, Rovaniemi, Finland. ACM, New York.

Thomas, K.P., Vinod, A.P. and Guan, C. (2013). Design Of An Online EEG Based Neurofeedback Game For Enhancing Attention And Memory, p.433–436,Annual International Conference of the IEEE Engineering in Medicine and Biology Society. IEEE Engineering in Medicine and Biology Society. Annual International Conference.

Tjokrodinata, C., Bangun, C.R.A., Dewi, H.L.C., Nuranindya, D. and Riatun. (2022). Video Pembelajaran Ramah Disabilitas Bagi Komunitas E- Sports Ability Indonesia. *Jurnal Komunikasi Profesional*; 6(2): 169-180.

Toh, W. and Lim, F.V. (2021). Using Video Games For Learning: Developing A Metalanguage For Digital Play. *Games and Culture*; 16(5): 583–610.

Vari, J. (2021). Playful Trajectories and Experimentations: Video Games in the Moral and Political Socialization of Children and Young People. In *Playful Trajectories and Experimentations*. Leiden, The Netherlands: Brill Publishing.

Verdugo, M.A., Navas, P., Gómez, L.E. and Schalock, R.L. (2012). The concept of quality of life and its role in enhancing human rights in the field of intellectual disability. *Journal Of Intellectual Disability Research*;*56*(11): 1036–1045.

Viana, R.B. and de Lira, C.A.B. (2020). Exergames as Coping Strategies for Anxiety Disorders During the COVID-19 Quarantine Period. *Games For Health Journal*; 9(3): 147–149.

Vidal, J.J. (1973). Toward Direct Brain-Computer Communication. *Annual Review Of Biophysics And Bioengineering*; 2: 157–180.

Wehmeyer, M.L. and Palmer, S.B. (2003). Adult Outcomes For Students With Cognitive Disabilities Three-Years After High School: The Impact Of Self-Determination. *Education and Training in Developmental Disabilities*; 38(2): 131-144.

Wiederhold, B.K. (2021). Kids Will Find A Way: The Benefits Of Social Video Games. *Cyberpsychology, Behavior And Social Networking*; 24(4): 213–214.

World Health Organization (WHO). (2012). The World Health Organization Quality of Life (WHOQOL). Retrieved August 26, 2023, fromhttps://apps.who.int/iris/rest/bitstreams/110129/retrieve.

Yamazaki, T., Tsurugasaki, Y., Taya, A., Tobe, Y. and Toyama, H. (2022). CBWS: Design of a Brain Wave Analysis System Suitable for Brain-Wave-Based Games. IEICE Technical Report; IEICE Tech. Rep.

Yeo, H. (2022). A Study on the Legal and Institutional Basis for the Development of E-Sports for the Disabled: Focused on the Act on the Promotion of E-Sports. *eSports Studies*; 4(1), 32-40.