SYAD / JOSMR

Stratejik Yönetim Araştırmaları Dergisi

Journal of Strategic Management Research

Geliş Tarihi/Received: 26.08.2022 Kabul Tarihi/Accepted: 21.09.2022

Yayın Tarihi/Published: 30.09.2022 *Araştırma Makalesi/Research Article*

Doi: 10.54993/syad.1167217

USING DIGITAL GAMES AS A STRATEGIC TOOL TO REINFORCE POSITIVE HEALTH BEHAVIOUR

OLUMLU SAĞLIK DAVRANIŞI GELİŞTİRMEDE STRATEJİK BİR ARAÇ OLARAK DİJİTAL OYUNLARIN KULLANIMI

Öğr. Gör. Dr. Hakan KAÇAK
Ankara Üniversitesi
ORCID iD: 0000-0001-6415-7224, hkacak@ankara.edu.tr

ÖZ

Teknoloji, sağlık sektöründe hayati bir rol oynamaktadır. Bunun sonucunda dijital sağlık hizmetleri ivme kazanmakta ve oyunlaştırmanın teşhis, koruyucu, tedavi edici ve palyatif bakım için hastalar ve hasta olmayanlar için kullanımını gündeme getirmektedir. Oyunlaştırma, sağlık sektöründe eğitim amaçlı, hasta izleme, tıbbi uyum ve mesleki eğitim için de uygulanmaktadır. Dijital sağlık oyunları, hızlı ve kolay erişilebilirlikle geniş bir kitleye hitap edebilir uygulamalar olsalar da henüz kullanıcıların uzun vadeli motivasyonunu ve katılımını sağlayacak kadar yetkin değiller. Bu çalışma dijital sağlık oyunlarının sınıflandırılmasına, uygulama alanlarına, başarılı dijital sağlık oyunlarına katkıda bulunan stratejilere ve faktörlere ve bunların sağlık davranışı değişikliği üzerindeki etkilerine odaklanmaktadır.

Anahtar Kelimeler: Dijital Sağlık Oyunu, Oyunlaştırma, İyilik Hali, Kronik Hastalıklar, Sağlık Davranışı.

ABSTRACT

Technology plays a vital role in the healthcare industry. Consequently, digital healthcare is gaining momentum, which brings forth the usage of gamification for predictive/preventive care, diagnosis, therapy and palliative care for patients and non-patients. Gamification is also applied for educational purposes, patient monitoring, medical adherence and professional training in the health sector. Digital health games promise to address a broad audience with quick and easy accessibility but are not competent enough to ensure users' long-term motivation and engagement. This paper focuses on the classification of digital health games, their implementation areas, the strategies and factors that contribute to successful digital health games and their effects on health behaviour change.

Keywords: Digital Health Game, Gamification, Well-Being, Chronic Diseases, Health Behaviour.

1. Introduction

Technology plays a vital role in the healthcare industry as we know it. It transforms the methods, techniques and procedures and perspective as well. This, being the case, the common practice of visiting a doctor just when someone is ill is gradually vanishing, and digital healthcare is gaining momentum. It would be correct to say that today's health sector is digital. There is no denying the prevalence of various imaging techniques, including x-rays, MRI, CT, ultrasound scans, and much more. In fact, modern medical imaging content is almost entirely high-tech and wholly digital (Mestress, 2017, p. 3). These advancements also bring forth the use of digital games and the term "gamification" for healthcare and well-being, which is simply defined as the use of game elements in a non-game context. Gamification appears to be a successful method in many areas of human life. It is used widely in education, enterprise, military, design and health. People's motivations are boosted by games or other entertaining components. Consequently, it becomes simpler to carry out demanding and challenging tasks via games (Maturo and Moretti, 2018, p. 1).

Health-related gamification trends have grown more quickly and extensively. On the one hand, this situation is mainly a result of changes in major health risks that have happened in recent decades at least in Western cultures where the primary health issues are no longer classic, pre-modern dangers like starvation, poor water quality, and indoor air pollution, but rather issues brought on by the modern world itself. Today the leading cause of death is chronic diseases. Sedentary behaviour, stress, excessive drinking and cigarette use, high intake of energy-dense foods other unhealthy behaviours and lifestyles are regarded as major risk factors, which result in high blood pressure, high blood glucose, high cholesterol and obesity (Johnsons et al., 2016; Maturo and Moretti, 2018, p. 1). According to the National Center for Chronic Disease Prevention and Health Promotion (NCCDPHP) "90% of the nation's $4.1 trillion in annual health expenditures are for people with chronic and mental health conditions". Therefore, in this case, a strategy may be to encourage the participants to adopt healthier behaviours, which digital health games can facilitate. With this aim, gamification is used to create web applications with the potential to better facilitate and incentivize self-management in people with chronic conditions. Persuasive technologies that monitor, self-track, and provide feedback on behaviour and facilitate social support are leveraged (Miller et al., 2014; Orji, 2016). Interactive video games appear to be an effective tool for promoting lifetime physical activity (Christie and Trout, 2007). In addition, digital health games also have a place in the literature on health informatics as a method of enhancing care. It is used to investigate how healthcare professionals use data to design their work for the patient, their institution and professional identity (Wallenburg and Ball, 2018).

According to 2016 data, the size of the digital health market, including health IT, mobile health wearables, EHR/EMR, personal genomics, population health management, medical imaging, telehealth and gamification in healthcare is more than 275 billion, and it is estimated that the market will exceed 710 billion dollars in 2025. The digital health market's share of gamification in healthcare was calculated as 16 billion dollars as of 2016. It is estimated that this figure will reach 40 billion dollars in 2024 (Capgemini, 2018).

