



SYSTEMATIC REVIEW

Gamified Physical Exercise and Mental Health

Ejercicio físico gamificado y salud mental

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Cite as: Ariño-Mateo E, García-Carretero J, Alonso-Rodríguez I, Olmos-Raya E. Gamified Physical Exercise and Mental Health. Salud, Ciencia y Tecnología. 2024; 4:1063. <https://doi.org/10.56294/saludcyt20241063>

Submitted: 05-02-2024

Revised: 06-04-2024

Accepted: 08-07-2024

Published: 09-07-2024

Editor: Dr. William Castillo-González 

ABSTRACT

Introduction: the incorporation of gamification into physical exercise has facilitated the exploration of its mental health benefits. Analysing the nexus between gamified physical exercise and mental well-being has yielded substantial and promising outcomes. The creation of applications to enhance adherence to physical exercise presents a multifaceted challenge, necessitating a multidisciplinary and innovative approach that encompasses psychological, motivational, and physiological factors pertinent to physical exercise. Gamified physical exercise emerges as an innovative strategy for addressing public health challenges.

Objective: this study aims to evaluate the relationship and impact of gamified physical exercise on mental health, through an analysis of published empirical studies.

Method: an exhaustive literature search was conducted in the SCOPUS and Web of Science databases, spanning from 2017 to 2022, adhering to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines.

Results: the search yielded 8 articles providing empirical evidence on the interplay between gamified physical exercise and mental health. 75 % of these studies ascertain a positive correlation, indicating enhancements in self-efficacy, stress levels, sleep quality, depression, mood, life satisfaction, and, in some instances, increased engagement in physical exercise.

Conclusions: gamified physical exercise exhibits a favourable impact on mental health, accompanied by ancillary benefits such as enhanced social relationships, motivation for ongoing exercise, enjoyment, and adherence.

Keywords: Gamification; Mental Health; Well-Being; Video Games; Physical Exercise.

RESUMEN

Introducción: la incorporación de la gamificación al ejercicio físico ha facilitado la exploración de sus beneficios para la salud mental. El análisis del nexo entre el ejercicio físico gamificado y el bienestar mental ha arrojado resultados sustanciales y prometedores. La creación de aplicaciones para mejorar la adherencia al ejercicio físico presenta un desafío multifacético, que requiere un enfoque multidisciplinar e innovador que abarque factores psicológicos, motivacionales y fisiológicos. El ejercicio físico gamificado surge como una estrategia innovadora para abordar los retos de la salud pública.

Objetivo: este estudio pretende evaluar la relación y el impacto del ejercicio físico gamificado en la salud mental, a través de un análisis de estudios empíricos publicados.

Método: se realizó una revisión exhaustiva de la bibliografía en las bases de datos SCOPUS y Web of Science, entre 2017 y 2022, siguiendo las directrices PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses).

Resultados: la búsqueda arrojó 8 artículos que proporcionan evidencia empírica sobre la interacción entre el ejercicio físico gamificado y la salud mental. El 75 % de estos estudios determinan una correlación positiva, indicando mejoras en la autoeficacia, los niveles de estrés, la calidad del sueño, la depresión, el estado de ánimo, la satisfacción con la vida y, en algunos casos, un mayor compromiso con el ejercicio físico.

Conclusiones: el ejercicio físico gamificado muestra un impacto favorable en la salud mental, acompañado de beneficios secundarios como la mejora de las relaciones sociales, la motivación para el ejercicio continuado, el disfrute y la adherencia.

Palabras clave: Gamificación; Salud Mental; Bienestar; Videojuegos; Ejercicio Físico.

INTRODUCTION

In the current digital era, an ever-increasing number of individuals integrate the internet into their daily routines. Technology's permeation into households has unveiled myriad applications, enriching everyday life.⁽¹⁾ Virtual interactions offer the unique advantage of engagement even in the absence of physical proximity. This evolving landscape of interaction models has pivoted our research focus towards their mental health benefits. Presently, virtual environments are recognised for their potential in enhancing emotional well-being within leisure contexts. Such stimulating virtual experiences are claiming more of individuals' leisure time, drawing significant research interest.^(2,3) Numerous studies have corroborated the positive correlation between virtual experiences and user satisfaction and well-being.^(4,5) In the realms of psychology and education, online platforms have been instrumental in augmenting happiness and alleviating depression among patients and students, reducing isolation and fortifying social support networks.⁽⁶⁾ An emerging trend in enhancing online interactions is through gamified elements.

