ACHSM Asia-Pacific Journal of Health Management

REVIEW ARTICLE

QUIET PANDEMIC AMID COVID-19: A LITERATURE REVIEW ON GAMIFICATION FOR MENTAL HEALTH

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ABSTRACT

BACKGROUND:

COVID-19 affects individuals both physically and mentally. The key is to address emerging needs with a modest technique that helps boost the positive approach in individuals. Literature defines Gamification as engaging users with the non-game approach, using game design elements. Its growing popularity is evident in other fields, such as finance and retail.

OBJECTIVE:

This research aims to study the available literature that analyzes and understands using the Gamification approach for mental health in the pandemic.

METHODS:

The author performed a systematic literature review using the PRISMA technique among the selected articles published until Jul 2023, focusing on Gamification, mental health, and COVID-19 in highly reputed record databases, which were peer-reviewed studies. Therefore, the studies using the standard international language of English were eligible for this Study.

RESULTS:

The Study identified elevated articles exploring Gamification through mobile application software, web-based platforms, and other tools since COVID-19 limited in-person social contact for individual safety during peak time.

CONCLUSION:

There are limited studies of Gamification in mental health, and the existing studies suggest that Gamification supports the betterment of mental health. Future studies can explore the different areas of mental health with gamification-based applications or gamified approaches.

KEYWORDS

Gamification, mental health, systematic literature review SLR, COVID-19, mental well-being

INTRODUCTION

During COVID-19, a wave of unidentified quiet global pandemic occurred, also known as mental health. As per the WHO Study, more than 300 million people are suffering from mental health issues such as depression [30]. As set out in a WHO report, the pandemic has affected the mental health of individuals across gender and age groups in the form of stress and anxiety by 25% [1]. The WHO study also highlights that mental health impacts the workplace, where around $US1 trillion worth of productivity is lost globally yearly [2]. The world has changed since the COVID-19 virus became the new normal, spreading globally at super speed since December 2019 [3]. Many pandemics have occurred, which have historically impacted individuals' mental health, but the impact of COVID-19 remains undeniable [4]. This pandemic left people stranded at home to follow social distancing protocols, which was distressing [5, 6]. As a result, it has impacted individuals' mental health and well-being irrespective of age, gender, or location [7]. The circulation of COVID-19 vaccines offered the solution to the virus, but the impact on mental health still resides [8]. Since then, Mental Health awareness has gained attention for the past couple of months as we slowly recover through the vaccine boosters of COVID-19 [9].

Scholars and academics in the literature have highlighted the COVID-19 impact on the global population [10]. The literature highlights the different solutions for mental health issues, and some countries' governments have started taking initiatives to address them. Since the impact on mental health is not immediately visible, such as when an individual is physically hurt [11]. Many people are unaware of its impact on their mental state. However, the solutions to overcome such impact are limited in the literature, which acted as a research gap.

Gamification implements design elements with its game mechanism in the non-game mode to create a user experience that brings user attention and engagement [31]. Since 2010, it has become prominent with game elements such as rewards and badges. This study found a research gap in Gamification offering positivity for mental health. In this systematic literature review, the author explores different offerings through Gamification for individuals' mental health. It's catching up in healthcare and e-commerce and gaining scholarly attention [12, 13]. The benefits of Gamification are explored and captured in literature by academicians at physical and cognitive levels [14, 15]. Gamification attributes are achieved by carefully implementing the game elements in a gamified context, designed using its mechanism to gain a certain level of user engagement [15]. However, a common misunderstanding about Gamification is that it is a game instead, and its features are popular for non-game purposes. Thus, Gamification gives the user space to trial and practice and see if it's helpful for the individual to benefit from the extrinsic and intrinsic motivations [16]. Gamification enables extrinsic motivation through rewards and points, and intrinsic motivation is achieved by seeing progress and giving feedback to the user [17].

Although Gamification studies are expanding in different areas, a gap exists in mental health during the pandemic. The existing prior studies in the form of original research and systematic research were limited to the initial consequences of the pandemic on the cognitive level of individuals.

The author systematically conducted the literature study in reputable databases, where the results section detailed the analysis. This study was a comprehensive systematic literature review that aimed to examine the impact of Gamification on mental health and well-being in COVID.

