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Gamification Application for Promoting and Encouraging Physical Activity in the Elderly

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Abstract: Physical activity positively promotes calmness and lowers stress levels, overall quality of life, and subjective well-being, particularly among older people. Isolation, shifts in cognition, and a decline in motor abilities are some of the negative consequences of ageing that make many seniors wary of exercise programs. In mobile technology, notably gamification applications, game design features can spark older people's intrinsic motivation, encouraging them to participate in and enjoy physical activity. Despite a growing body of research on this topic, there is still a lack of consensus regarding the nature and extent of older adults' knowledge and healthcare professionals about gamification applications and physical health outcomes among this demographic group. This study seeks to address this gap by examining healthcare professionals' perspectives on using gamification applications to rehabilitate patients' physical activities and overall well-being. Specifically, the study explores the needs, motivations, and obstacles healthcare workers face concerning this approach. qualitative description method was followed to understand the fundamental perspectives of healthcare professionals, capture the experiences of patients and professionals to ensure reliable and trustworthy results and contribute to the credibility and validity of the study. Interviews were reviewed several times, and to analyze, content analysis was used, furthermore, texts were imported into MAXQDA software version 10, which supported the content analysis. The results showed that gamification applications can give patients a sense of support and community while also assisting patients in improving the management of their chronic diseases. Gamification applications can improve the efficiency and convenience of physical exercise programs. However, when an application crashes or is infected with a virus, it can provide patients with false information, exposing users to attacks from hackers when they are using it. Incorrect diagnosis poses a risk to a patient's life as risks and ethical considerations due to using gamification applications in physical activity.
Keywords: *Gamification Application; Game Elements; Healthcare; Older People; Physical Activity*.

1. Introduction

Physical inactivity causes nearly 5 million deaths annually. Conversely, systematic Physical Activity (PA) reduces the risk of chronic diseases, slows their progression, and decreases premature mortality [1]. According to the World Health Organization (WHO), health is "a state of mental, physical, and social well-being" [2]. Most individuals need to understand public health standards and the advantages of recommended PA levels; everyday PA can help them maintain a healthy weight and lower their chances of developing lipid problems, high blood pressure, obesity, cardiovascular disease, and diabetes. However, many physically inactive persons can be found in high-income countries, particularly among women, children, and older people [3]. In their study, Hattingh (2020) explained that regular PA has been shown to impact the prevention of heart disease through various mechanisms

positively. These include the reduction of blood pressure, the elevation of high-density lipoprotein cholesterol levels responsible for transporting fat away from arteries, the decrease of low-density lipoprotein cholesterol levels that can contribute to the formation of fatty deposits in arteries, the enhancement of blood circulation, the promotion of fat loss, and the development of muscle mass [2].

Our realities and lives are becoming increasingly game-like, not only because games have become an inseparable part of our daily routines but also because systems, activities, and services are becoming progressively gamified [4]. In recent years, there has been an increasing global recognition of gamification across several domains; many studies have defined gamification as “the use of game design elements in nongame contexts.” 'Gamification' was the first type designed in the digital media industry in various operational sectors. Since it first emerged in 2008, the notion of gamification has been linked to several terminologies, such as "*surveillance entertainment," "productivity games," "fun ware," "serious games," and "behavioral games."* [5].

The effect of the self-determination theory on gamification is evident in its assertion that individuals are inclined to engage in activities that offer intrinsic and extrinsic incentives. Drawing upon established notions of self-motivation, gamified systems include various motivating components such as immediate feedback, badges, point systems, leaderboards, certifications, quests or challenges, customization options, unlocking material, avatars, levels, and in-game currency to foster active engagement [5,6]. The most common applications of gamification are in education, not only through applications or serious games but also through the gamification of teaching to improve educational achievement. Gamification is utilized for entertainment to enhance user satisfaction and loyalty. Numerous examples of gamified apps for telemedicine and self-learning about diseases to aid in diagnosis and treatment, such as Mango, health by Apple, Zero, Eyeworkout, prehab, Loóna, happify, and Moodfit [7]. Business environments attempt to increase worker productivity and pleasure. Furthermore, gamification marketing can improve the product's visualization and bring it closer to the final consumer [8].