Implications of Gamification

Gamification is conceptualised as the craft of embedding game-like elements in non-game contexts to achieve predefined goals or challenges, rewarded by context-specific incentives (e.g., points, badges, avatars) aimed at positively influencing behaviour.^(7,8) The realm of physical activity has witnessed an influx of platforms and apps designed for gamified exercise.⁽⁹⁾ It is crucial to distinguish between traditional video gaming and gamification; the latter focuses on encouraging engagement through the enjoyment of exercise.⁽¹⁰⁾ Unlike traditional video games that primarily deliver gratification through audiovisual elements, gamification constructs experiences that foster empowerment and independence, catalysing positive behavioural transformations.⁽¹¹⁾ This approach has garnered attention across health, psychology, and education sectors.

Gamification entails introducing various entertaining elements into non-gaming contexts.^(7,12) It adds value by bolstering user motivation. The combination of challenges, simplicity in objectives, observation, and reciprocal feedback transcends mere entertainment, imparting educational and behavioural change.⁽¹³⁾ A well-designed gamified health application, by rewarding users for achieving health-related goals, fosters continued engagement and behavioural adaptation.⁽¹³⁾ Such applications are tailored to user needs, balancing extrinsic and intrinsic motivations and selecting game rules that resonate with the user.⁽¹⁴⁾ The objective is to encourage competition either against one's previous achievements or with other users, thereby promoting exercise engagement.⁽¹⁴⁾ For such gamified applications, the theory of social interdependence has been applied, categorising games as collaborative, competitive, or individualistic based on the nature of the goals and their impact on participants.⁽¹⁵⁾

Implications for Mental Health

Understanding mental health necessitates a perspective beyond the absence of disease, encompassing behavioural and subjective facets of individuals. It is a multifaceted concept, incorporating adaptability and vitality.⁽¹⁶⁾ From a psychological and health education standpoint, mental health signifies an individual's ability to maintain positive life perceptions, manage negative emotions, and exhibit flexibility in self and others' understanding.⁽¹⁷⁾ It embodies positive interpersonal relationships, trust, respect for diversity, satisfying personal relationships, effective problem-solving skills, and the ability to adapt to environmental changes.⁽¹⁸⁾

Addressing mental health also involves understanding mental illness, particularly behaviours deviating from perceived normalcy. Theories in this field have strived to elucidate the connection between health-risk behaviours and poor physical health.⁽¹⁹⁾ Mental health's correlation with physical health and longevity is increasingly recognised, impacting at community, individual, structural, and population levels, demanding a multidisciplinary approach.^(20,21) The onset of the 21st century saw an estimated 450 million individuals globally suffering from mental illnesses annually,⁽²¹⁾ with mental disorders representing a significant portion of the global disease burden.⁽²²⁾ Efforts in mental health promotion have underscored the role of such programmes in enhancing life quality on individual and societal scales.^(23,24,21)

The recent pandemic has further strained mental health, with factors like uncertainty, stress, social isolation,

job insecurity, and restricted social and leisure activities exacerbating mental health issues.^(25,26) Addressing and managing these stressors is critical to prevent unhealthy coping mechanisms that could worsen mental health problems.⁽²⁵⁾ Thus, the development and care of mental health remain a priority, aiming to diminish mental disorders through mental health promotion.⁽²¹⁾

Mobile Applications and Gamified Exercise

The correlation between physical activity and mental health has been a focal point of research in recent years. Exercising at home has emerged as a beneficial alternative,⁽²⁷⁾ with the pandemic necessitating increased home stays and remote working, leading to a rise in sedentary lifestyles.⁽²⁸⁾ Sedentary behaviour is a leading contributor to premature mortality, alongside factors like hypertension and smoking.^(29,30) Studies indicate that regular physical exercise enhances cognitive function and guards against premature death,⁽³¹⁾ improving overall health.