2. Conceptual Framework

2.1. Digital Games and their Status in the Health Sector

Games have existed throughout human history. They are divided into two categories in the literature: traditional and digital games. While the games assessed on the traditional game idea involve more movement and physical exercise, it is evident that the games under the digital game concept involve more mental engagement than physical activity (Hazar and Hazar, 2017). Digital gaming includes various activities done using an electronic device in an online or offline setting, both alone and as a team (Esposito, 2005). In other terms, the definition of a digital game is a game that offers realistic simulation, dynamic pictures, and sound effects (Liu and Chen, 2013). It would be appropriate to look at the definition of health in order to decide whether the usage of games is beneficial in the health sector. The general definition of health is perceived as being free of illness or injury. However, World Health Organization (WHO) makes an extensive definition and defines it as: *"Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity"*. Gamification's primary goal is to encourage participants to commit to and maintain engagement in desired behaviour. Gamification, in particular, piques users' interest in friendly competition and social interaction to produce motivators for making lifestyle changes. Successful products combine these game tactics for incentive with a compelling user experience (Deloitte, 2016). Thus, it may be inferred that the games dealing with healthy habits such as physical exercise may be used in e-health along with the games dealing with disease management and professional training.

The games used in the health sector may be named as "serious games". Even though there is no single definition for serious games, it is stated on the web page of Victoria State Government that:

> "It is widely accepted that a serious game in an educational setting is considered to be a purposeful learning environment that targets key curriculum areas for explicit learning. Serious games are games or game-like interactive systems developed with game technology and design principles for a primary purpose other than pure entertainment."

The lines above suggest that serious games involve pedagogical aims rather than providing fun. The designer of the game, plans to achieve cognitive and behavioural changes, which are also among the focus of e-health. Wattanasoontorn et al. (2013) explain that all games consist of five components: Rule/Gameplay, challenge, interaction, explicit objective and implicit objective. It is essential to mention that serious games have implicit objectives, whereas commercial games have an explicit objective, which may be named as entertainment. Implicit objectives include skill improvement, gaining knowledge and more experience, physical improvement and recovery (Wattanasoontorn et al., 2013).

2.2. Gamification Strategies for Promoting Behavioural Changes for Well-being in Health

Seven core ingredients of gamification have been identified to trigger behavioural changes in health, which are listed in Table 1. The first six are common strategies that are used in most fields and serious games. However, fun is neglected from time to time, which is an essential element of gamification. In other words, the mixture of components that give a product its entertaining and engaging qualities is the persuasive architecture of gamification. If you eliminate some of these essential components, the product becomes dull,

and the magic happens once they are reintroduced. Therefore, it is vital to include the fun factor among the others (Cugelman, 2013):

Table 1

The persuasive architecture of gamification and its 7 persuasive strategies

Strategy	Definition
Target setting	Committing to a target's accomplishment
The ability to overcome obstacles	Growth, learning, and development
Giving performance feedback	Constantly getting feedback from the experience
Reinforcement	Earning rewards, evading punishments
Compare improvement	Tracking one's own and other people's improvement Monitoring progress with self and others
Social interaction	Interacting with others
Fun and engagement	Acting out a different world

2.3. Key Factors Related to the Success of Gamified Products

Researchers and business professionals have identified three key factors that influence the success of gamified products (Deloitte, 2016):

The Fun factor: Effective health games should encourage patients to fulfil their objectives in a pleasant manner. Therefore, games must have objectives that players can relate to and are motivated to pursue.

The Friends factor: Games can also have features that let players challenge other competitors and enter competitions in order to incite competitive motivation.

The Feedback Factor: Individuals can actively personalize their profiles and follow their medical histories by consistently tracking their health state. The two-way messaging and fast feedback features instruct patients on good habits and the negative effects of harmful ones. Gamification software should also provide easy-to-use menus and concise explanations of difficult medical words and conditions in order to boost adoption rates and foster long-lasting interactions.

The strategies defined in section 4 and this section are complementary for ensuring the success of e-health games.

2.4. Classification of Digital Health Games

Games have different requirements, objectives, and instruments depending on how they intend to influence the patient experience. They can be applied in predictive/preventive care, diagnosis, therapy and palliative care. A taxonomy for health games was created by the Games for Health Project, a project that established a network of experts and academics in the games for the health sector. Preventative, Therapeutic, Assessment, Education and Training, Informatics, and Production are the taxonomy's primary categories. Additional details about the games for health classification are provided in Table 2. (Ben Sawyer, Digital, Inc. & Games for Health Project, as cited in Hall and Marston, 2014):

Table 2

The games for health taxonomy

	Personal	Professional practice	Research/ academia	Public health
Preventative	Health assets: PERMA, exergaming, stress, nutrition	Patient communication	Data collection	Public health policy and social awareness campaigns
Therapeutic	PT/OT sensorimotor rehabitainment disease management	Pain distraction cyber psychology disease management	Virtual humans	First responders
Assessment	Self-ranking	Measurement	Inducement	Interface/visualization
Education and training	First aid, patient education health literacy	Skills/training	Recruitment	Management sims
Informatics	Personal health record (PHR)	Electronic medical record (EMR)	Visualization	Epidemiology
Production	Personal data collection quantified self	Biotech manufacturing and design	Biotech manufacturing and design	Large-scale data collection and monitoring

A similar taxonomy is given in Deloitte's report (2016) with a brief description of each game, which clarifies the type of the game with the appropriate healthcare area. The taxonomy is demonstrated in Table 3.

Table 3

Type of Digital Health Games and Descriptions (Deloitte, 2016)

Type of Game	Healthcare Field	Aim	Usage and Feature
Educational	Diagnosis Palliative Care	provide information on health-related topics	spreading knowledge and educating others about certain illnesses, epidemics, symptoms, etc.
Engagement	Diagnosis	prevent unhealthy conduct	triggering heathy behaviour by holding users responsible for their choices, we can encourage promoting active engagement in the diagnosis of illnesses
Therapy	Palliative Care	assist the management of serious illnesses	enhancing the reward system and neural pathways that produce pleasant feelings in patients in order to increase their resistance to numerous chronic diseases.
Patient Monitoring	Diagnosis Palliative Care	track users' health status	competing with other users over KPIs and publicizing accomplishments on social media channels. diagnosis of disorders, mostly behavioural.
Medication Adherence	Preventive Care Palliative Care	motivate patients to follow their prescribed medication schedule	earning points for following medication schedules, responding to questions about various diseases, and having prescriptions filled.
Professional Training	Predictive/Preventive Care Diagnosis Therapy Palliative Care	tutor medical personnel	performing duties in a gamified space based on experimenting with various outcomes via trial and error. development and sharpening the skills of medical students' and practitioners' (e.g., robotics surgery).