Gamification is the process of developing information systems to provide comparable experiences and motivations as games [4] give an explanation that gamification seeks to influence user behavior [4,8] improve user engagement and experience [9,10], motivate people naturally, and make non-gaming apps such as tiresome and repetitive daily work more entertaining and engaging [11], and gamification in the healthcare sector involves enhancing individuals' motivation to engage in physical activity [12,13] or adopt healthier eating habits. Furthermore, engaging in physical activities positively impacts relaxation, stress reduction, overall quality of life, and subjective well-being. In recent years, there has been a surge in research exploring the utilization of technology and mobile devices to encourage individuals to participate in increased physical activity. Employing purposefully developed technology to modify individuals' attitudes or behaviors is sometimes called "Persuasive Technology." It seeks to influence user behavior by leveraging game-design features to activate individual motivations [14]. Despite their interest in fitness, research indicates that numerous older people are hesitant to participate in fitness programs due to aging issues such as social isolation, changes in cognition and mental anguish, and a reduction in motor skills. These issues can be addressed primarily through technology, mainly digital games. However, the limitations of aging create barriers to technology-supported fitness activity; for example, an older person unable to participate in PA due to age-related deficits may struggle while participating in technology. Also, intrinsic motivation outweighs extrinsic incentives in older persons who participate in physical activity [15].

Previous research has examined the benefits of gaming activities and how older people use game technologies. In their study, [15] focused on the importance of gaming and its apps in entertainment, rehabilitation, cognitive training, physical, leisure, and adult learning. While older adults frequently

participate in activity classes, aerobics, dancing, gardening or yard work, swimming, water aerobics, or even Tai Chi, cognitive changes and increasing physical challenges associated with aging limit older adults' opportunities to play digital games or exercise using video games. In recent years, gamification and gamified health and fitness apps have increased in healthcare to inspire healthier lifestyles. For example, playful apps like "Motion-based video games" can encourage accessible PA in elderly people. Therefore, this study aims to examine healthcare professionals' perspectives on using gamification applications to rehabilitate patients' PA and overall well-being. Specifically, the study explores the needs, motivations, and obstacles healthcare workers face concerning this approach. This study will also answer the following research questions:

1. How Does Gamification Application Provide Patient Support?
2. How does Gamification application in physical activity Efficiency and Convenience?
3. How do gamification applications increase physical activity acceptance and readiness?
4. What are the trends in the Patient Use of Gamification Applications in Physical Activity?
5. What are the participants' viewpoints on the effect of risk and ethical issue factors affect gamification?

2. Theoretical Background of Gamification Application in Healthcare

Gamification Applications (GA) increase enthusiasm and enjoyment in various contexts, including education, marketing, tourism, health care, and social activities. In healthcare, these mechanisms are practical in re-learning skills, such as providing enhanced, game-like feedback to support the practice of new skills [16]. Modern technology has contributed to how patients recover as patients use current rehabilitation methods. Several facets of peoples' health and medicine are investigated and recorded through innovative technologies as humans utilize different ways to check their well-being through traditional treatment; humans, in some cases of disease, require self-management [17]

Promoting healthy aging, which refers to developing and maintaining functional capacity that facilitates well-being in older people, is paramount in bridging the gap between lifespan and health span. Additionally, older individuals must be enabled to make varied and valuable contributions to society. Research emphasizes the necessity of comprehensive change across the health system and community to address the challenges posed by aging through technological innovation, which is identified as a crucial factor in supporting this transformation [18]. The healthcare sector has a distinct advantage in leveraging technological advancements to facilitate substantial improvements across various domains. Technology enhancement has led to significant improvements in multiple aspects of the patient experience, including scheduling, engagement, and the provision of individualized care [19].

Additionally, rising technology usage has resulted in a growth in mobile health applications. Users embrace these programs for various reasons relating to acceptability and gamification; however, there is still no consensus regarding which aspects influence user adoption the most [19]. The utilization of gamification, which involves incorporating game features and gameful experiences, has emerged as a significant facet of cultural evolution in entertainment. This trend has extended beyond typical gaming environments and is increasingly applied to healthcare and fitness domains [20]. Additionally, gamification is employed to assist individuals with chronic illnesses in effectively managing their conditions, aid those with mental disorders in overcoming their challenges, and encourage the utilization of e-learning platforms among medical learners [13]. Gamification health and fitness apps have recently been on the rise in the healthcare industry to encourage healthy lifestyles; gamified health applications include asthma management and cigarette cessation, while examples of game-based health apps such as MyFitnessPal, RunKeeper, and Nike+ Running have GPS, social media sharing,

and advanced technology for sensors that measure physiological information like heart rate, calories burned, blood pressure, and blood glucose [11].