Continuous and supervised physical activity has shown multiple physical and mental benefits,^(32,28) and gamified physical exercise has proven effective in developing motivation and promoting exercise adherence.⁽³³⁾ The technology industry increasingly caters to physically active users.^(34,28) Trends in video games promoting physical activity have advanced with enhanced player motion control and voice recognition technologies. Examples include “Your Shape: Fitness Evolved” or “Shape Up,” offering short challenges that blend fun with physical activity.⁽²⁸⁾

Nintendo Switch’s innovations like “Fitness Boxing” or “Sports Party,” and notably “Ring Fit Adventure” (figures 1 and 2), exemplify this trend, combining physical exercises with an adventurous context.⁽³⁵⁾ According to,⁽³⁵⁾ continued use of the “Ring Fit Adventure” game offers varied benefits, including stress reduction, motivation enhancement, improved cognitive skills, role-playing competencies, improvisation, imagination, and problem-solving skills.^(36,37) Van Uffelen et al.,⁽³⁸⁾ demonstrated the efficacy of reducing sedentary behaviour and increasing physical exercise in alleviating depressive states, while⁽³⁹⁾ noted the relaxing effects of video games.

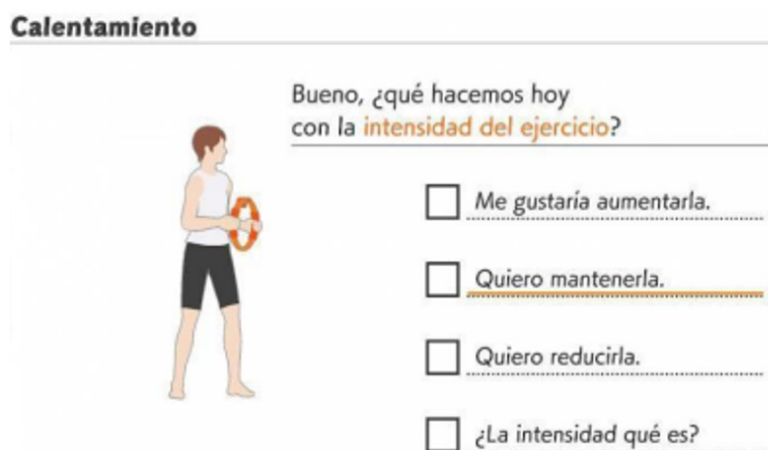


Figure 1. Suggestion of energy level at the beginning of the activity. Ring Fit Adventure, Nintendo
Source: Lloret (2019)



Figure 2. Ring Fit Adventure, Nintendo
Source: Lloret (2019)

The Evolution of Persuasive Technology and Gamification in Health

Over the past two decades, there has been a significant escalation in computerized technology focused on altering human behavior to foster health and well-being, commonly referred to as persuasive technology or positive computing.^(40,41) This advancement has given rise to an array of personal applications for self-information management and tracking.⁽⁴²⁾ Since its inception, gamification has garnered immense interest, both in the technology sector and academia, leading to an expansion in research and publications on persuasive technology.^(7,43) Researchers have recognized the substantial potential of gamification in effecting behavioral change and habit formation, particularly in health contexts.^(44,45,46) The digitization trend is increasingly permeating sports and physical exercise realms, strengthening its bond with health promotion and prevention.⁽⁴¹⁾ Modern smartphones facilitate the installation of diverse apps catering to physical health, mental well-being, exercise routines, healthy lifestyle choices, and self-help.⁽⁴⁷⁾

The MoVo Model and Wearable Fitness Technology

The MoVo (Motivation-Volition) model suggests that sustained action to enhance physical exercise in patients hinges on their health status. The application of the MoVo model includes five psychological elements: high goal self-concordance, robust purpose, realistic project implementation, action monitoring strategies, and anticipation of positive outcomes.⁽⁴⁸⁾ The integration of Wearable Fitness Technology (WFT) plays a pivotal role in understanding how gamified tools influence physical activity behavior.⁽⁴⁹⁾ WFT also impacts user engagement with sports practices, influencing gym or sports club attendance.⁽⁵⁰⁾ The Myzone application exemplifies this influence on the user-context-organization nexus.⁽⁵¹⁾ Observations indicate that experiences within clubs or gyms, leveraging social interaction and gamification, enhance application control and continuity beyond the physical confines of these spaces.⁽⁵¹⁾ Myzone has demonstrated positive social interaction outcomes among users, fostering a sense of community through installed screens in sports clubs and mobile devices, thus enhancing exercise tracking and engagement with gamified features. The Zults program, integrating exercise, Myzone, and diet, offers extensive physical and physiological data.⁽⁵¹⁾