As stated by Wattanasoontorn (2013), it is also important to mention the classification of e-health games in terms of "player", which refers to both the patient and non-patient. The difference lies in the objectives. The objectives for the patient may be listed as follows:

- Health monitoring
- Detection
- Treatment
- Rehabilitation
- Education for self/directed care

On the other hand, the objectives for the non-patient focus on two areas:

- Health and wellness: Focus on lifestyle issues
- Training and simulation: Target professionals and non-professionals.

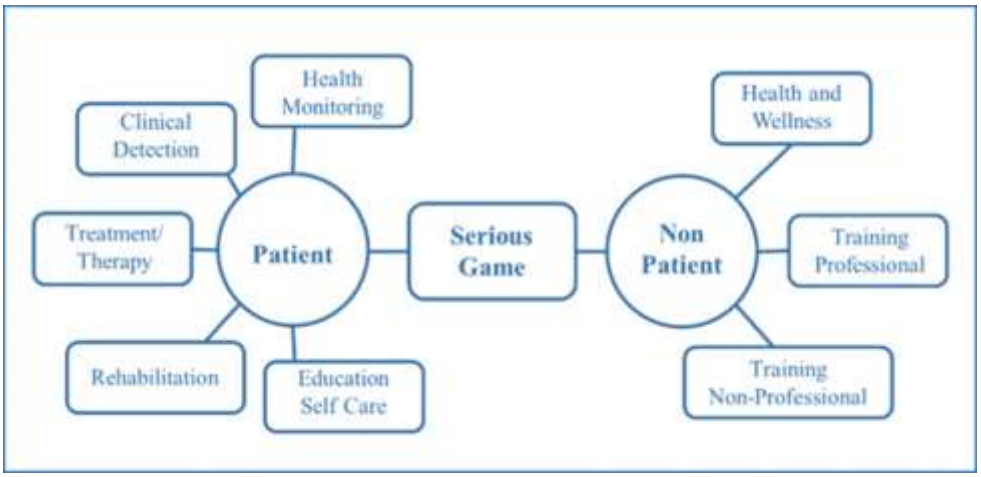

Figure 1. Classification of serious games for health by player (Wattanasoontorn et al., 2013)

2.5. Pros and Limitations of Digital Health Games

Digital health games embody significant advantages along with several limitations and disadvantages. Table 4 (Johnson et al., 2016; Deloitte, 2016) provides a brief summary of the reasons why gamification may be useful for changing health behaviours in the present as well as the limitations it carries.

Table 4

Pros and Limitations of Digital Health Games

Pros	Limitations
Provide intrinsic motivation	Sustainability of motivation is challenging: Users lose interest quickly.
Provide instant feedback	Embody extrinsic rewards: lead to short-term engagement.
Have broad accessibility through mobile technology and ubiquitous sensors	Difficult to ensure medical data security and patient privacy.
Bear broad appeal: game elements become more approachable and attainable to extensive audiences within each day.	Many obstacles occur while creating efficient IT healthcare systems: IT healthcare system certification procedures are time-consuming and expensive.
Have broad applicability: main chronic health hazards include exercise, a healthy diet and weight management, adherence to medicine, therapy, mental health, drug usage, and patient involvement in chronic diseases like diabetes or cancer.	High cost of game design

Fit everyday life
Support well-being: generate positive experiences and emotions; foster a feeling of accomplishment.

2.6. Health Behaviour Improvement Studies on Digital Games

As a part of the health promotion activity, health behaviour improvement is one of the main topics in healthcare. This is mainly due to increasing healthcare costs, which lead health policymakers to explore a rational way to curb costs. In this perspective, self-care is the most efficient and cheapest alternative. Since gamification is one of the most effective tools to change behaviour, it may be used in self-care and as a favourable impact on the healthcare sector as well (Hamari et al. 2014).

Several studies on digital health games/ serious games have been conducted so as to determine their scope and effectiveness in healthcare. These studies comprise professional and non-professional healthcare treatment of children and elderly, and a wide range of other healthcare areas. They may be listed as follows:

A study by Tomaselli et al. showed that gamification successfully instructs attentive, economical care to Emergency (EM) patients. The study depicts that gamification is an enjoyable and interesting option that ought to be used more frequently in EM educational formats. They developed a game named the *Price is Right* to teach cost-awareness to resident emergency physicians.

Another significant study is completed by Michmizos and Krepse (2012), who facilitated the use of serious games for children with Cerebral Palsy disease during robotic therapy. They found that serious games facilitate training of the damaged ankle in Dorsi-plantar flexion and inversion-eversion by being visually led and evoked, easy to play, and portable. The usage of serious games for the treatment of younger people is not limited to this. Parisod (2018) for instance, worked on the development and evaluation of the feasibility of a health game intervention, which supports tobacco-related health literacy in 10 to 13-year-old early adolescents. She found strong evidence between video games and promoting physical activity. In addition, Hu et al. (2014) employed serious game and gamification techniques to help the management of paediatric obesity. They created a children's social network game, in which the system primarily uses behaviour treatment, giving parents and kids access to two different types of user terminals, informing parents scientifically and teaching children about obesity within the game frame. Knöll and Moar (2012), on the other hand, looked into how digital health games encourage young diabetic users to take care of their condition on a daily basis.

