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Israel's Economy: Turbulence and Hope in Dark Times

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Reflections on Gamified Technology in the Mental Health Sector

This article delves into the interplay of technology and mental health, with a particular focus on the transformative influence of gamified technology, shedding light on its potential, implications, and the legal terrain it traverses.

In an era marked by a need to address the escalating challenges within the mental health sector, combined with unprecedented advancements in technology, the fusion of well-being and innovation has become an area of particular interest to healthcare industry players. Recognizing its potential to offer innovative solutions with broad applicability, significant resources are being invested in this dynamic intersection.

The global digital mental-health healthcare market has witnessed substantial growth in the last five years, reaching USD 23.45 billion in 2023 – and its future looks even more compelling. A study conducted in March 2024 by Market Research Future (MRFR), a global market research company, unveiled projections indicating a substantial escalation to approximately USD 72.3 billion by 2032, exhibiting an impressive compound annual growth rate (CAGR) of 20.6% between 2023 and 2032 (see Chart 1 below). This exponential rise is fueled by a convergence of factors and exacerbated by the COVID-19 pandemic.

Market Research Future's report also identified the top 10 key trends and innovations shaping the landscape of mental-health technology. These include AI-powered therapy chatbots; the integration of virtual reality (VR) in therapy; expansion of telemedicine and remote care; utilization of social media data analytics for mental health insights; wearable devices for stress monitoring; and, notably, gamification.

GAMIFICATION IN HEALTHCARE AND IN MENTAL-HEALTH HEALTHCARE

Gamification is commonly defined as integrating game-design concepts into non-game settings

Chart 1: Market Research Future Report on Digital Mental Health Market/ Market Size in USD Billions
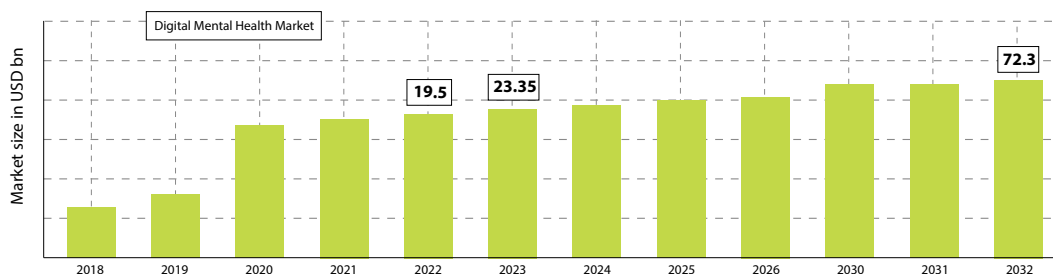
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in order to motivate, stimulate and influence (or manipulate) human behavior, fostering habits, or encouraging pattern-breaking. This concept has become increasingly popular across diverse sectors, such as education, sales/retail and HR.

In practice, a "gamified" product utilizes features such as points, levels, rewards, storytelling elements, immediate feedback and competitions. These features are strategically deployed to enhance user engagement, cultivate a sense of achievement, promote social interaction, and track progress and success.

Potentially, a more sophisticated form of gamification could be achieved through the personalization and customization of gamified products, including gamified medical treatments, by leveraging patient data collected and processed within these frameworks.

In the context of the healthcare sector, gamified interventions have the potential to tailor medical treatments and interventions to specific patient needs. This has the transformative capacity to optimize healthcare delivery and overall outcomes, offering promising avenues for enhancing patient care on many different levels. Gamified apps such as MySugar exemplify this by gamifying the management of chronic diseases such as diabetes. Similarly, the integration of gamification in healthcare could help patients adhere to short-term treatments or medical regimes, either under virtual supervision or through self-supervision, hopefully increasing patient engagement and adherence. Additionally, these gamification platforms have the capability to provide pediatricians with continuous,

high-quality health-data – facilitating more informed medical interventions ultimately leading to improved patient care. Gamified health and wellness products could also serve as educational tools, bridging the gap between information dissemination and comprehension, thus contributing to a more informed and engaged healthcare landscape.

THE MOMENTUM, OR: INVESTMENTS SURGE

Riding the wave of trends observed across diverse segments of the healthcare sector, global digital mental-health healthcare funding soared

Chart 2: Rock Health Q3 2023 Digital Health Funding Report findings regarding U.S. digital health funding and deal size (total venture funding in USD billions, number of deals)