Fitness industry experts have employed Myzone to gamify physical exercise. Gym and club professionals have utilized it to encourage sports practice and stimulate competition through a system of rewards and color-coded puzzles linked to specific heart rate zones, thereby gamifying the process and assigning points based on physical effort. The Myzone app quantifies and monitors physical activity through WFT, providing dynamic feedback to monitor progress.⁽⁵¹⁾ Gamified physical exercise enhances social interactions,^(52,53) motivates engagement, and fosters responsible behavior.⁽⁵¹⁾

Impact of Gamified Physical Activity on Lifestyle and Group Dynamics

Gamified physical activity has been shown to effectively foster an active lifestyle.⁽⁵⁴⁻⁵⁶⁾ Studies indicate that elements of gamified exercise, such as increased challenges, rewards, frequent innovations, and social multiplayer opportunities, serve as motivating factors for sustained physical exercise engagement.⁽⁵⁷⁾ Additionally, gamified exercise allows for personalized engagement through continuous updates justified by monitored activity, underscoring its adaptability.⁽⁵⁸⁾ Research by⁽⁵⁹⁾ highlights that both gamified exercise and personalized sports practices yield positive satisfaction, preference, and motivation outcomes.^(60,61) Group participation, in contrast to solitary engagement, positively correlates with ongoing use of gamified physical exercise, evidencing the potential for healthy behavioral changes.⁽⁵⁹⁾ The inclusion of challenges and rewards in gamified physical exercise positively impacts user behavior.⁽⁶²⁾

The gamification of physical activity underscores the significance of group dynamics, especially pertinent during periods such as the pandemic when physical interaction was constrained. Various applications have combated loneliness and isolation by enabling interaction opportunities. Group activities in virtual environments have emerged as a viable solution for safe socialization.

Objective

The main objective of this study was to review studies and research on the relationship between gamified physical exercise and mental health to identify the extent to which gamified activities influence psychological well-being.

METHOD

Literature Review

The literature search was conducted using the Scopus and Web of Science electronic databases. These databases were selected for their comprehensive coverage of publications pertinent to the exploration of the association between gamification and mental health. The process followed for the literature search is detailed in the flowchart presented in figure 3, adhering to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.

Inclusion and Exclusion Criteria

The review was focused on high-quality academic sources, specifically academic articles that report on the impact of gamified physical exercise on mental health. In line with this focus, the following inclusion and exclusion criteria were established:

Table 1. Inclusion and exclusion criteria	
Inclusion Criteria	Exclusion Criteria
Empirical studies published as articles, not reviews.	Conference papers, theses, abstracts, news articles, or any other documents without peer review.
Studies conducted between 2017 and 2022.	Qualitative studies.
Articles published in English or Spanish.	Articles that do not evaluate the effects of gamified physical exercise.
Articles that have measured mental health outcomes.	Articles written in languages other than English or Spanish.
Studies that have applied gamification in the context of emotional or psychological well-being.	Articles not focused on mental health.
Empirical studies published as articles, not reviews.	Gamification applied to other areas not related to emotional or psychological well-being.

Procedure

The literature search was meticulously conducted in the Scopus and Web of Science databases. The initial search yielded 75 articles from Scopus and 63 from Web of Science, culminating in a collective total of 138 articles. A thorough check for duplicates resulted in the identification and removal of 2 duplicate articles.

Subsequently, the titles and abstracts of the remaining 136 articles were scrutinised. Articles were excluded if they did not encompass the key terms “gamification,” “mental health,” and “physical exercise.” This preliminary screening led to the selection of 42 articles for in-depth full-text review.

In the final phase of the review process, a focused examination was conducted to identify empirical studies explicitly exploring the relationship between gamified physical exercise and mental health from a psychological perspective. Exclusion criteria were applied to studies if they a) examined gamified physical exercise and considered both physical and mental health as outcome variables, but failed to provide specific results on the relationship between gamified physical exercise and mental health; or b) included gamified physical exercise and psychological elements as variables, but predominantly focused on the motivation towards sports practice rather than mental health outcomes.