METHODOLOGY

Academics suggest approaching literature studies using the systematic method, and in this research, the author adopted the use of a systematic literature approach with PRISMA. It's commonly applied in literature with the full name of Preferred Reporting Items for Systematic Reviews and meta-analyses [18]. The goal of this meta-analysis technique is to enable us to ensure that the protocol followed was transparent and rigorous. Key research conducted with this approach doesn't have limitations of arbitrary selection or any form of duplication. The PRISMA methodology has been commonly used in different fields of Gamification to find, analyze, and centralize research outcomes. This systematic study method approaches the research in five stages. The first stage begins with identifying the purpose of the research and research databases. Followed by setting the eligibility and quality criteria, it ends with screening final records. The author analyzed the final records considered in the Study in the later parts, where it was concluded, along with its limitations.

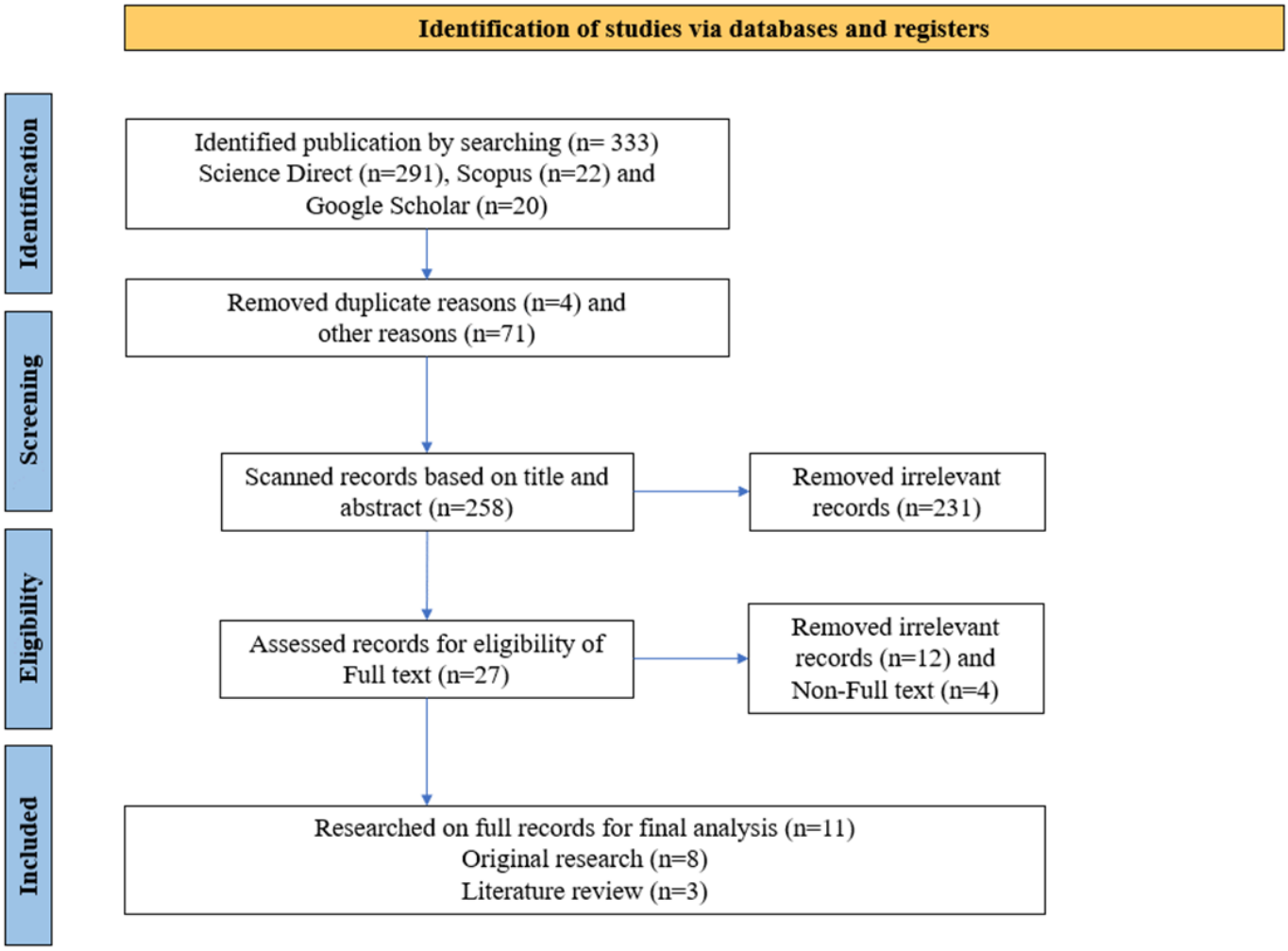
This study includes publications for three years, from 2020 untill the end of July 2023, and the author performed the last search on Aug 4, 2023. The articles reported in the literature use English as an international language, and the texts are complete texts based on authentic research. The elimination criteria of the papers were either duplicate or dual publications with full text and were available in the open access journals. The search directories are enormous because of the nature of the research. Therefore, the scope defined for this literature search was limited to high-impact databases, including Science Direct and Scopus, as they both are large databases at an international level and include good-quality papers. Table 1 lists the research study approach with the keywords from the research database to identify the papers, the Boolean operators used, and the study's timeframe and duration. The author searched by adopting Boolean operators such as AND and OR. The author used a search query on the electronic digital database to identify the review process performed as "Gamification AND mental AND (health OR wellbeing) AND COVID."