Also, the growth of location-based games, exergames, and Pokémon Go has increased the relevance of gaming for physical fitness [22]. Thus, they can increase health intervention cost-effectiveness and create a motivating and engaging engagement concept for wearables [11]. As games are frequently assumed to foster an unhealthy way of life, gamification presents a fascinating innovation in physical exercise; beyond using PA to play games, deliberate gamification tries to incorporate gaming elements into activities while keeping an eye on the direct health effects [22]. It also uses game mechanics, dynamics, and components to push players to complete challenging tasks [8].

In both study and practice, exercise and health are among the most popular contexts for gamification projects. It is often used when people commonly lack motivation, such as work, education, and healthcare because motivational advantages are recognized as being at the core of games [23]. [1] stated that gamifying PA encourages players to play and walk, making their workout more enjoyable. Its strategies focus on global PA in all facets of daily life; unlike serious games and other classic video games that require location, time, and implementation, wearable and mobile technologies gadgets can continuously track and collect daily activities online.

The primary objective of gamification is to incorporate the elements that contribute to the pleasurable aspects of games into everyday activities to motivate individuals to participate actively in physical exercise [1]. Furthermore, [9] shed light on the gamified motivational affordances that can be categorized into two main groups: intrinsic and extrinsic. The intrinsic elements encompass goals, advancement, challenges, achievements, quests, social sharing, and choices. On the other hand, the extrinsic factors consist of points, awards, badges, leaderboards, and incentives. Additionally, gamification's "motivational affordances" can alter psychological results, such as attitude, motivation, and enjoyment, as well as physical results, like physical capacity, which thus appears to be a potentially influential technique for changing behavior [1].

Overall, introducing technology that encourages healthy lives, such as gamified health apps and wearables, may provide a practical way of motivating individuals to adopt healthy behaviors, resulting in a healthier population [11]. Nevertheless, [15] explained in their research that aging is accompanied by many cognitive and physical obstacles that diminish the ability of older individuals to engage in enjoyable activities such as games or physical exercise. As mentioned above, the phenomenon can potentially have detrimental health consequences and significantly impact an individual's well-being. Gamified-based video games, among other playful uses, have the potential to offer older persons accessible opportunities for engaging in physical activity.

According to Méndez et al. [9] the primary motive for seniors to adopt new technology is to escape from their reality; they use it for enjoyment, leisure, or educational objectives. Their regular social engagements, however, are via phone conversations, letters, and face-to-face communication. As a result of a lack of technological proficiency to utilize social media for social connection, individuals become socially isolated, leading to mental and physical health issues. Because they have to accept current technologies, these people are regarded as users who lack digital literacy. On the other hand, senior users spend more time at home.

Therefore, technology designers and researchers must first comprehend the two critical principles of gamification and game mechanics to fully understand how the theory of games can be used to boost physical activity. Game mechanisms are the goals, rules, and structures that comprise a game; they govern how the user communicates with the contest and, consequently, how the game responds to the user's engagement [24].

While motivation and engagement are crucial components in developing a meaningful, long-term experience for behavioral change, the whole user experience is critical for effective technology design. Users might continue to find value in the fundamental goal of an app if it is useable and accessible but not necessarily enjoyable or engaging; nevertheless, an entertaining but complex application may experience a dramatic decline in user activity irrespective of the inspiring functionalities and features [25].

[23] proposed that an application should possess the following attributes: a high level of usability, relevance to the specific requirements of the intended audience, aesthetic appeal, effective presentation of information, accessibility for all user groups, and a sense of credibility. To optimize the utilization of an application's user experience to enhance user physical activity, it is possible to categorize the relevant components into two distinct aspects: how the content is presented and the convenience of accessing said content. Based on the widespread adoption of smartphones and the significant popularity of downloading applications, it is evident that leveraging apps to encourage healthy lives holds considerable promise. Such an approach can effectively facilitate behavioral modifications toward the adoption and maintenance of a healthy way of life [11]. Hence, a gamified mobile application does not function as a comprehensive gaming platform; instead, it simply employs design elements such as badges, points, experience, and leaderboards to enhance user engagement with the program [3].

3. Methodology

3.1 Research Design

This is the first study in Iraq investigates Healthcare Providers (HCPs') viewpoints towards employing GA in healthcare sectors through utilize descriptive qualitative approach. The complexity and depth of real-world events are well-captured by this approach, allowing for a more informed interpretation of the data. Health interventions can be more effectively targeted and customized when they take into account diverse viewpoints and contextual factors [25]. This technique assists the healthcare industry by offering a comprehensive and detailed understanding of the experiences and viewpoints of HCPs, and other stakeholders. The researchers were able to shed light on the possible benefits, obstacles, and hazards of applying gamification in healthcare by employing descriptive qualitative approach. Expert participation in qualitative descriptive research also strengthens the study's credibility and validity by guaranteeing accurate and trustworthy results. The study's rigor and breadth have been greatly increased by the inclusion of researchers from a wide range of backgrounds and fields of study. The study's credibility and validity are bolstered by the fact that neither the interviewer nor the subjects knew one other before the interview.