As for the elderly, Hartin et al. (2014) developed a smartphone app with gamification components to motivate older persons with Alzheimer's disease and monitor their behavioural improvement. They discovered positive findings about behavioural change. Another research with regard to the physical fitness of the elderly is conducted by Brauner et al. (2013). They investigated the relationship between ExerGames (Fitness games) and physical fitness. They observed a generally positive impact on pain perception after the Exergame intervention. Physical rehabilitation via gamification is studied by Madeira et al. (2014) and Schonauer et al. (2011). They utilised Natural User Interface (NUI) tools like Microsoft Kinect as well as gamification and found that patients were optimistic about the

game and relished training with the game. Exergames can help people improve their motivation, confidence, and comprehension of physical activity. It is probable that these games will have a good impact on young people's knowledge, abilities, attitudes, and habits regarding health and physical activity (Charikleia et al., 2011). ExerGames are employed in a variety of settings, including rehabilitation programs and fitness plans similar to personal trainers (Malaka, 2014).

Management of chronic diseases, treatment of patients with motor difficulties and cervical cancer may be listed among other areas in which studies on gamification have been administered. For instance, Miller et al. (2016) concluded that gamification might be used to create applications that could better support self-management in people with chronic diseases. Furthermore, according to Martins et al. (2015) serious games are practical tools for patients with motor difficulties to motivate them to continue receiving treatment. As for cervical cancer, Nirmal et al. (2013) developed a digital health game to inform women about (HPV)/cervical cancer prevention and treatment. Ninety per cent of users thought the game was a better teaching tool than the established ones.

Aforementioned, gamification is effectively used by non-patients for prevention of diseases and enhancing health and fitness. Namely, Zhao et al. (2016) investigated the feasibility and possible benefits of using wearables to gamify health and fitness. Similarly, a smartphone application was created, which aimed at influencing users' behaviour through engagement in a group. It was built so as to demonstrate the utility of persuasive technology in altering users' eating habits and encouraging a healthy lifestyle. It also depicts how gamification can be used as a motivational trigger (Pereira et al., 2014).

According to research, games can benefit the brain. Puzzles such as jigsaws, crosswords, and number puzzles have been revealed to improve cognitive performance in the elderly. Meanwhile, numerous studies have discovered that board games, chess, checkers, and other analogue games can boost the processing of the brain and memory (Li, 2021)

A combination of proper digital game use and other play therapy interventions can significantly improve the therapeutic process's connection, relationship, treatment progression, evaluation, comprehension, motivation, and enjoyment (Stone, 2020).

Gamification may also be applied successfully for social interaction. Chen and Pu (2014) investigated the effects of gamification methods on social interaction, such as playing together. The results depicted that users engaged more in physical activities while in a group. They also found a positive correlation between physical activity and the number of messages the users exchanged in the group. Likewise, Prada-Dominguez et al. (2014) suggested an application for tracking lower member physical activity while the user engages in certain movements inside a gamified system. The system includes point incentives that rise or fall in proportion to how well or poorly the routine is carried out. It was concluded that by utilizing gaming mechanics for physical exercise, it is possible to overcome issues such as lack of motivation and subjective evaluations. In addition, the created software is easily adaptable to exercises for the upper body as well, since it defines exercise mechanics that have been verified with a healthcare professional. Lastly, Sardi (2017) examined the gamification components and functions of the available mobile blood donation applications.

3. Conclusion

It may be stated that gamification trends relating to health have expanded more quickly and significantly in the last decade. Undoubtedly they will continue to have a prominent place in the health sector with the advancements in technology and the busy and demanding lifestyle of today. The individual of the modern world either suffers from chronic diseases such as diabetes, cancer and heart disease or attempts to engage in various prevention methods. Thus, digital health games are useful for both patients and non-patients. Today, individuals do not only aim to be free from illnesses, but they also wish to attain an overall condition of mental, bodily, and social welfare. E-health games seem to address all these issues with the fields of healthcare they offer. They incorporate a large scope of areas from education and professional training to prediction, therapy, patient monitoring, medication adherence, rehabilitation and assessment. They offer significant health behaviour change; which contributes to the well-being of the person and the functioning of the health sector. Studies demonstrate that they have proved to be beneficial for all the groups in the society; the young and the elderly. They are beneficial in professional treatment as well as non-professional treatment in a wide scope of areas. Their accessibility and engaging design motivate users easily. Instant feedback and promotion of positive feelings contribute to their success as well. Nevertheless, it is challenging to establish the continual commitment of the users. If the dedication of the user is provided, digital health games may be used to increase awareness, encourage the participants to adopt healthier behaviours and develop the self-management skills of patients with chronic diseases. It would also benefit policymakers to consider digital health games in health promotion activities. Research in this area should be encouraged, and the results should be compared. When cost-effective alternatives are proposed, the governments should encourage them.

Digital games will facilitate more creative solutions to develop and adopt positive health behaviour in the near future. The important thing is to support best practices that can lead to permanent solutions.

References

Brauner, P., Calero Valdez, A., Schroeder, U., & Ziefle, M. (2013). Increase physical fitness and create health awareness through exergames and gamification: The role of individual factors, motivation and acceptance. Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lektöre Notes in Bioinformatics), 7946 LNCS, 349–362. https://doi.org/10.1007/978-3-642-39062-3_22/COVER/

Charikleia, P., Antoniou, P., Batsiou, S., Bebetsos, E., & Lymnioudis, A. (2011, October). Exploring the Benefits of Digital Interactive Games on People's Health. In *European Conference on Games Based Learning* (p. 750). Academic Conferences International Limited.