Ultimately, this rigorous selection process resulted in the inclusion of 8 studies that closely aligned with the study’s objectives and met the established criteria. Figure 3 illustrates the comprehensive overview of this selection process.

Description of selected documents

This section delves into a detailed analysis of the results obtained from the selected studies, focusing on the experiences and findings delineated in each article. The analysis is structured to highlight key themes and insights regarding the relationship between gamified physical exercise and mental health, as emerged from the empirical evidence. Each study is examined for its unique contributions, methodologies employed, and the specific aspects of mental health explored in the context of gamified physical exercise.

The discussion will encompass a range of variables, including the types of gamification elements used, the psychological outcomes measured, participant demographics, and the overall effectiveness of gamified physical exercise in enhancing mental health. The aim is to synthesise and interpret the findings from these studies, providing a comprehensive understanding of how gamified physical exercise impacts mental well-being and the mechanisms through which these effects are achieved.

By presenting a concise yet thorough analysis of each selected document, this section seeks to offer a cohesive narrative on the current state of research in this field, identifying gaps in existing knowledge and potential avenues for future research.

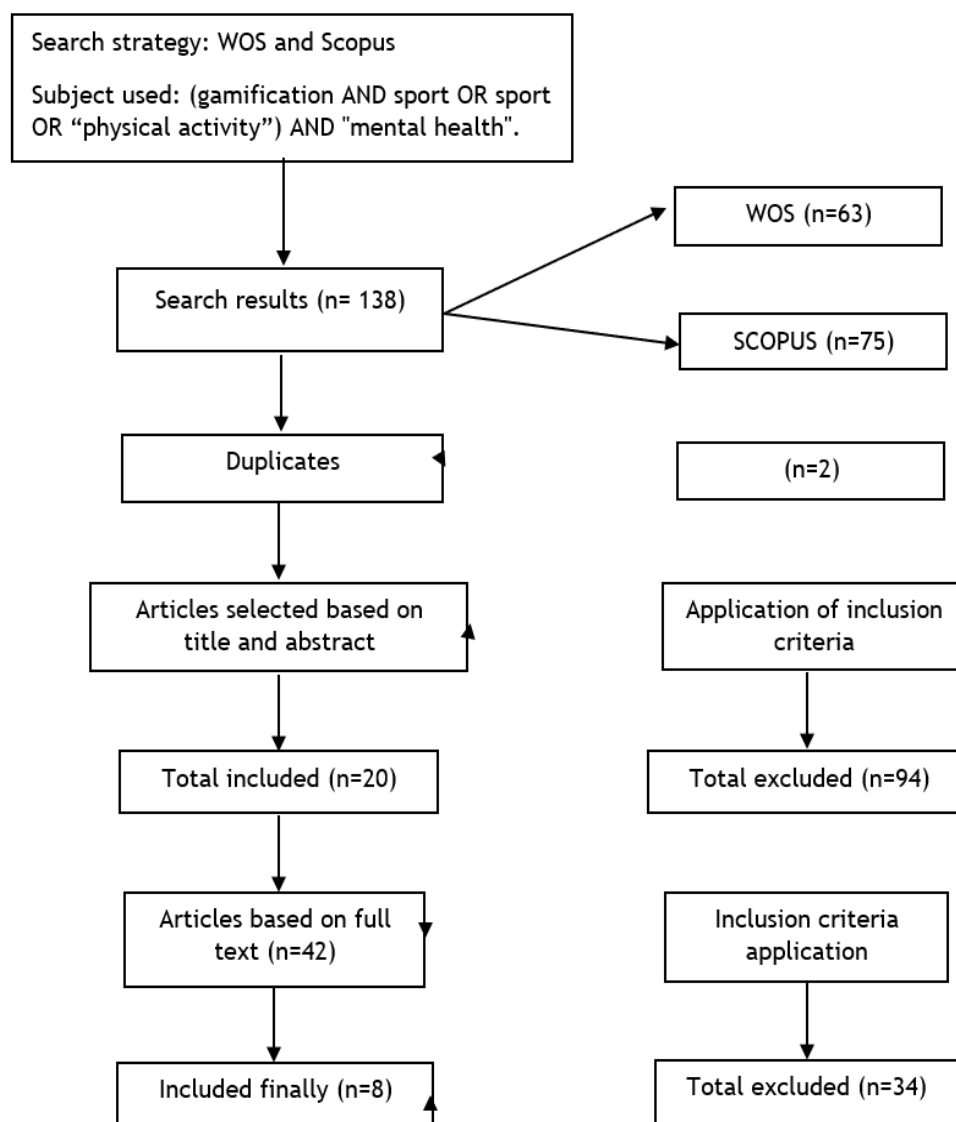


Figure 3. Steps for the systematic review

RESULTS AND DISCUSSION

The main objective of this study was to explore the relationship between gamified physical exercise and mental health. The studies analyzed consistently demonstrate that gamified physical exercise positively influences mental well-being in individuals who partake in it. This review has underscored the multifaceted benefits of physical exercise - encompassing well-being, enjoyment, sociability, satisfaction, and engagement - irrespective of the modalities of execution or the context of the exercise.

Data analysis reveals a marked improvement in mood among individuals engaging in gamified physical exercise, alongside a decrease in negative psychological states.⁽⁶⁶⁾ Randomized controlled trials, such as those examining the 'Fun for Wellness (Ffw)' program, have highlighted its efficacy in enhancing subjective well-being, physical activity, and self-efficacy.⁽⁶⁷⁾ Furthermore, the study on 'Pokémon Go' participants indicates mental health benefits coupled with an increase in physical exercise levels.⁽⁶⁸⁾ Applications like 'Move It' and 'Balance It' have shown promising results in improving mental health (stress) and sleep quality. Notably, among participants exhibiting depressive symptoms at the outset, 35 % reported an improvement in their condition.⁽⁶⁹⁾ The wellness program integrating gamification elements witnessed high participation and significant long-term benefits in both mental and physical health during its first year.⁽⁷⁰⁾ Participants initially suffering from depression showed notable enhancements in mental well-being and stress reduction.^(69,66)

The evidence supports a positive correlation between physical activity and mental well-being.⁽⁷¹⁾ The results suggest that engaging in gamified physical exercise can significantly improve athletes' emotional states.^(72,66,7,73) Gamification has proven effective in enhancing adherence to sports practice and fostering healthy habits,^(60,74,61) resulting in marked improvements in mood and overall life satisfaction.⁽⁷⁵⁾

Table 2. Summary of the selected documents

Author	Objective	Design	Sample	Evaluation	Main results