3.1.1 Participants

National and international participants were interviewed as shown in Table1; To inform participants, researchers made appointments with those who played a crucial role in the study. In-person consent was obtained from all participants. No compensation was given to the respondents.

Table 1: Interviewee Information

Characteristics		Frequency	Percentage
Age	24-26	8	80%
	Older than 27	2	20%
Nationality	National	7	70%
	International	3	30%
Sector	Privet	9	90%
	public	1	10%

The age of the interviewee was varied from twenty-four to forty-five. National and international interviewees participated in the study, and professionals in the healthcare industry in Iraq, Azerbaijan, and India were recruited through purposeful sampling. as well as, A number of professionals from both public and private industries were involved in the; regards regarding private sector participants from Tishk International University participated and one participant from the public sector.

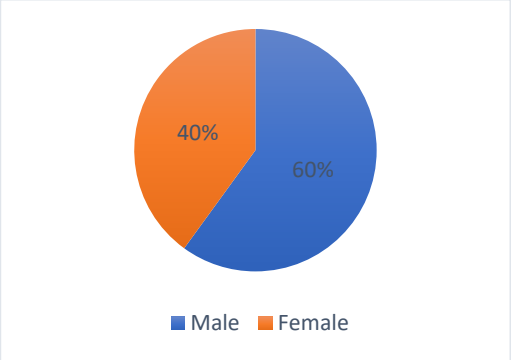

Figure1: Interviewee gender

As demonstrated in Figure 1. The majority of the participants were Male, approximately 60 percent of participants in the interview were male in the other hand only 40 percent were Female, and about half of those taking part were nurses

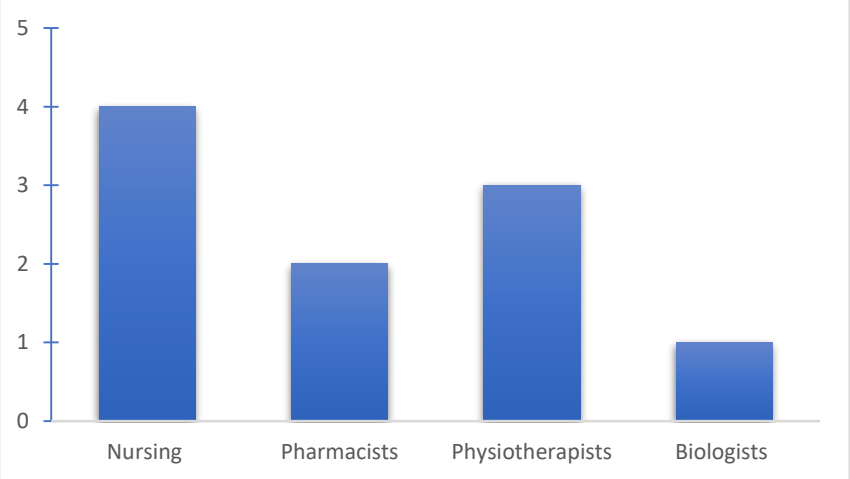

Figure 2: Interviewee specialization

As shown in figure 2. Different professionals participated in this interview including nurses, pharmacists, physiotherapists, and biologists. However, specialties that were not the primary focus of the research were excluded. as demonstrated in Figure 2.

3.2 Data Collection

Individual 20-minute face-to-face interviews were conducted in English with the participants between February 2023 and August 2023. Face-to-face interviews allow non-verbal communication cues to be observed and analyzed, enhancing the depth of data collected. Moreover, this method allows for immediate clarification of ambiguous responses, leading to more accurate and comprehensive findings. The interviewer used a voice recorder (Samsung voice recorder) to capture the conversation. Interviews were recorded, transcribed by hand, and edited to remove irrelevant text and improve the clarity of responses to specific research questions.