Capgemini. (2018). Digital Health Transforming Healthcare. https://www.capgemini.com/be-en/wp-content/uploads/sites/17/2018/10/Digital-health-final-paper-22.10.pdf

Centers for Disease Control and Prevention. (2022, June 6). Health and Economic Costs of Chronic Diseases. Centers for Disease Control and Prevention. Retrieved July 8, 2022, from https://www.cdc.gov/chronicdisease/about/costs/index.htm#:~:text=Nothing

Chen, Y., & Pu, P. (2014). HealthyTogether: Exploring social incentives for mobile fitness applications. ACM International Conference Proceeding Series, 25–34. https://doi.org/10.1145/2592235.2592240

Christie, B., and Trout, J. (2007). Rather than contribute to a sedentary lifestyle, these games demand activity from the players. Interactive Video Games in Physical Education, 78(5), 29–45.

Cugelman, B. (2013). Gamification: What it is and why it matters to Digital Health Behavior Change Developers. JMIR Serious Games, 1(1). https://doi.org/10.2196/games.3139

Deloitte. (2016). Boosting Patient Empowerment and Motivational Pull Achieving the Next Level in a Gamified Health Environment. In Monitor Deloitte (Issue 02). Retrieved July 7, 2022, from https://www2.deloitte.com/global/en/pages/strategy-operations/monitor-deloitte/topic/monitor-deloitte.html

Esposito, N., 2005. A short and simple definition of what a videogame is. Available from http:// www.utc.fr/~nesposit/publications/esposito2005definition.pdf.

Hall, A. K., & Marston, H. R. (2014). Gaming and older adults in the digital age of healthcare. Handbook of Smart Homes, Health Care and Well-Being, 1–9. https://doi.org/10.1007/978-3-319-01904-8_55-1

Hamari, J., Koivisto, J., & Sarsa, H. (2014). Does gamification work? - A literature review of empirical studies on gamification. Proceedings of the Annual Hawaii International Conference on System Sciences, 3025–3034. https://doi.org/10.1109/HICSS.2014.377

Hartin, P. J., Nugent, C. D., McClean, S. I., Cleland, I., Tschanz, J. T., Clark, C., & Norton, M. C. (2014). Encouraging behavioral change via everyday technologies to reduce risk of developing Alzheimer's disease. Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics), 8868, 51–58. https://doi.org/10.1007/978-3-319-13105-4_9/COVER/

Hazar, Z. and M. Hazar, 2017. Digital game addiction scale for children. Journal of Human Sciences, 14(1): 203-216.

Hu, R., Fico, G., Cancela, J., & Arredondo, M. T. (2014). Gamification system to support family-based behavioral interventions for childhood obesity. 2014 IEEE-EMBS International Conference on Biomedical and Health Informatics, BHI 2014, 181–184. https://doi.org/10.1109/BHI.2014.6864334

Johnson, D., Deterding, S., Kuhn, K.-A., Staneva, A., Stoyanov, S., & Hides, L. (2016). Gamification for Health and Wellbeing: A Systematic Review of the Literature. Internet Interventions, 6, 89–106. https://doi.org/10.1016/j.invent.2016.10.002

Knöll, M., & Moar, M. (2012). The space of digital health games. International Journal of Computer Science in Sport, 11(1), 61–72.

Li, L. (2021). What Games Should You Play For Better Brain Health? Being Patient - Alzheimer's News, Advice, Stories & Support. https://www.beingpatient.com/games-brain-health/

Liu, E.Z.F. and P.-K. Chen, 2013. The effect of game-based learning on students' learning performance in science learning–a case of conveyance go. Procedia-Social and Behavioral Sciences, 103: 1044-1051.Available at: https://doi.org/10.1016/j.sbspro.2013.10.430.

Madeira, R. N., Costa, L., & Postolache, O. (2014). PhysioMate-Pervasive physical rehabilitation based on NUI and gamification. EPE 2014 - Proceedings of the 2014 International Conference and Exposition on Electrical and Power Engineering, 612–616. https://doi.org/10.1109/ICEPE.2014.6969982

Malaka, R. (2014). How Computer Games Can Improve Your Health and Fitness. In: Göbel, S., Wiemeyer, J. (eds) Games for Training, Education, Health and Sports. GameDays 2014. Lecture Notes in Computer Science, vol 8395. Springer, Cham. https://doi.org/10.1007/978-3-319-05972-3_1

Martins, T., Carvalho, V., & Soares, F. (2015). A serious game for rehabilitation of neurological disabilities: Premilinary study. Proceedings - 2015 IEEE 4th Portuguese Meeting on Bioengineering, ENBENG 2015. https://doi.org/10.1109/ENBENG.2015.7088843

Maturo, A. F., & Moretti, V. (2018). Digital Health and the Gamification of Life: How Apps can Promote a Positive Medicalization. Emerald Publishing Limited.

Mestress, J.-C. (2017). State of the Art of Healthcare: The Cubism Period. In L. Menvielle, A.-F. Audrain-Pontevia, & W. Menvielle (Eds.), Digitization of Healthcare: New Challenges and Opportunities (pp. 3–21). essay, Palgrave Macmillan.

Michmizos, K. P., & Krebs, H. I. (2012). Serious Games for the Pediatric Anklebot. 2012 4th IEEE RAS & EMBS International Conference on Biomedical Robotics and Biomechatronics (BioRob), 1710–1714. https://doi.org/10.1109/BioRob.2012.6290706

Miller, A. S., Cafazzo, J. A., & Seto, E. (2014). A Game Plan: Gamification Design Principles in mHealth Applications for Chronic Disease Management. Health Informatics Journal, 22(2), 184–193. https://doi.org/10.1177/1460458214537511

Miller, A. S., Cafazzo, J. A., & Seto, E. (2016). A game plan: Gamification design principles in mHealth applications for chronic disease management. Health Informatics Journal, 22(2), 184–193. https://doi.org/10.1177/1460458214537511

Nirmal, R., Yun, C., Le, M., Paripoonnanonda, P., & Yi, J. (2013). Digital health game on cervical health and its effect on American women's cervical cancer knowledge. IEEE Consumer Electronics Society's International Games Innovations Conference, IGIC, 191–198. https://doi.org/10.1109/IGIC.2013.6659134