TABLE 1 – METHOD USED FOR THE SEARCHING

Keywords used	Boolean operator	Timeframe
Gamification mental health wellbeing COVID	AND, OR	2023(up to July 2023)

The COVID-19 pandemic occurred in December 2019, but WHO announced it as a global pandemic in 2020. The author searched from the beginning of the pandemic until July 2023 given that there are no publications on this pandemic prior to these dates. The search resulted in 333 records, whereas Science Direct identified 291, and the Scopus search resulted in 22. Because of the lack of studies, an additional Google Scholar search yielded 20 articles to consider. Figure 1 details the steps applied in the literature review and systematically concluded the eleven records. Among them, eight were original research records, and three were literature reviews. Thus, the study summarizes 11 records for the final analysis.

FIGURE-1 THE SYSTEMATIC FLOW APPLIED FOR THE STUDY THROUGH PRISMA METHOD



RESULTS & DISCUSSION

This study concludes with the 11 research records considered for the final analysis. In recent years, gamification has gained momentum in different fields, such as education and financial industries. Chart 1 reflects the publication by year, where 2020 has 9% publication, 27% in 2021, 2022 has 37%, and 2023 has 27 % publication.

Gamification has been growing in different fields, and health science researchers are identifying different areas of it [15]. However, based on the research from the mental health perspective, there is limited research in this area. Mental health awareness has been growing since 2021, and therefore, in this research, we observe the growing but limited publication in the same year.

CHART-1 ARTICLE PERCENTAGE PUBLICATION BY YEAR.

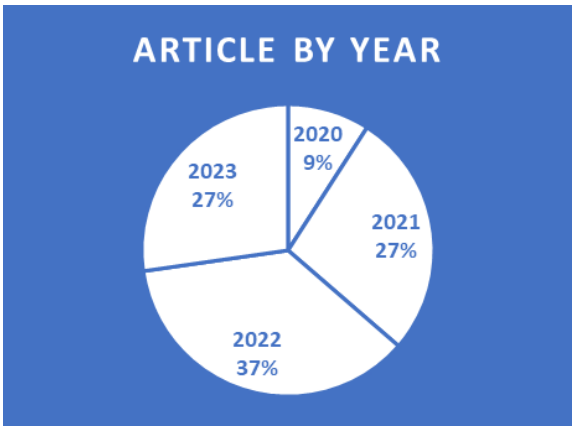


Table 2 summarizes the rank from the Scopus sources of the journal where the research papers are published, which are outcomes of this research study. Through this analysis, all the selected research papers are from different journals. The Elsevier publishers appeared with its two journals, Computers in Human Behaviour, which aligned with psychology in the cyber world, and the International Journal of Medical Informatics, which details medical healthcare aspects and required settings. The Digital Health journal details health in the digital world, published by Sage, and the Journal of Healthcare Informatics Research focuses on emerging areas in health from Springer Publisher. The JMIR publications appeared in three journals, such as the Journal of Medical Internet Research, which focuses on health in the Internet era. The JMIR Mental Health aligns on the mental health areas technology innovations. The JMIR Serious Games journal was a multidisciplinary journal aimed at emerging technologies such as VR and mobile applications. The Behavioral Sciences journal was a peer-reviewed journal based on behavioral and psychological aspects, and the Children and Society journal was an interdisciplinary journal dedicated to children-based research.

