KRAWCZYK, Michał, MOLENDA, Marek Jarosław, WOSZCZYŃSKA, Oliwia Brygida, RYCĄBEL, Paweł Maciej, ROMANIUK, Mateusz, WACHOWSKA, Maria, PANIAK, Mateusz, SOWIŃSKI, Wojciech Jan, SZYMURA , Marta and WOJCIECHOWSKA, Agnieszka Ewelina. Gamifying Physical and Mental Health: An Umbrella Review of Pokémon GO's Public Health Impacts. Quality in Sport. 2025;41:60063. eISSN 2450-3118.
https://doi.org/10.12775/QS.2025.41.60063
https://apcz.umk.pl/QS/article/view/60063

The journal has been 20 points in the Ministry of Higher Education and Science of Poland parametric evaluation. Annex to the announcement of the Minister of Higher Education and Science of 05.01.2024. No. 32553.
Has a Journal's Unique Identifier: 201398. Scientific disciplines assigned: Economics and finance (Field of social sciences); Management and Quality Sciences (Field of social sciences).
Punkty Ministerialne z 2019 - aktualny rok 20 punktów. Załącznik do komunikatu Ministra Szkolnictwa Wyższego i Nauki z dnia 05.01.2024 r. Lp. 32553. Posiada Unikatowy Identyfikator Czasopisma: 201398.
Przypisane dyscypliny naukowe: Ekonomia i finanse (Dziedzina nauk społecznych); Nauki o zarządzaniu i jakości (Dziedzina nauk społecznych).

The authors declare that there is no conflict of interests regarding the publication of this paper.
Received: 04.04.2025. Revised: 25.04.2025. Accepted: 06.05.2025. Published: 11.05.2025.

Gamifying Physical and Mental Health: An Umbrella Review of Pokémon GO's Public Health Impacts

Authors:

Michał Brunon Krawczyk

ORCID: 0009-0008-9697-6548

michalkrawczyk@gumed.edu.pl

Pediatric Cardiac Surgery Department of Mikołaj Kopernik Hospital in Gdańsk, Gdańsk, Poland

Marek Jarosław Molenda

ORCID 0009-0002-7900-4970

markollo1998@gmail.com

4th Clinical University Hospital in Lublin, ul. Kazimierza Jaczewskiego 8, 20-954 Lublin, Poland

Oliwia Brygida Woszczyńska
ORCID: 0009-0001-7724-544X
ob.woszczynska@gmail.com
Independent Public Health Care of the Ministry of the Internal Affairs, ul. Kartuska 4/6, 80-104 Gdańsk, Poland

Paweł Maciej Rycąbel
ORCID: 0009-0008-4039-8312
pawelrycabel@gmail.com
Independent Public Health Care Center of the Polish Ministry of Interior and Administration in Lublin, ul. Grenadierów 3, 20-331 Lublin, Poland

Mateusz Romaniuk
ORCID: 0009-0007-1486-5522
mateusz.romaniuk.44@gmail.com
Independent Public Health Care Center of the Polish Ministry of Interior and Administration in Lublin, ul. Grenadierów 3, 20-331 Lublin, Poland

Maria Wachowska
ORCID: 0009-0004-2069-9469
maria.wac97@gmail.com
Podhale Specialist Hospital named after St John Paul II in Nowy Targ, ul. Szpitalna 14, 34-400 Nowy Targ, Poland

Mateusz Paniak
ORCID: 0009-0009-0110-9634
mateuszpaniak.mp@gmail.com
Cardinal Stefan Wyszyński Province Specialist Hospital in Lublin, ul. al. Kraśnicka 100, 20-718 Lublin

Wojciech Jan Sowiński
ORCID: 0000-0002-2267-4773
wojciechjansowinski@gmail.com
1st Military Clinical Hospital with the Outpatient Clinic, Lublin, Poland

Marta Szymura
ORCID: 0009-0000-2776-8974
martaszymura3581@gmail.com
Independent Public Healtcare Center No.1 in Rzeszów, ul. Tadeusza Czackiego 2 35-051 Rzeszów

Agnieszka Ewelina Wojciechowska
ORCID: 0009-0009-3344-9115
ine.wojciechowska@gmail.com
Cardinal Stefan Wyszyński Province Specialist Hospital in Lublin, ul. al. Kraśnicka 100, 20-718 Lublin

Abstract

Regular physical activity plays a vital role in supporting physical, mental, and social well-being, particularly among younger populations. However, rapid technological advancements and the growing popularity of digital entertainment have led to increasingly sedentary lifestyles. Pokémon GO, an augmented reality (AR) game, has emerged as a potential tool to counteract this trend by encouraging outdoor activity and real-world social interaction.