Orji, R., & Moffatt, K. (2016). Persuasive Technology for Health and Wellness: State of The Art and Emerging Trends. Health Informatics Journal, 24(1), 66–91. https://doi.org/10.1177/1460458216650979

Parisod, H. (2018). A Health game as an intervention to support tobacco-related health literacy among early adolescents. In Turun yliopiston julkaisuja.Sarja D.Medica-Odontologica: Vol. Doctor (Issue 1357). https://www.utupub.fi/bitstream/handle/10024/144897/AnnalesD1357Parisod.pdf?sequence=1&isAllowed=y

Pereira, C. v., Figueiredo, G., Esteves, M. G. P., & de Souza, J. M. (2014). We4Fit: A game with a purpose for behavior change. Proceedings of the 2014 IEEE 18th International Conference on Computer Supported Cooperative Work in Design, CSCWD 2014, 83–88. https://doi.org/10.1109/CSCWD.2014.6846821

Prada-Dominguez, E., Valdivia-Trujillo, S., Uribe-Quevedo, A., & Perez-Gutierrez, B. (2014). Lower member complimentary exercise gaming app. 2014 IEEE Colombian Conference on Communications and Computing, COLCOM 2014 - Conference Proceedings. https://doi.org/10.1109/COLCOMCON.2014.6860420

Sardi, L., Idri, A., & Fernández-Alemán, J. L. (2017). Gamified mobile blood donation applications. Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics), 10208 LNCS, 165–176. https://doi.org/10.1007/978-3-319-56148-6_14/TABLES/2

Schonauer, C., Pintaric, T., Kaufmann, H., Jansen-Kosterink, S., & Vollenbroek-Hutten, M. (2011). Chronic pain rehabilitation with a serious game using multimodal input. 2011 International Conference on Virtual Rehabilitation, ICVR 2011. https://doi.org/10.1109/ICVR.2011.5971855

Serious games. Department of Education and Training Victoria. (2017). Retrieved July 7, 2022, from https://www.education.vic.gov.au/about/programs/learningdev/Pages/expired/ techgames.aspx

Stone, J. (2020). Digital Games. In J. Stone and C. E. Schaefer (Eds.), Game play therapy: therapeutic use of games with children and adolescents (pp. 99–120). John Wiley & Sons, Ltd.

Tomaselli, P. J., Papanagnou, D., Karademos, J. E., Teixeira, E., & Zhang, X. C. (2018). Gamification of Hospital Utilization: Incorporating Cost-consciousness in Daily Practices. Cureus, 10(8). https://doi.org/10.7759/cureus.3094

Victoria State Government. (2017). Serious Games. https://www.education.vic.gov.au/about/programs/learningdev/Pages/expired/techgames.aspx

Wallenburg, I., & Bal, R. (2018). The Gaming Healthcare Practitioner: How Practices of Datafication and Gamification Reconfigure Care. Health Informatics Journal, 25(3), 549–557. https://doi.org/10.1177/1460458218796608

Wattanasoontorn, V., Boada, I., García, R., & Sbert, M. (2013). Serious Games for Health. Entertainment Computing, 4(4), 231–247. https://doi.org/https://doi.org/10.1016/j.entcom.2013.09.002

Woolf, S. H. (2008). The Power of Prevention and What It Requires. JAMA, 299(20), 2437. https://doi.org/10.1001/jama.299.20.2437

World Health Organization. (n.d.). Constitution of the World Health Organization. World Health Organization. Retrieved July 7, 2022, from https://www.who.int/about/governance/constitution

Zhao, Z., Ali Etemad, S., & Arya, A. (2016). Gamification of exercise and fitness using wearable activity trackers. Advances in Intelligent Systems and Computing, 392, 233–240. https://doi.org/10.1007/978-3-319-24560-7_30/COVER/

Genişletilmiş Özet

Teknoloji, sağlık sektöründe hayati bir rol oynamaktadır. Bunun sonucunda dijital sağlık hizmetleri ivme kazanmakta ve oyunlaştırmanın teşhis, koruyucu, tedavi edici ve palyatif bakım için hastalar ve hatta sağlıklı bireyler için de kullanımını gündeme getirmektedir. Oyunlaştırma, sağlık sektöründe eğitim amaçlı, hasta izleme, tıbbi uyum ve mesleki eğitim için de uygulanmaktadır. Dijital sağlık oyunları, hızlı ve kolay erişilebilirlikle geniş bir kitleye hitap edebilir uygulamalar olsalar da henüz kullanıcıların uzun vadeli motivasyonunu ve katılımını sağlayacak kadar yetkin değildir. Bu çalışma dijital sağlık oyunlarının sınıflandırılmasına, uygulama alanlarına, başarılı dijital sağlık oyunlarına katkıda bulunan stratejilere ve faktörlere ve bunların sağlık davranışı değişikliği üzerindeki etkilerine odaklanmaktadır. Dijital sağlık oyunlarının kullanımını ve basitçe oyun öğelerinin oyun dışı bir bağlamda kullanımı olarak tanımlanan sağlık ve esenlik için "oyunlaştırma" terimini de gündeme getirmektedir. Oyunlaştırma, insan yaşamının birçok alanında başarılı bir yöntem olarak kullanılmaktadır. Eğitimde, işletmecilikte, tasarımda ve sağlıkta yaygın olarak kullanılmaktadır. İnsanların motivasyonları, oyunlar veya diğer eğlenceli bileşenler tarafından artırılabilir. Sonuç olarak, oyunlar aracılığıyla hoş olmayan görevlerin üstesinde rahatlıkla gelinebilir.