The reflective notes allowed the respondents to express their thoughts and insights more reflectively, providing a deeper understanding of their perspectives. Additionally, sending the interview questions beforehand allowed them to prepare and deliver more thoughtful and well-articulated responses during the interview in order to ensure consistency and gather relevant information. The interview questions consisted of nine open ended questions reflecting the purpose of the study. The interview questions were adopted from previous research [26] after being modified to align with the research objectives, and the researchers added one question after in-depth consultations with experts in qualitative research. Questions were designed to reflect the five most important factors influencing the spread of gamification in physical health. Benefits refer to how much an innovation is thought to be superior to the current standard of care; alignment refers to how well an innovation fits in with the adopter's (e.g., a patient's) needs and values; sophistication refers to how challenging an innovation is; and trial potential refers to how much it can be tested. Risk refers to the extent to which the apps might cause risk for patients and HCPs.

3.3 Data Analysis

All participants received their copy approval of verbatim texts and verification of their accuracy. Only minor modifications were accepted and incorporated into the final texts, ensuring the reliability of the data. To prepare for the data analysis, audio recordings, text, and field notes for each interview were reviewed several times, and texts were imported into MAXQDA software version 10, which supported the content analysis. Researchers inductively coded texts, followed by a coding and collaborative comparison discussion of symbols (for intercoder agreement) and their extension symbols to capture sub-symbols and eventually group characters in common threads. For this study topic, participants' accounts reflect their views (needs, motivations, challenges, risks, and ethical problems) concerning GAs for physical health management.

4. Result and discussion

The researcher conducted ten one-to-one interviews to capture HCPs' viewpoints toward adopting PA applications. five main themes were obtained while analyzing qualitative data in the study: “The Gamification Application Provides Patient Support”, “Gamification application in physical activity Efficiency and Convenience”, "Gamification application in physical activity adoption and readiness", "Trends in the Patient Use of Gamification Applications in Physical Activity", "Participant viewpoints on the effect of risk and ethical issue factors affect gamification". Bellow sub-sections show each theme with the participants’ responses.

4.1 The Gamification Application Provides Patient Support

It was believed that gamification applications could serve as a conduit for patients to get support in rehabilitating their' physical activity; participant responses revealed that the app supports many patients with Alzheimer's. The application can provide reminders and notifications to patients with Alzheimer's to take their medication at specific times and track their daily physical activities, encouraging them to engage in exercises suitable for their condition. This comprehensive support system helps improve the overall well-being and treatment adherence of Alzheimer's patients, ultimately enhancing their quality of life. Also, participants revealed that the GA might support patients following a medication schedule and physical activity. The study findings support the studies conducted by [27, 1], as they illustrated in their studies that GAs can help patients in several ways. For example, they can assist patients in improving the management of chronic diseases by reminding them to take their medicines, track their symptoms, and learn about their status. It can also help patients stay motivated and engaged in their treatment plans by rewarding and challenging them.

Furthermore, by connecting patients with others facing similar issues, gamification applications can give patients a sense of support and community. Gamification applications might be helpful for medication adherence, allowing patients to track and mark off each dose they take. The app could also reward patients with points or badges for consistently following their medication schedule, creating a sense of achievement and motivation to stay on track. Correspondingly, GAs have emerged as a promising method for improving patient participation and health outcomes. These programs can drive patients to adopt better behaviors and stick to treatment plans by including game-like elements such as badges, points, and leaderboards [1,3,5,6,28].

Still, participants commented that the application also provides features that assist patients in monitoring their vital signs and tracking their overall health progress. Additionally, the participants highlighted that the application's user-friendly interface dramatically contributes to its effectiveness in aiding patients with various medical conditions. The application might also benefit patients with chronic conditions such as diabetes, as it provides tools for monitoring blood sugar levels and managing insulin dosages. The study discovered that a diabetes management GA significantly improved blood glucose control among users in a comparable manner. [29] revealed in their study that when compared to a control group, the GAs aimed at losing weight resulted in more significant weight loss and increased PA levels. These findings imply that GAs can be an effective strategy for giving patient support and encouraging beneficial health practices. The application provides personalized meal plans, tracks daily calorie intake, and offers educational resources to help patients make informed dietary choices. It allows healthcare providers to monitor patient's progress remotely and provide timely feedback better to manage their conditions with chronic diseases like diabetes. The versatility of the application allows healthcare providers to cater to a wide range of medical conditions and provide personalized care for each patient. An excerpt from a participant's response is shown below:

> *"So, in this case, for example, if I take Alzheimer's as an example, Alzheimer's patients have a problem following things, but if we make some small, easy games for the kids so that they can recall the things again and their memory can be improved.*
>
> *The same applies to nutrition; if we say so, we can make some quizzes like that, as they also get to play games like one plus one is two plus two is four. So, we can apply the same thing to genetic patients and some healthy individuals because the problem is occurring at any age nowadays. So, under these headings like nutrition and medicine schedule, we can plan some games or write in the program that will install like an app; through this app, they will get all the information they wanted"*