Despite numerous studies indicating positive effects of the game on physical activity, mental health, and social engagement, the existing research remains fragmented. This umbrella review aims to synthesize current evidence on the public health impact of Pokémon GO. By analyzing findings from systematic reviews, meta-analyses, and literature reviews, this study provides a comprehensive evaluation of the game's influence on health-related behaviors. The review highlights Pokémon GO's potential to promote physical activity and social connectivity, while also acknowledging the need for further standardized, long-term studies to fully understand both its benefits and associated risks.

Key words: Augmented Reality Games, Pokémon GO, Physical Activity, Mental Health, Social Interactions

1. Introduction:

Regular physical activity is crucial for maintaining overall health and well-being, particularly among young individuals. The World Health Organization (WHO) recommends at least 150–300 minutes of moderate-intensity aerobic activity per week for adults and a minimum of 60 minutes of physical activity daily for children and adolescents to support cardiovascular health, muscle strength, and mental well-being[1]. Studies have shown that engaging in regular exercise reduces the risk of obesity, cardiovascular diseases, depression, and anxiety, while also promoting cognitive function and social engagement[2,3]. Additionally, physical activity is an essential component of a balanced lifestyle, providing an enjoyable way to spend leisure time while fostering interpersonal interactions[4].

However, in recent years, technological advancements and the widespread availability of computer games have contributed to increasingly sedentary lifestyles, particularly among

young people [5]. In today's world dominated by the world of computers, we have transferred our world of work, entertainment, social contacts to digital reality. [6] This translates into a reduction in our overall physical activity[7]. Not only does it suffer, but it also causes the spread of mental disorders and limited social contacts.[8]

Pokemon go is a computer game distributed all over the world, which uses augmented reality. [9] It is a system that connects the real world with the computer-generated one [9]. In its debut year, it collected 232 million[10], in 2024 97 464 163 users still play[11]. Already in 1992, two scientists - T. Coudell and D. Mizell used the first term "augmented reality". [12] Their invention may turn out to be a bridge thanks to which we will more often move from the virtual to the real world. In recent years, a number of works have been created suggesting that the game Pokémon go has a positive effect on our physical activity.[13–17] In terms of the impact on our well-being, mental health, and social connections, players' social interactions and their mood/affect, memory, and attention in specific social groups improved.[17]

Despite the growing body of research exploring the health benefits of Pokémon GO, the available studies remain fragmented and insufficient in providing a comprehensive assessment of its overall public health impact[18,19]. While systematic reviews, narrative reviews, and original studies have addressed different aspects of the game's influence on physical activity, mental health, and social interactions, no study has yet synthesized these findings into a single, cohesive evaluation. Recognizing this gap, the authors decided to conduct an umbrella review to systematically compile and analyze the existing evidence, offering a broad yet detailed perspective on the potential benefits and risks of Pokémon GO as an augmented reality game that promotes physical and mental well-being.

2. Methods:

In our analysis, we searched databases such as pubmed, scopus, Web of Science, iCochrane Library, Ebsco. Google Scholar, CINAHL, SPORTDiscus, PsycInfo. In the given databases, we found 147 articles, the search was carried out using the Boolean technique [20] - "AND", "OR" and "NOR using the words "pokemon go", "physical activity", "mental health" "social contact" from 3 different studies, a total number of 5,609,041 participants was obtained [13–16]. The age of the study participants ranged from 5 years to over 60 years. [13–17] We decided to include in our work meta-analyses and review papers. [13,14,16,17] From the presented press

reviews, we managed to distinguish 3 systematic reviews, [13,16,21] 1 meta-analysis [15] and 1 literature review[17]. Data were collected from regions all over the world, almost all continents such as Europe, Americas, Near and Far East Asia, no papers were found from Africa and Australia and assessed [13,15–17,21] . Data from all articles were published between 2016 and 2024 [13–17,21] . GRADE (Grading of Recommendations, Assessment, Development, and Evaluations) [22] is a framework for developing and presenting evidence summaries and provides a systematic approach to formulating recommendations for clinical practice. We analyze whether playing Pokémon had a positive effect on all aspects: Physical activity, Social contacts, Mental health.