Gelişen dünyamızda sağlık ile ilgili risk faktörleri de değişim göstermiştir. Artık başlıca ölüm nedenleri arasında kronik hastalıklar da sayılmaya başlanmıştır. Hareketsiz yaşam, stres, aşırı alkol ve sigara kullanımı, yüksek enerjili gıda alımı ve diğer sağlıksız davranışlar ve yaşam tarzları, yüksek tansiyon, yüksek kan şekeri, yüksek kolesterol ve obezite gibi sağlık problemlerine yol açmaktadır. Ulusal Kronik Hastalıkları Önleme ve Sağlığı Geliştirme Merkezi'ne (NCCDPHP) göre "Amerika'da yıllık 4,1 trilyon dolarlık sağlık harcamasının %90'ı kronik ve zihinsel sağlık sorunları olan kişiler için yapılmaktadır". Dolayısıyla böylesi bir durumda dijital sağlık oyunları olumlu sağlıklı davranışları kazanmaya yardımcı olabilir. 2016 verilerine göre dijital sağlık pazarının büyüklüğü 275 milyarın üzerinde olup, 2025 yılında pazarın 710 milyar doları aşacağı tahmin edilmektedir. Dijital sağlık pazarının içerisinde oyunlaştırma payının 16 milyar dolar olduğu hesaplanmaktadır. Bu rakamın 2024 yılında 40 milyar dolara ulaşacağı tahmin edilmektedir. Dijital oyun hem tek başına hem de ekip olarak çevrimiçi veya çevrimdışı bir ortamda elektronik bir cihaz kullanılarak yapılan çeşitli etkinlikleri içermektedir. Diğer bir deyişle dijital oyun tanımı gerçekçi simülasyon, dinamik resimler ve ses efektleri sunan oyunlardır. Oyunlaştırmanın temel amacı, kullanıcıları istenen davranışa bağlı kalmaya ve bu davranışı sürdürmeye teşvik etmektir. Özellikle oyunlaştırma, yaşam tarzı değişiklikleri sağlama ve kişileri motive etmek için rekabet ve sosyal etkileşimle kullanıcıların ilgisini çekmektedir. Böylece, hastalık yönetimi ve mesleki eğitim ile ilgili oyunların yanı sıra fiziksel egzersiz gibi olumlu sağlık davranışı geliştiren oyunların da e-sağlıkta kullanılabileceği sonucuna varılabilir. Sağlık sektöründe kullanılan oyunlar genellikle "ciddi oyunlar" olarak adlandırılır. Ciddi oyunlar, temel olarak eğlence dışında kullanılan, oyun teknolojisi ve tasarım ilkeleriyle geliştirilen oyunlar veya oyun benzeri etkileşimli sistemlerdir.

Araştırmacılar, oyunlaştırılmış ürünlerin başarısını etkileyen üç temel faktör belirlemiştir: Eğlence faktörü: Etkili sağlık oyunları, hastaları amaçlarını hoş bir şekilde gerçekleştirmeye teşvik etmelidir. Bu nedenle oyunların, oyuncuların ilişki kurabilecekleri ve takip etmeye motive oldukları hedeflere sahip olması gerekir. Arkadaş faktörü: Oyunlar, oyuncuların

diğer rakiplere meydan okumasına olanak sağlamalı ve rekabetçi motivasyonu teşvik etmelidir. Geribildirim Faktörü: Bireyler, sağlık durumlarını sürekli takip ederek profillerini kişiselleştirebilmeli ve tıbbi geçmişlerini takip edebilmelidirler. İki yönlü mesajlaşma ve hızlı geri bildirim ile hastalar iyi alışkanlıkların faydaları ve kötü alışkanlıkların ise olumsuz etkileri konusunda bilgilendirilebilmelidir. Oyunlar, kullanıcı dostu menülere sahip olmalı, tıbbi kelimeler ve uygulamalar hakkında kısa bilgiler sağlamalıdır. Böylece oyunlar, kullanıcılar tarafından benimsenecek ve uzun süreli etkileşimler teşvik edilecektir. Dijital sağlık oyunları, etkilemeyi amaçladıkları grubu bağlı olarak sınıflandırılabilir. Örneğin; koruyucu bakım, teşhis, tedavi ve palyatif bakımla ilgili uygulamalar. Oyunlar ayrıca hasta ve hasta olmayanları kapsayan "oyuncular" açısından da sınıflandırılabilir. Hastaya yönelik hedefler şu şekilde sıralanabilir: Sağlığın izlenmesi, algı, tedavi, rehabilitasyon, kendi kendine bakım; hasta olmayanlar için ise hedefler iki alana odaklanır: Sağlık ve zindelik: yaşam tarzı konularına odaklanır. Eğitim ve simülasyon: sağlık profesyonelleri ve diğer çalışanlar içindir. Sağlığı geliştirme faaliyetinin bir parçası olarak, sağlık davranışlarının iyileştirilmesi, sağlık hizmetlerinde ana konulardan biridir. Bunun başlıca nedeni ise artan sağlık hizmet maliyetleri nedeniyle, sağlık politika yapıcılarının maliyetleri azaltmak için rasyonel bir yol keşfetmeye yönlendirilmesidir. Bu açıdan bakıldığında kendi kendine bakım en verimli ve en ucuz alternatiftir. Oyunlaştırma, davranışları değiştirmede en etkili araçlardan biri olduğu için kendi kendine bakımda kullanılabilir ve bu da sağlık sektörünü de olumlu etkileyebilir.