Scarpa et al., (2021)	Evaluate the user experience and engagement with the Ffw platform.	Quantitative and qualitative.	In the quantitative study, 500 participants were involved in 2015, and 900 participants were involved in 2019. In the qualitative study, 91 participants were involved, with the most common age range being between 35 and 54 years old.	The I Coppe survey and measures of self-efficacy were used in both experimental controlled trials (ECAs). In the case of the second ECA, additional measures of physical activity were included, as well as the SF-36v2 health survey, which assesses physical and mental health. Participants were instructed to participate in the 24/7 platform, and after 30 days, they were instructed to complete the same battery of measures as at baseline, along with a user experience questionnaire. At 60 days, the battery of measures administered at the beginning of the study was completed again.	Randomized controlled trials (RCTs) have shown that FFW (Fit for Wellness) is effective and efficient in improving various aspects of subjective well-being, physical activity, and self-efficacy.
Brown et al. (2020)	Intervention of self-guided, automated, web-based acceptance and commitment therapy in a health promotion program to improve and foster subjective well-being and engagement with lifestyle.	Feasibility trials. Experimental design at two time points.	In the quantitative study, 100 participants were recruited for 4 test arms, with 25 participants in each arm, ranging in age from 18 to 65 years, with most women. For the qualitative study, 8 participants completed the feedback survey.	The control group used "Champions for Health" with five modules: smoking cessation, responsible drinking, weight optimization, regular exercise, and healthy eating. Intervention group 2 used Champions for Health plus the ACT-based well-being module (Activate your Well-being). Intervention group 2 used Champions for Health and Activate your Well-being, plus five well-being films. Intervention group 3 used Champions for Health and Activate your Well-being, plus a social norm message.	The number of participants who enrolled in at least one health behavior change module was high at 75 %, and 43 % enrolled in the well-being module. However, adherence and engagement were low at 6,8 %.
Rowntree, & Feeney (2019).	Improving our understanding of video game and smartphone game use and perceptions among patients.	Quasi-experimental.	Ninety-three patients (n=93) responded, with a mean age of 40,04 years (min. 19 and max. 71).	A cross-sectional and anonymous survey was conducted, with self-selected and self-administered respondents. Data were analyzed using SPSS version 24 (IBM Corp., 2016).	In this study, participants who used Pokémon Go found that it provided mental health benefits while increasing their levels of physical exercise.
Lowensteyn et al., (2019)	Evaluate the results of workplace well-being incorporating gamification principles.	Prospective experimental cohort study, evaluating health outcomes after 2 years.	A total of 775 employees from a pharmaceutical company participated (n=775). Participation was voluntary and free of charge.	The personalized holistic wellness program was delivered using key elements, including Move It (exercise), Fuel It (nutrition and weight management), and Balance It (mental health).	The best results were seen in mental health (stress), which improved by 22 %, and sleep, which improved by 25 %. Of the 25 employees who reported depressive symptoms at the beginning of the study, their depression scores improved by 35 %.
Harris, (2018).	Study the relationship between gamified physical activity and mental well-being, with a focus on those who are inactive as the main objective.	Experimental design, one-way analysis of variance (ANOVA).	The initial sample size was n=1686 participants who completed the initial mental well-being assessment. The final sample size was n=167 individuals who provided follow-up and reference data.	The intervention program used in this study was Beat the Street, which utilizes gamification to promote physical activity. Physical activity levels of the users were measured using the Scottish Physical Activity Screening Questionnaire (Scot-PASQ). Mental well-being was measured using the Warwick-Edinburgh Mental Well-being Scale (WEMWBS). ⁽⁶³⁾	Regarding the relationship between physical activity and mental well-being, it can be concluded that there was a strong positive connection between physical activity and mental well-being, with this relationship being statistically significant.