3. Results:

To sum up the 4 studies taken, we have placed the collected data in the table below. The number of studies from each systematic review is given in brackets. The age of participants and the country of origin of the studies have been omitted from the table. The age of patients has been omitted because in different studies it ranged from 5 to 65 years. The studies came from many countries and continents. Some studies did not assess physical activity itself, without any impact on social interactions and mental health. In the given studies, different terms were used for social interactions, where they were collected as one collective aspect.

Table 1.

	Liang	Lee	Khamzina	Piqueras
year	2023	2021	2020	2024
number of studies	10	36	17	12
intervention time	6-10week	60min-9mon	60 min-10week	no info
number of participants	2 548	38 724	33 108	9 866
sample size	13 to 944	301 to 999	no info	no info

physical activity	poz (6)	poz(19)	poz(17)	poz(2+3?)
PA assessment method	questionnaire	questionnaire	nr of steps	nr of steps
time of increase in physical activity	1week till 2mon	1-4week	no info	no info
long-term effect on PA	poz(1)	poz(1)	no info	no info
stress	no info	no info	no info	poz(1)
affect and mood	no info	poz(11)	no info	no info
well-being	poz(4)	poz(9)	no info	no info
social interactions	poz(2)	poz(7)	no info	poz(1)
gaming disorder	poz(1)	0	no info	neg(2)
study quality scale				
high	0	2	0	no info
moderate	5	11	7	no info
low	5	23	10	no info

The presented results clearly indicate a positive effect on physical activity. However, only 2 studies showed a positive long-term effect. The only objective method to increase physical activity was the number of steps and the questionnaires remain quite subjective.

Many aspects such as social interactions or psychological issues are also described by subjective questionnaires.

When it comes to mental health aspects, many studies reported very different aspects. There is no unified single aspect of the study. The level of anxiety (e.g. before leaving the house), stress level, affect, well-being were examined. But collectively they show a positive effect.

Numerous studies examined social interactions and most of them showed a positive effect of Pokemon Go on this aspect.

It is also worth mentioning that a negative effect was also presented in terms of gaming disorders, although 1 study showed a positive effect.

4. Discussion:

Due to the decreasing amount of physical activity in our lives,[23] the transfer of our lives to the digital sphere [23] and the disorders associated with it, we are looking for possible solutions. Designing modern games has become extremely helpful at a time when there is an increasing percentage of obese people [24] and people with mental disorders around the world. The great advantage of the Pokémon game is that it brings fun and supports physical activity. [13,15,16,21] Where traditional games convince players to stay at home.

Our umbrella review aimed to evaluate the results from around the world,[13,15,16] the best works and show that we should take steps to increase the number of games in augmented reality. We tried to show that such games have a positive impact on our mental health and physical activity. Physical activity was measured in many different ways, such as subjective surveys [13,21] and by an application counting the number of steps [14,16]. All of them showed that there is a positive effect on physical activity [13,15,16,21], but attention is paid to the subjective assessment of the study group and to the dangers associated with the game, for example driving a car while playing or not paying attention to the traffic lanes. A positive aspect was also found on Affect and mood, well-being, social interactions. [13,16,21] One study found a negative effect on gaming-related disorders[16].

The study is not without limitations. Many studies used subjective surveys to assess outcomes, [13,21,25] using step counts from wearable watches as a quantitative measure of physical activity, which do not yet have published validity reports [25]. It is worth adding that few studies were conducted with a randomized, blinded design.

5. Conclusion:

The variety of studies conducted leads us to conclude that they must be evaluated with caution. Future studies on augmented reality should be conducted with a standardized scale for physical activity and psychological aspects. It would be worthwhile to add that studies assess the time point of physical activity and improvements in interpersonal interaction and mental health, in the short term and the long term.

6. Statement of the authors' contribution

Conceptualization: Marek Molenda, Oliwia Woszczyńska, Paweł Rycąbel, Mateusz Romaniuk, Maria Wachowska, Mateusz Paniak, Wojciech Sowiński, Marta Szymura, Agnieszka Wojciechowska, Michał Krawczyk

Methodology: Marek Molenda, Oliwia Woszczyńska, Paweł Rycąbel, Mateusz Romaniuk, Maria Wachowska, Mateusz Paniak, Wojciech Sowiński, Marta Szymura, Agnieszka Wojciechowska, Michał Krawczyk

Software: Marek Molenda, Oliwia Woszczyńska, Paweł Rycąbel, Mateusz Romaniuk, Maria Wachowska, Mateusz Paniak, Wojciech Sowiński, Marta Szymura, Agnieszka Wojciechowska, Michał Krawczyk