TABLE 2 – RANKING BY THE JOURNAL

Journal Name	Publisher	Cite score 2023	SJR 2023
Computers in Human Behavior	Elsevier Ltd	19.1	2.641
Journal Of Medical Internet Research	JMIR Publications Inc.	14.4	2.020
Journal of Healthcare Informatics Research	Springer Science and Business Media Deutschland GmbH	13.6	1.664
JMIR Mental Health	JMIR Publications Inc.	10.8	1.63
International Journal of Medical Informatics	Elsevier Ireland Ltd	8.9	1.110
JMIR Serious Games	JMIR Publications Inc.	7.3	0.986
Digital Health	SAGE Publications Inc.	2.9	0.767
Behavioral Sciences	MDPI	2.6	0.616
Children and Society	John Wiley and Sons, Inc	2.6	0.599

Table 3 summarizes the citations found in the Scopus directory for the research article considered for this Study. The author Drissi N [19] gained the maximum number of citations, followed by another author Six SG [20], where both have crossed more than 20 citations.

Chart 2 refers to the citations found in the Scopus directory from 2020 to 2023 for the records considered for this study. In 2020, the studies attained 1 citation; in 2021, they attained ten citations; in 2022, they attained 32 citations. Lastly, the year 2023 attained 60 citations.

TABLE 3 – NUMBER OF CITATION OF RECORDS BASED ON SCOPUS

Article Details	Total Citation till 2023
Drissi, [19]	24
Six, [20]	23
Suppan, [21]	12
Nicolaidou, [22]	11
Manzano-León, [23]	10
Yoon, [24]	10
Cheng, [25]	6
Xi, [26]	2
Piao, [27]	2
Litvin, [28]	2
Lubbe, [29]	1

CHART-2 ARTICLE CITATIONS BY YEAR.

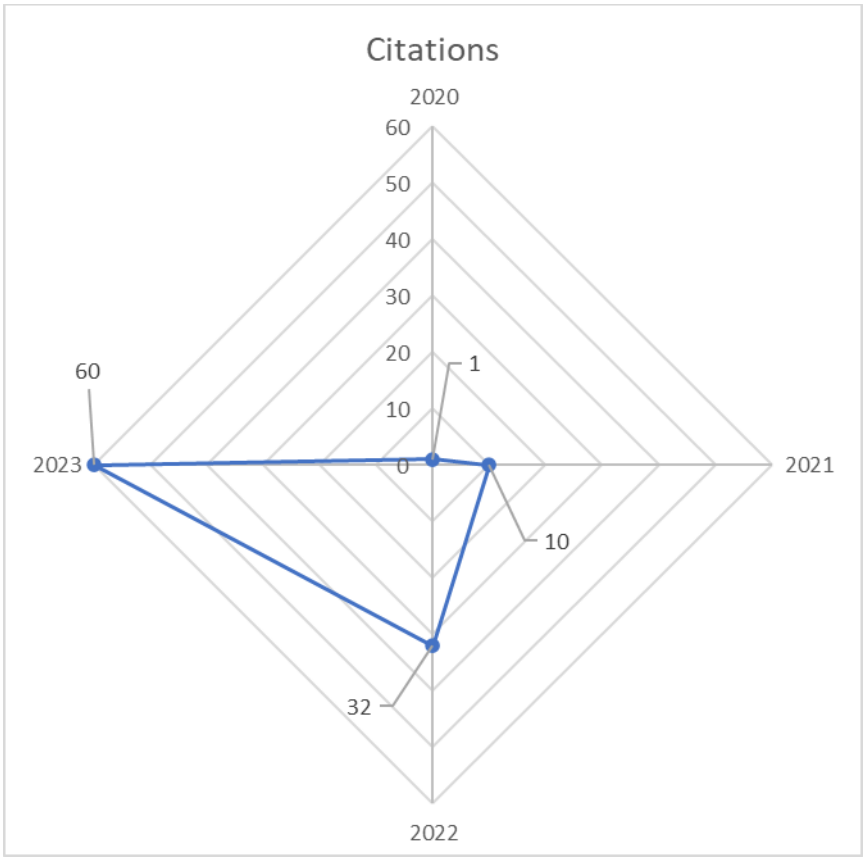


TABLE 4 – LITERATURE REVIEW

No.	Author	Year	Title	Methodology	Population	Findings
1	Drissi, [19]	2020	An analysis of self-management and treatment-related functionality and characteristics of highly rated anxiety apps	Systematic Literature review with PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses)	One hundred sixty-seven anxiety apps inclusive of Android and iOS Apps.	51% of apps used Gamification to motivate and encourage users