Cayetano et al., 2022)	Study the emotional state of basketball athletes after engaging in gamified physical exercise during pandemic-induced confinement.	Quantitative research. A quasi-experimental design with pretest and posttest measures was conducted in a field setting.	The sample consists of n=26 basketball athletes from three different levels: youth, junior, and senior, with a mean age of 16,65 (+3,84) years.	The measurement instrument used was the Profile of Mood States (POMS) developed by McNair et al. in 1971. ⁽⁶⁴⁾ Paired-samples t-test was used to assess emotional differences before and after gamified physical activity. Each participant engaged in gamified physical activity using the IMOVIE application.	The results obtained showed that engaging in gamified physical exercise improved the emotional state of the basketball players.
Pyky et al., (2017)	Effects of a mobile, adapted, and gamified physical activity intervention on life satisfaction.	Scientific experiment consisting of a six-month randomized controlled trial (RCT) with parallel groups.	All the men who attended the recruitment for military service in the Oulu area of Finland completed a questionnaire, but only n=1035 participants completed it, and n=811 participated in the final measurements. In the randomized controlled trial (RCT), n=496 men aged approximately 18 years participated for a duration of six months.	Both intervention and control groups were provided with physical activity monitors (Polar Active, Polar Electro Ltd., Finland). After the reference week, the intervention group had access to a new mobile service called Moportal aimed at motivating participants physically, mentally, and socially, and received feedback through the Moportal. The questionnaires administered were "Physical activity and readiness" and "Physical activity and sedentary behavior". ⁽⁶⁵⁾	In this study, life satisfaction increased, with a higher success rate observed among men who had low mood levels at the beginning of the study. This suggests that gamified physical exercise may be effective for young men with low life satisfaction.
Tu et al., (2019).	Making physical exercise more enjoyable by proposing that fitness apps be more social to provide better value and increase consumer engagement in physical exercise.	Experimental design with pretest and posttest assessment of physical fitness.	A total of n=144 students participated, with an age range between 19 and 24 years, and 67 % of them were women. Out of the n=144 participants, 128 completed the study, with 65 using WeChat Sports and 63 using Walkup.	A seven-week follow-up study was conducted to assess physical fitness. Two physical activity applications, Walkup with game elements to improve emotional value, and WeChat Sports which focuses on increasing social value, were selected. Both applications represent different orientations of gamification. The two applications recorded daily step counts and physical activities of the participants. One week after the physical fitness follow-up study, participants' intentions to continue exercising with the application were measured.	En este estudio, los participantes que utilizaron la aplicación WeChat Sports, la cual se enfocaba en el valor social, mostraron un mayor rendimiento en términos de ejercicio físico (caminar) y también reportaron mayores intenciones de continuar ejercitándose con la aplicación en comparación con los participantes que utilizaron la aplicación Walkup, la cual se centraba en el valor emocional. Esto sugiere que la gamificación con un enfoque en el valor social puede tener un impacto positivo en el rendimiento y la motivación para el ejercicio físico en comparación con un enfoque basado en el valor emocional.