Check: Marek Molenda, Oliwia Woszczyńska, Paweł Rycąbel, Mateusz Romaniuk, Maria Wachowska, Mateusz Paniak, Wojciech Sowiński, Marta Szymura, Agnieszka Wojciechowska, Michał Krawczyk

Formal analysis: Marek Molenda, Oliwia Woszczyńska, Paweł Rycąbel, Mateusz Romaniuk, Maria Wachowska, Mateusz Paniak, Wojciech Sowiński, Marta Szymura, Agnieszka Wojciechowska, Michał Krawczyk

Investigation: Marek Molenda, Oliwia Woszczyńska, Paweł Rycąbel, Mateusz Romaniuk, Maria Wachowska, Mateusz Paniak, Wojciech Sowiński, Marta Szymura, Agnieszka Wojciechowska, Michał Krawczyk

Resources, data curation: Marek Molenda, Oliwia Woszczyńska, Paweł Rycąbel, Mateusz Romaniuk, Maria Wachowska, Mateusz Paniak, Wojciech Sowiński, Marta Szymura, Agnieszka Wojciechowska, Michał Krawczyk

Writing - rough preparation: Marek Molenda, Oliwia Woszczyńska, Paweł Rycąbel, Mateusz Romaniuk, Maria Wachowska, Mateusz Paniak, Wojciech Sowiński, Marta Szymura, Agnieszka Wojciechowska, Michał Krawczyk

Writing - review and editing: Marek Molenda, Oliwia Woszczyńska, Paweł Rycąbel, Mateusz Romaniuk, Maria Wachowska, Mateusz Paniak, Wojciech Sowiński, Marta Szymura, Agnieszka Wojciechowska, Michał Krawczyk

Visualization: Marek Molenda, Oliwia Woszczyńska, Paweł Rycąbel, Mateusz Romaniuk, Maria Wachowska, Mateusz Paniak, Wojciech Sowiński, Marta Szymura, Agnieszka Wojciechowska, Michał Krawczyk

Supervision: Marek Molenda, Oliwia Woszczyńska, Paweł Rycąbel, Mateusz Romaniuk, Maria Wachowska, Mateusz Paniak, Wojciech Sowiński, Marta Szymura, Agnieszka Wojciechowska, Michał Krawczyk

Project administration: Marek Molenda, Oliwia Woszczyńska, Paweł Rycąbel, Mateusz Romaniuk, Maria Wachowska, Mateusz Paniak, Wojciech Sowiński, Marta Szymura, Agnieszka Wojciechowska, Michał Krawczyk

All authors have read and agreed with the published version of the manuscript.

Funding Statement

The study did not receive special funding.

Institutional Review Board Statement Not applicable.

Informed Consent Statement

Not applicable.

Conflict of Interest Statement

No conflict of interest.

References:

1. Bull FC, Al-Ansari SS, Biddle S, et al. World Health Organization 2020 guidelines on physical activity and sedentary behaviour. *Br J Sports Med*. 2020;54(24):1451-1462. doi:10.1136/BJSPORTS-2020-102955
2. Warburton DER, Bredin SSD. Health benefits of physical activity: a systematic review of current systematic reviews. *Curr Opin Cardiol*. 2017;32(5):541-556. doi:10.1097/HCO.0000000000000437
3. Guthold R, Stevens GA, Riley LM, Bull FC. Worldwide trends in insufficient physical activity from 2001 to 2016: a pooled analysis of 358 population-based surveys with 1·9 million participants. *Lancet Glob Health*. 2018;6(10):e1077-e1086. doi:10.1016/S2214-109X(18)30357-7