Dijital oyunların sağlık hizmetlerindeki etkinliğini belirlemek için çeşitli çalışmalar yapılmıştır. Bu çalışmalar, çocukların ve yaşlıların sağlığı, sağlık profesyonellerinin çalışması ve eğitimi ile diğer sağlık alanlarını içermektedir. Söz konusu çalışmalar şu şekilde sıralanabilir: Tomaselli ve ark. acil serviste çalışan personele hizmet maliyetleri ile ilgili farkındalık oluşturmak için Price is Right adlı bir oyun geliştirmişlerdir. Michmizos ve Krepse (2012) Serebral Palsi (beyin felci) hastası çocukların robotik terapilerini kolaylaştırmak için bir ciddi oyun geliştirmiştir. Ciddi oyunların çocuk ve gençlerin tedavisi için kullanılması bununla da sınırlı değil. Örneğin, Parisod (2018), 10-13 yaşları arasındaki çocukların tütünle ilgili sağlık okuryazarlığını destekleyen bir sağlık oyunu geliştirmişlerdir. Ayrıca Hu ve ark. (2014), pediatrik obezitenin tedavisine yardımcı olmak için ciddi oyun ve oyunlaştırma teknikleri kullanmışlardır. Knöll ve Moar (2012) ise dijital sağlık oyunlarının genç diyabet hastalarının günlük sağlık durumlarıyla ilgilenmeye nasıl teşvik ettiğini araştırdı. Yaşlılarla ilgili dijital sağlık oyunları incelendiğinde, Hartin ve ark. (2014), Alzheimer hastalığı olan yaşlı kişileri motive etmek ve davranışsal gelişimlerini izlemek için oyunlaştırma bileşenlerine sahip bir akıllı telefon uygulaması geliştirdiler ve davranış değişikliği hakkında olumlu bulgular tespit ettiler.

Oyunlaştırmanın yanı sıra Microsoft Kinect gibi Doğal Kullanıcı Arayüzü (NUI) araçlarının da kullanılması hastaların oyunlaştırılmış eğitimden keyif almalarını sağlamaktadır. Böylece Exergames benzeri oyunlar, insanların motivasyonlarını, özgüvenlerini ve fiziksel aktivite anlayışlarını geliştirmelerine yardımcı olabilir. Charikleia ve ark. (2011) göre, bu oyunların gençlerin sağlık ve fiziksel aktivite ile ilgili bilgi, beceri, tutum ve alışkanlıkları üzerinde iyi bir etkisi olması muhtemeldir. ExerGames, ayrıca kişisel antrenörlere benzer rehabilitasyon programları ve fitness planları gibi farklı ortamlarda kullanılabilir. Oyunlaştırma çalışmalarının yürütüldüğü diğer alanlar arasında kronik hastalıkların yönetimi, motor güçlükleri olan hastaların ve kanser tedavisi sayılabilir.

Örneğin, Miller ve ark. (2016), oyunlaştırmanın kronik hastalıkların kendi bakımlarını daha iyi sağlamalarına yardımcı olmak için oyunlaştırmanın kullanılabileceği sonucuna varmıştır. Uygun dijital oyun kullanımı, tedavi sürecini önemli ölçüde geliştirebilir. Oyunlaştırma, sosyal etkileşim için de başarılı bir şekilde uygulanabilir. Chen ve Pu (2014), oyunlaştırma yöntemlerinin birlikte oynama gibi sosyal etkileşim üzerindeki etkilerini araştırmışlardır. Sonuçlar, kullanıcıların bir grup içindeyken daha fazla fiziksel aktiviteye katıldığını göstermiştir. Sağlıkla ilgili oyunlaştırma eğilimleri son on yılda önemli ölçüde artmıştır.

Modern dünyanın bireyleri diyabet, kanser ve kalp hastalığı gibi kronik hastalıklardan muzdariptir. Dijital sağlık oyunları hem hastalar hem de hasta olmayanlar için faydalıdır. Günümüzde bireyler sadece hastalıklardan kurtulmayı değil, aynı zamanda genel bir ruh, beden ve sosyal refah durumuna ulaşmayı da hedeflemektedir. Dijital sağlık oyunları, sundukları sağlık hizmeti alanlarıyla tüm bu sorunları ele alma gayretindedir. Hasta eğitimi ve mesleki eğitimden terapi, hasta izleme, ilaç uyumu, rehabilitasyon ve değerlendirmeye kadar geniş bir alanı kapsarlar. Dijital sağlık oyunları bireylerin sağlık davranışlarını geliştirip pozitif davranış kazandırarak; kişinin refahına ve sağlık sektörünün işleyişine katkıda bulunur. Araştırmalar, dijital sağlık oyunlarının toplumdaki tüm gruplar için faydalı olduğunu göstermektedir. Tedavi gibi sağlık ve egzersiz gibi sağlık dışı alanlarda söz konusu oyunlardan faydalanılabilmektedir. Oyunların erişilebilirlikleri ve ilgi çekici tasarımları kullanıcıları kolayca motive etmektedir. Anında geri bildirim ve olumlu duyguların teşviki de olumlu davranış geliştirmeye katkıda bulunmaktadır. Bununla birlikte, kullanıcıların dijital sağlık oyunlarına bağlılıklarının sürekli olması oldukça zordur. Kullanıcının özverisi sağlanırsa, farkındalığı artırmak, katılımcıları daha sağlıklı davranışlar benimsemeye teşvik etmek ve kronik hastalığı olan hastaların kendi kendileri bakım sağlama becerilerini geliştirmek için dijital sağlık oyunları kullanılabilir. Politika yapıcıların sağlığı geliştirme faaliyetlerinde dijital sağlık oyunlarını dikkate almaları da faydalı olacaktır. Bu alandaki araştırmalar teşvik edilmeli ve sonuçlar karşılaştırılmalıdır. Maliyet etkin alternatifler önerildiğinde, politika yapıcılar tarafından teşvik edilmelidir. Dijital sağlık oyunları, yakın bir gelecekte birey davranışlarını geliştirmek için daha yaratıcı çözümlere olanak sağlayacaktır. Önemli olan kalıcı çözümler ortaya koyabilecek en iyi uygulamaların desteklenmesidir.

Ek Bilgiler

Çıkar Çatışması Bilgisi: Sorumlu yazar, çalışmada çıkar çatışması olmadığını kabul etmektedir.

Destek Bilgisi: Çalışmada herhangi bir kuruluştan destek sağlanmamıştır.

Etik Onay Bilgisi: Çalışma, etik onay belgesi gerektirmemektedir.

Katkı Oranı Bilgisi: Yazarın katkı oranı %100'dür.