4.2 Gamification Application in Physical Activity Efficiency and Convenience

GAs are being increasingly employed to encourage physical exercises. GAs incentivizes users to meet their PA objectives by including game-like elements [5,27,3,14, 1, 6]. GAs can improve the efficiency and convenience of physical exercise programs in various ways [27]. They can also increase physical exercise by making it more fun and engaging. Fitness apps, for example, might use gaming components such as characters, virtual worlds, and storylines to provide users with a more immersive experience. This can make exercise less inconvenient and more fun [22,30]. As a result, they can reduce the cost of health interventions while also developing a compelling and engaging interaction idea for wearables [11].

Another technique GAs can use to improve the effectiveness of PA agendas is to make it easier for users to track their progress. GAs can automatically track users' physical exercise levels and store the data in an essential location in a local or cloud storage device. This allows individuals to easily track their progress over time and find areas for development [27]. Participants commented on the app's efficacy and suitability for patients and doctors. According to the respondents, gamification in physical therapy helps both the patient and the therapist save time, allowing the therapist to see more patients. The app's real-time responses also relieve clinicians of the burden of manually monitoring patient health.

The advantage of these applications is that they will save time for the patients, and they can take care of themselves more frequently. They can monitor their health and follow their goals. Interestingly, GAs can also be utilized to improve the convenience of PA regimens. GAs can give users access to various PA resources, such as instructional videos, training regimens, and support groups. This makes it easier for individuals to get started and remain engaged with PA; also, it provides users with workout routines suited to their fitness level and goals. Alternatively, a GA may give users access to a live chat room to connect with other users attempting to be more active [2,32]. Listed below is a piece from one of the participants' answers.

> *"In my opinion as a doctor, the usage of gamification applications will be effective in terms of saving time and I can diagnose more patients at the same time. particularly, if there is an app that patients can go through and fill out before visiting me. There will be some questions; patients should answer them, and then I will know the issue. Then patient comes back to me, and at the same time, I will give patient some advice or prescriptions. Consequently, I will save my time"*

4.3 Gamification Application in Physical Activity - Adoption and Readiness

Gamification has emerged as an effective method for increasing PA acceptance and readiness, particularly in fitness and health applications. Individuals are inspired to become more physically active by including game-like aspects such as challenges, rewards, and social communication in PA tracking apps [1,10,11]. [33] discovered that gamified fitness apps resulted in considerably higher levels of engagement and increased physical activity among users. This is due to the intrinsic motivation that gamification generates, such that individuals are encouraged to attain personal goals and compete with others in a fun and dynamic environment [5,10,34].

Furthermore, gamification can improve individuals' willingness to engage in physical exercise by assisting them in setting reasonable objectives and tracking their progress, thereby enhancing their self-efficacy. As a result, by making the activity more competitive, entertaining, and rewarding, gamification can be crucial in inspiring people to begin and sustain a PA lifestyle [24,34,21b, 1]. Participants declared they were open to adopting this app and would recommend it to their patients because it helps patients stay motivated throughout lengthy exercise regimens and track their progress.

They also appreciated the app's user-friendly interface and the ability to customize exercise plans based on individual needs. Additionally, participants mentioned that the app's reminders and notifications helped patients stay motivated and consistent with their exercise routines. Below is an excerpt from a participant's response:

> *"Yeah, gamification application will be good. For example, the case of muscular dystrophy, muscle damage, the case of cardio, and cardiac exercises. Thus, if they have several exercises, they can perform more, and their recovery will be faster. So, I agree with this."*

Participants' opinions on whether or not the GA should be used in PA varied according to the nature of care provided and the degree to which the patient trusts the caregiver. All agreed that patient adoption and physician recommendation would increase significantly if the app received official government backing and was subsequently approved by a credible third party. The following is a sample of a participant's answer:

> *"Some might use it, and for specific content, some might not because they have yet to try it; I think they will...If the application is robust, for example, supported by the government or any medical community; if these organizations back it, people might use it. However, if people randomly make this program, they might not use it. However, it is better to have the support of the government or a medical organization; people might trust it and use it for their daily problems. So, support from the government and medical organizations is critical".*

4.4 Radness in the Patient Use of Gamification Applications in Physical Activity

GAs for PA have grown in popularity as they use the effectiveness of principles from game design to drive individuals to exercise and live more fulfilling lives. Numerous significant trends have emerged in these applications. Wearable fitness smartphones and equipment are rapidly being integrated with GAs. Users can use these gadgets to track their PA, such as steps done, heart rate, and calories burned, and then translate this information into achievements and in-app prizes. This connection assists users in remaining motivated and accountable during their exercise adventures [30]. Furthermore, the concept of social interaction has been critical. GAs frequently encourages users to share their progress and triumphs on social media networks, generating a sense of competition and community. This trend is based on the premise that peer encouragement and social support can improve exercise participation and commitment [35].