2	Six, [20]	2021	Examining the Effectiveness of Gamification in Mental Health Apps for Depression: Systematic Review and Meta-analysis	Systematic Literature review with PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses)	38 articles with 8110 participants	Apps for mental health were helpful and had both gamified and non-gamified features.
3	Suppan, [21]	2021	Impact of a Serious Game (Escape COVID-19) on the Intention to Change COVID-19 Control Practices Among Employees of Long-term Care Facilities: Web-Based Randomized Controlled Trial	A random control trial and the triple-blind approach and Escape COVID-19 as a serious game.	Switzerland participants from long-term care facilities. 295 responses	The gamified approach was more engaging in a serious game than traditional material.
4	Nicolaidou, [22]	2022	A gamified app for supporting undergraduate students' mental health: A feasibility and usability study	Feasibility technique and system usability scale. Student Stress Resilience App was combined with IoT Technology.	Seventy-four participants (44-M and 30-F) of undergraduate students' categories from 5 different university	Gamification with design principles can be a creative approach after the pandemic for mental health betterment.
5	Manzano-León, [23]	2022	Gamification and family leisure to alleviate the psychological impact of confinement due to COVID-19	Mixed methods Quasi-experimental Longitudinal	Spanish families, among which 18 are male, 64 are female parents, and 82 children.	Gamification can boost emotional competencies to decrease anxiety levels.
6	Yoon, [24]	2021	Perceptions of Mobile Health Apps and Features to Support Psychosocial Well-being Among Frontline Health Care Workers Involved in the COVID-19 Pandemic Response: Qualitative Study	Qualitative Study by a semi-structured interview with sampling technique as purposive	Singapore 42 participants as Frontline workers in twelve 1-1 interviews or focus group	A gamified approach by goal setting and a tailored method can help.
7	Cheng, [25]	2023	A meta-analytic review of gamified interventions in mental health enhancement	Systematic Literature review with PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses)	42 study where 5792 participants among the eight world areas	Gamification intervention for mental health tools was valuable.
8	Xi, [26]	2022	Effect of the "Art Coloring" Online Coloring Game on Subjective Well-Being	Independent 2-tail t-test and Univariate analysis	1390 global players	Gamification through colors can relax the

			Increase and Anxiety Reduction During the COVID-19 Pandemic: Development and Evaluation			mental stress in the subjective well-being (SWB)
9	Piao, [27]	2022	A Behavioral Strategy to Nudge Young Adults to Adopt In-Person Counseling: Gamification	Experimental and Random. Followed by the Hayes Model	120 people in the language community of the Korean and Chinese	Gamification makes a positive impact on individual personal counseling.
10	Litvin, [28]	2023	The Impact of a Gamified Mobile Mental Health App (eQuoo) on Resilience and Mental Health in a Student Population: Large-Scale Randomized Controlled Trial	A random control trial using the ANOVA method and the eQuoo app.	United Kingdom, 1165 Students, 180 University	The Gamification app has demonstrated value and effectiveness through its game elements.
11	Lubbe, [29]	2023	Experiences of Users with an Online Self-Guided Mental Health Training Program Using Gamification	Experimental design for six weeks	294 participants	Gamification with story form and reward for the user's self-compassion towards mental health was useful.

Table 4 sets out the author details for the literature review, including the academician, publication year, study title, type of research methodology used, population size, and critical findings.

Mental health is at the psychological level, impacting the individual through emotions and changing the individual's behavior. Figure 2 summarizes the keywords reflected in the articles considered for this study. It's about a person's attitude changes towards self and society and how they feel or react in different situations. Like the invisible nature of COVID-19, the mental health impact is not visible immediately. Several studies mentioned the importance of mental health beginning from childhood across different human life age groups and gender. The different forms of mental health are stress, anxiety, distress, and depression. Anxiety was also referred to in different ways by the author in the studies [19, 23, 26, 27, 28]. The word depression kept appearing in the literature review [19, 20, 25], and stress was identified in the studies by the author [19, 22]. Mental health and Gamification are elaborative topics; hence, Table 5 refers to the areas of mental health that emerged in this literature study. The themes of the research paper are part of Table 5, describing their application and where all studies with the same theme are applicable.