Given the positive impact of gamified physical activity on mental health, it is recommended that health organizations, sports centers, and educational institutions promote activities incorporating new tools, programs, and apps for gamified sports practice. There is a compelling need to advocate for gamified practices and harness their benefits for fostering positive health and well-being behavior changes. The diversity of gamified applications, tailored to the needs and characteristics of each user, offers a plethora of choices, thereby enhancing user adherence, commitment, satisfaction, and motivation.^(58-61,75, 76,)

The accessibility of numerous applications and apps in the market presents a unique opportunity to make gamified sports practice more inclusive, catering to various age groups and populations. This could potentially establish gamified sports practice as a common activity, directly benefiting the physical and mental health of many users who value accessibility and flexibility. Customizing applications to suit different age groups, considering the developmental needs of each demographic, is crucial, particularly for those at risk of mental disorders. The accessibility of these products to socially, economically, or health-disadvantaged groups is equally vital. Gamified physical activity programs focusing on maintaining interest in continued exercise have employed strategies like challenges, reinforcement, and interaction. However, the evolving nature of this exercise form necessitates further studies to validate and assess the effects of gamified sports practice more ecologically and naturally. Many studies suggest that fun-oriented fitness applications (through gamification) can increase user engagement, thereby promoting and extending physical activity.^(1,77,78) The findings underscore the significance of social interactions in encouraging long-term maintenance of gamified physical exercise. The emerging importance of social relationships and support in optimizing emotional and psychological states highlights a new research avenue that requires more sensitive and ecological studies considering variables specific to real-world, user-centric sports practice contexts.

CONCLUSIONS

From the analysis and results of the documents reviewed, several key conclusions can be drawn. Despite the limited number of studies specifically focused on the positive effects of gamified sports practice on mental health improvement, the existing evidence provides a promising foundation for further exploration in this area. The eight studies analyzed reveal a significant relationship between physical exercise and the development of well-being, sociability, satisfaction, commitment, and overall physical health improvement.

Moreover, gamified physical activity has been shown to positively impact mood and overall mental health, leading to notable improvements in mental and psychological states. Gamification has emerged as an effective tool in enhancing adherence to sports practice and in establishing healthy habits. Continuous participation in gamified sports practice leads to lasting benefits in both mental and physical health.

However, the effectiveness of adherence and sustained commitment to sports practice varies based on personal and individual characteristics, indicating the need for tailored approaches to maximize the benefits of gamified sports activities. These findings underscore the potential of gamification in promoting long-term engagement and health benefits in sports practice.

Study Limitations

This study encountered several limitations that should be considered when interpreting the results. One significant limitation was the sample size, as in at least two studies, the number of participants was lower than expected, necessitating larger sample sizes for greater data confidence. Additionally, the use of economic incentives as a motivating factor might have introduced motivation bias in participant responses. Future studies should focus on intrinsic motivators, such as the enjoyment or well-being provided by gamified physical activity.

Another issue was adherence, with long-term adherence problems in some studies leading to reduced sample sizes by the end of the research. The lack of a control group also limited the ability to assert with certainty that the observed benefits were directly due to the intervention, as there was no group for comparison.

Self-reporting bias was another concern, as self-reported data collection methods might introduce biases based on the individual's perceptions. Furthermore, uncontrolled variables, such as the frequency and familiarity with the apps, could have influenced responses. External factors, such as social relationships or non-gamified physical exercise, might also have impacted the observed mental health improvements. These limitations highlight the need for more robust and controlled study designs in future research.

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FINANCING

The authors did not receive financing for the development of this research.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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