In addition, adaptive and individualization gamification is becoming increasingly popular. Many apps now use machine learning and data analytics to personalize the gamified experience for each user. By studying their behaviors and preferences, these apps can give rewards, challenges, and feedback better aligned with users' particular objectives and requirements [23]. Overall, participant viewpoints on app usage varied, highlighting the importance of considering individual preferences and concerns when implementing such applications in patient care. Contributors gave different answers based on their personal experiences. Some participants found the app to be a valuable tool for patients in managing their health and appreciated its support. Others, however, expressed concerns about the extent of patients' trust in these kinds of apps, leading them to be more hesitant about using the app. People must be guided or encouraged to use such apps to adhere to healthcare regulations. However, it is essential to consider that not all individuals may possess the motivation to use healthcare apps. Some people may already need to manage their health, making them more likely to need these technologies. Additionally, healthcare professionals can be crucial in educating and encouraging patients to utilize these apps for better health outcomes. Beneath is a snapshot of a participant's response:

"For physical activity, patients use it, as I said, because of timing, it will remind them every hour or time. Most of us do not have the time to go to the gym to see a trainer and tell us what activities we need to do based on our BMI, weight, age, and situation. So, in that case, it is a good idea for us to download the app. Furthermore, it tells us every detail when we give our weight and height. Based on our BMI, it will calculate what to do at which time and how to do it".

"Some patients use this app because they know it will improve their lives. Still, others do not choose it because they do not comprehend the gamification process and find it challenging to use since they do not know enough about electronic devices and cannot read or write.

4.5 Participant viewpoints on the effect of risk and ethical issue factors affect gamification

Gamification involves incorporating game-like components into non-game environments and has garnered substantial interest in numerous fields, such as healthcare, education, and business. Besides the potential benefits of the success of gamification creatives, it is essential to recognize associated risks and mitigate ethical concerns. From the standpoint of the participants, it is imperative to comprehend and address these elements to ensure the continued success and adoption of gamified interventions [36]. Participants are presented with many risks and ethical considerations when using gamification applications in physical activity, including the application crashing, the application being infected with a virus, the application providing false information to patients, and hackers attacking it while using it. Incorrect diagnosis presents a risk to the patient's life. [37,38] State that ethical gamification approaches need to balance participant privacy with data requirements. When participating in gamified experiences, users frequently voice concerns about data privacy and security. When sensitive data is involved, gathering and using personal information for rewards and progress monitoring may raise ethical concerns. Furthermore, players can view older adults' lack of willingness to develop GA systems as an ethical concern. The implicit workings of performance reviews and incentive schemes might create a sense of manipulation. In order to resolve these issues, designers must establish confidence in the application by being transparent about the guidelines and methods controlling gamified platforms [30].

Besides the abovementioned risks and ethical issues, another concern related to using gamification applications in PA is the potential for privacy breaches. Since these applications often collect personal data and health information, there is a risk of unauthorized access or misuse of this personal information. Furthermore, relying solely on a GA for diagnosis or treatment without proper medical supervision can lead to incorrect assessments and potentially harmful patient consequences. Also, excessive usage of the application can cause harm to both physical and mental health. Finding a balance and limiting screen time is essential to avoid negative consequences. Additionally, excessive use of applications can lead to decreased productivity and hinder social interactions. The following is an excerpt from a participant's response:

"Actually, this app possesses many advantages that encourage the patient to use it unfortunately it is an app and many problems have been recognized previously with technology devices, such as viruses, system failure, hacking sensitive data."

"Maybe privacy issue make challenge to patient to thing many times to use this app, and maybe old patients are not familiar with technology enough to use it properly".

5. Conclusion

Games have become an integral part of our everyday lives. As a result, systems, activities, and services are also progressively becoming gamified, giving our realities and lives a more game-like quality.