The three gamification themes concluded in this study's analysis are mobile software, online websites, and online tools. In mobile software, many gamified applications (Apps) resulted, among which two apps appeared: eQuoo and Student Stress Resilience. In the online context, different web programs were referred to during COVID-19 for serious games such as Escape COVID-19 while others for self-guidance. Lastly, online tools for counseling meetings during COVID-19 were used, such as the Zoom tool as the gamified approach.

TABLE 5 – THEMES IDENTIFIED IN THE STUDY

No.	Theme	Applications	References
1	Gamified Mobile Software Applications	Use of different Gamification Apps for different mental health purposes, enhancement, and depression. Use of Apps such as Student Stress Resilience and eQuoo. An art coloring technique was part of a gamified approach.	[19, 20, 22, 24, 25, 26, 28]
2	Gamified Online Web Programs	Usage of Serious games example Escape COVID-19. Use of Web platforms for questionnaires and self-guided programs.	[21, 23, 29]
3	Gamification with Online Meeting Tools	Tools like Zoom were part of the Gamification approach for personal counseling.	[27]

In Table 4, the second study is a literature analysis conducted in 2021 that also found the effectiveness of mental health using support from both game and non-game features, while the seventh study highlighted the promising benefits of gamification [20, 25]. The first study from Table 4 opened a deep dive into the different emerging areas of the gamified-based mobile application software that individuals can use, which also requires further studies [19]. As part of the research, the author also referred to handling anxiety levels with mobile apps. The article also highlighted the different forms of mental well-being that are effectively supported by mobile applications. In industry, different mobile apps use different versions of software. In this study, 123 apps had the platform of Android and were usable on non-Apple devices, and Apple iOS devices had only 44 apps. The apps include different management and coping mechanisms techniques for mental and cognitive therapies. These apps offer different functionalities at both online and offline levels, where users can chat for communication purposes. Thus, mental health care can be addressed during the pandemic with different mental health apps, as identified in the author's Study. The Study also suggested integrating apps as part of the mental health care process for professionals.

FIGURE-2 SUMMARIZE THE KEYWORDS APPEAR IN THE STUDIES

In the fourth and tenth study from Table 4, the author used Student Stress Resilience and eQuoo, a gamified app, to conduct the study, which supported mental wellness and anxiety [22, 28]. The participants in the sixth study who were frontline workers looked for other support features from the community, such as social influence [24]. In long-term care facilities, the third study authors used a serious game named Escape COVID-10 to study, resulting in better outcomes than traditional guidelines presentation [21]. The ninth study directed the analysis of gamification adoption among young people for counseling purposes [27]. Gamification is continuously gaining attention in other healthcare areas, as studied in the literature by academicians. Based on the research, the article's authors suggested using a gamified counseling approach for better user engagement. The author suggested carefully

considering using the information at low or high vividness as Gamification aims to ensure individual learning involvement and participation.

Another gamification fifth study was on web-based platforms for parents and children, and the author also highlighted the pandemic's impact on everyone, including their psychological issues [23]. Children's social gatherings and meetings are part of their daily activities, limited by the COVID-19 lockdowns. The stress coping mechanisms among parents of different genders are different, and with the Gamification attempt in the study, the parents could express this to other family members. In the eighth study, online gamification implementation with art coloring focused on the subjective well-being of adults with different colors [26]. In the eleventh study, the story mechanism of gamification and the reward system for motivation were promising for self-compassion [29]. This research attempted to probe the gamification aspects of mental health as it has become necessary for humankind and its well-being. However, the study is currently limited to Gamification, and future studies can explore its different dimensions. Mental health is an urgent topic in the ongoing post-pandemic worldwide, and thus, Gamification here offers to bring positive behavioral change. However, some common misunderstandings involve calling games with the name Gamification. However, using the game design and its mechanism to design and make it goal-oriented is to engage users with a non-serious purpose.

CONCLUSION

The distress of COVID-19 on mental health has left scars on individuals even with its recovery in the later year of 2023. Good mental health is also the foundation for life's survival and growth. As the government and institutions' awareness of mental health increases, the existing study analysis proposes gamification solutions to individuals. In literature, gamification has transformed the user experience by promoting better participation and encouraging morale. This research systematically studied eleven articles, as listed in the earlier sections. Current literature limits the Study with the gap of the longitudinal studies, and in the future, more studies can focus on different countries where the population count remains vast. The purpose of humankind is to have sustainable communities for future generations. Hence, gamification support brings changes in user perspectives and engagement so that they can focus on building a better future.

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