4. Hallal PC, Andersen LB, Bull FC, et al. Global physical activity levels: surveillance progress, pitfalls, and prospects. *Lancet*. 2012;380(9838):247-257. doi:10.1016/S0140-6736(12)60646-1
5. Hale L, Guan S. Screen time and sleep among school-aged children and adolescents: a systematic literature review. *Sleep Med Rev*. 2015;21:50-58. doi:10.1016/J.SMRV.2014.07.007
6. Praca zdalna w Polsce – statystyki i prognozy - Beskidzka24.pl - Regionalny Portal: Bielsko-Biała, Cieszyn, Żywiec, Czechowice, Sucha Beskidzka, Wadowice. Accessed January 27, 2025. https://beskidzka24.pl/praca-zdalna-w-polsce-statystyki-i-prognozy/
7. Vadym F, Bigstockphoto P/. Aktywność fizyczna Polaków w czasie pracy zdalnej-prezentacja wyników badań empirycznych. doi:10.5604/01.3001.0014.3883
8. Sęczkowska K. KONSEKWENCJE PSYCHOSPOŁECZNE PRACY ZDALNEJ. *Problemy Nauk Humanistycznych i Społecznych Teoria i Praktyka*. 2019;(2). Accessed January 27, 2025. https://www.brosix.com/files/docs/Working-Remotely-
9. Pokémon Go – Wikipedia, wolna encyklopedia. Accessed January 27, 2025. https://pl.wikipedia.org/wiki/Pok%C3%A9mon_Go
10. Ilu jest graczy Pokemon Go? Accessed January 27, 2025. https://www-thegamer-com.translate.goog/pokemon-go-player-count/?_x_tr_sl=en&_x_tr_tl=pl&_x_tr_hl=pl&_x_tr_pto=rq
11. Statystyki Pokemon GO 2024: Aktywni gracze, Pobrania, Przychody i Trendy popularności. Accessed January 27, 2025. https://www-locachange-com.translate.goog/pokemon-go/pokemon-go-statistics/?_x_tr_sl=en&_x_tr_tl=pl&_x_tr_hl=pl&_x_tr_pto=rq
12. AR Solutions - Krótka historia reczywistości rozszeszonej. Accessed January 27, 2025. https://arsolutions.pl/krotka-historia-reczywistosci-rozszeszonej/
13. Lee JE, Zeng N, Oh Y, Lee D, Gao Z. Effects of Pokémon GO on Physical Activity and Psychological and Social Outcomes: A Systematic Review. *J Clin Med*. 2021;10(9). doi:10.3390/JCM10091860
14. Khamzina M, Parab K V., An R, Bullard T, Grigsby-Toussaint DS. Impact of Pokémon Go on Physical Activity: A Systematic Review and Meta-Analysis. *Am J Prev Med*. 2020;58(2):270-282. doi:10.1016/j.amepre.2019.09.005

15. Khamzina M, Parab K V., An R, Bullard T, Grigsby-Toussaint DS. Impact of Pokémon Go on Physical Activity: A Systematic Review and Meta-Analysis. *Am J Prev Med*. 2020;58(2):270-282. doi:10.1016/J.AMEPRE.2019.09.005
16. Piqueras-Sola B, Cortés-Martín J, Rodríguez-Blanque R, et al. Systematic Review on the Impact of Mobile Applications with Augmented Reality to Improve Health. *Bioengineering (Basel)*. 2024;11(6). doi:10.3390/BIOENGINEERING11060622
17. Wang AI. Systematic literature review on health effects of playing Pokémon Go. *Entertain Comput*. 2021;38:100411. doi:10.1016/J.ENTCOM.2021.100411
18. pokemon go - Google Scholar. Accessed February 7, 2025. https://scholar.google.com/scholar?hl=pl&as_sdt=0%2C5&q=pokemon+go&btnG=
19. pokemon go - Search Results - PubMed. Accessed February 7, 2025. https://pubmed.ncbi.nlm.nih.gov/?term=pokemon+go
20. Dentalcare CE682 PubMed Strategie wyszukiwania Instrukcje dotyczące kursów. Accessed January 27, 2025. https://manuals.plus/pl/dentalcare/ce682-pubmed-search-strategies-course-manual
21. Liang H, Wang X, An R. Influence of Pokémon GO on Physical Activity and Psychosocial Well-Being in Children and Adolescents: Systematic Review. *J Med Internet Res*. 2023;25(1). doi:10.2196/49019
22. What is GRADE? | BMJ Best Practice. Accessed January 27, 2025. https://bestpractice.bmj.com/info/us/toolkit/learn-ebm/what-is-grade/
23. Coşkun MG, Öztürk Rİ, Tak AY, Sanlier N. Working from Home during the COVID-19 Pandemic and Its Effects on Diet, Sedentary Lifestyle, and Stress. *Nutrients*. 2022;14(19). doi:10.3390/NU14194006
24. NFZ o zdrowiu. Otyłość i jej konsekwencje. - ezdrowie.gov.pl. Accessed February 7, 2025. https://ezdrowie.gov.pl/19636
25. Veerabhadrappa P, Moran MD, Renninger MD, Rhudy MB, Dreisbach SB, Gift KM. Tracking Steps on Apple Watch at Different Walking Speeds. *J Gen Intern Med*. 2018;33(6):795. doi:10.1007/S11606-018-4332-Y