Global awareness of gamification has grown in recent years across several areas. By incorporating game-like components like badges, points, and leaderboards, among others, these programs might encourage patients to adopt improved habits and adhere to treatment plans. Gamification is "the use of game design elements in nongame contexts." Consequently, the impact of the self-determination theory on gamification becomes apparent through its argument that humans possess a natural inclination to participate in activities that provide both intrinsic and extrinsic incentives. Utilizing established approaches of self-motivation, gamified systems incorporate a range of motivational elements, including prompt feedback, badges, point systems, leaderboards, certifications, quests or challenges, customization options, unlocking of content, avatars, levels, and in-game currency, to promote active engagement.

On the other hand, regular PA lowers premature mortality, delays the onset of chronic diseases, and lowers the risk of developing them. The WHO defines health as "a state of mental, physical, and social well-being". Most people should be aware of public health guidelines and the benefits of suggested PA levels; regular PA can help people maintain a healthy weight and reduce their risk of cholesterol issues, high blood pressure, obesity, cardiovascular disease, and diabetes. The study aimed to determine the opinions of medical experts about using gamification programs to enhance patients' PA and quality of life. It analyzed the relationship between gamification and physical activity among the senior population and the motivations behind and difficulties that HCPs face when implementing this approach. However, there are a significant number of physically inactive individuals, especially among women, infants, and older people. According to the study, consistent physical activity has been shown to aid in preventing cardiovascular disease via various mechanisms; the benefits encompassed in this category are the following: blood pressure reduction, increased levels of high-density lipoprotein cholesterol that facilitates fat removal from arteries, decreased levels of high-density lipoprotein that may contribute to fatty deposit formation in arteries, improved blood circulation, fat loss promotion, and muscle mass development.

The GA provides support to the patient. It was anticipated that it would serve as a channel for patients to obtain support in rehabilitating their diet, level of physical activity, and regimen of medications. According to the study's findings, participant replies demonstrated that the app can help many people with Alzheimer's. Additionally, the program may give patients with Alzheimer's reminders and notifications to take their prescriptions at specified times and track their daily physical activities, encouraging them to engage in exercises appropriate for their condition. This complete support system improves Alzheimer's patients' general well-being and medication adherence, ultimately improving their quality of life.

Furthermore, studies have found that GAs may assist patients in adhering to a prescription schedule and engaging in physical activity. Moreover, the study shows that GAs can aid patients in various ways. For example, they can help patients improve their chronic disease management by reminding them to take their medications, log their symptoms, and learn about their status. Rewarding and challenging patients can also help them stay motivated and engaged in their treatment regimens. GAs can also provide patients with support and community by linking them with others dealing with similar challenges. GAs may aid medication adherence by allowing patients to log and tick off each dose. The software may also give patients points or badges for consistently sticking to their prescription plan, generating a sense of accomplishment and motivation to keep on track. Participants also mentioned that the application has capabilities that help patients monitor their vital signs and track their overall health development.

Furthermore, the participants emphasized that the application's user-friendly interface significantly contributes to its success in assisting patients with various medical issues. Patients with chronic

diseases, such as diabetes, may also benefit from the program, which includes capabilities for monitoring blood sugar levels and regulating insulin dosages. According to the study's findings, a diabetes management GA dramatically improved blood glucose control among users in a comparable manner. Finally, physical activity gamification applications have progressed, focusing on integration, social interaction, and customization. These developments can drive future user engagement and improve health outcomes.

The study recommends that more investigation into using GAs in PA is warranted. Different points of view must be explored; HCPs and patients are essential stakeholders whose needs should be prioritized when evaluating gamified apps. In addition, a mixed research approach will strengthen the study by combining quantitative and qualitative methods to gain a more nuanced understanding of the patient's point of view and include in-depth interviews with a larger sample size.

Future research might conduct long-term studies examining the durability and longevity of the effects of gamified apps on levels of physical activity. Interventions and healthcare strategies could benefit significantly from the findings of this approach. This study offered significant insights into the examination of healthcare professionals' perspectives on using gamification applications to rehabilitate patients' PA and overall well-being It is essential to recognize several limits. The results may lack generalizability due to the limited sample size and the inclusion of only a certain group of professionals. Moreover, the study was confined to the participants' viewpoints and exclusively employed a qualitative methodology.

6. Author Contribution

The authors contributed to this study in various ways. The research idea was implemented and developed collaboratively. The authors were involved in creating the methodology and designing the questionnaires. Initial investigation, data collection, and formal analysis were conducted by one author, while the other provided guidance and supervision throughout the process. Data organization and visualization were managed by the same author responsible for the analysis. Both authors participated in writing the original draft and subsequent revisions, ensuring thorough review and editing.

7. Conflict of Interest

There is no conflict of interest for this paper.

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