Average Deal Size	$10.7m	$15.2m	$14.7m	$13.5m	$15.8m	$21.6m	$19.6m	$30.2m	$39.6m	$26.5m	$23.5m
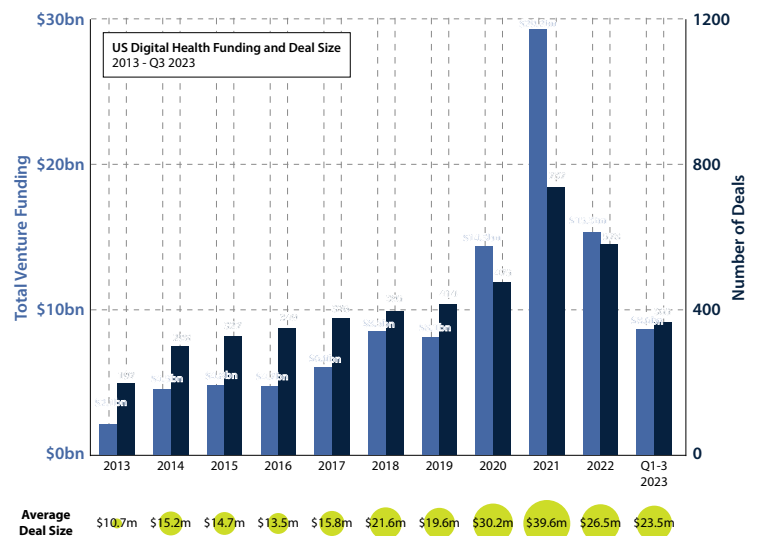
Note: Includes US deals >$3m; data through September 30 2023.
Source: Rock Health Digital Health Venture Funding Database

to a pinnacle of USD 29.2 billion through 737 deals during 2021 (see Chart 2). The entrance of tech giants into the mental-health healthcare market further serves as another validation of its perceived potential. Notable investments include Amazon's USD $3.9 billion acquisition of One Medical in February 2023. One Medical is a "hybrid" healthcare service provider, currently offering services such as the "Stress and Anxiety Series" which comprises six 75-minute group sessions in a virtual community with a primary care physician and health coach. In the same month, Alphabet's venture capital arm, GV, invested USD 28.1 million in Firsthand, a startup employing a peer-support model to assist patients with serious mental illness to access care. Meanwhile, Apple has been actively experimenting with various mental healthcare products.

Despite these promising developments, mental healthcare investments witnessed a downturn in 2023, in line with the broader decline in healthcare funding, various sources/research methods suggest that startups in this sector secured between USD 8.6 billion to USD 10.7 billion across approximately 365 to 492 deals, marking the lowest capital influx into

the digital health sector since 2019. Nevertheless, according to the Q3 2023 Digital Health Funding Report published (October 2023) by Rock Health, mental health retained its position as the most heavily funded area among digital health startups over the past four years (see Chart 3 below).

Despite the slowdown of funding in overall tech sectors, a recent review of investment inclinations in the digital healthcare sector, and particularly, in the digital mental-health healthcare sector, does show a growing recognition of the potential of gamification to revolutionize mental-health healthcare delivery. The (general) healthcare gamification market size was estimated by a recent (March 2024) Research and Market Report at USD 3.55 billion in 2024, a report which also expects this market to hit $15.9 billion by 2030, translating into a compound annual growth rate (CAGR) of 34.59% in six years.
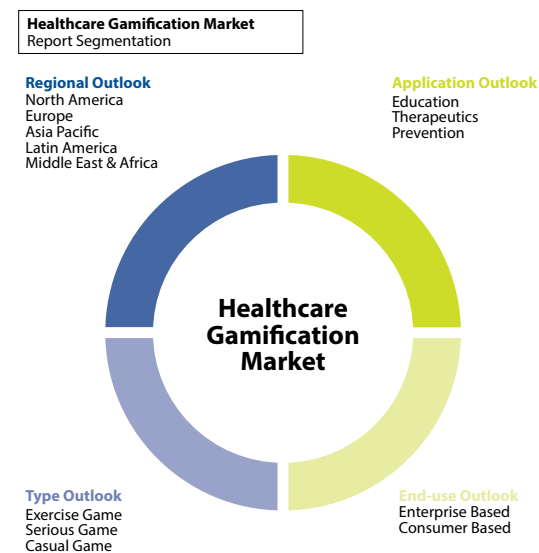
THE POTENTIAL

A report by Grand View Research, a market research and consulting company based in the U.S. and India, titled "Healthcare Gamification Market Size, Share & Trends Analysis Report By Type (Exercise Game, Serious Game, Casual Game), By Application (Education,

Chart 3: Q3 2023 Digital Health Funding Report by Rock Health / Mental Health as a top funded clinical indication among digital health startups across 2019-2023

Top Funded Clinical Indications
2019 - Q3 2023; integers equate to funding rank

	2019	2020	2021	2022	Q1-Q3 2023
Mental Health	$1.0bn 1	$2.4bn 1	$4.9bn 1	$2.1bn 1	$0.9bn 1
Nephrology	$0.1bn 20	$0.4bn 16	$0.5bn 18	$0.1bn 23	$0.7bn 2
Cardiovascular	$0.8bn 2	$1.2bn 4	$2.0bn 3	$1.2bn 2	$0.3bn 3
Oncology	$0.6bn 3	$1.3bn 3	$1.4bn 9	$1.2bn 3	$0.3bn 4
Neurology	$0.2bn 10	$0.3bn 17	$1.0bn 12	$0.5bn 10	$0.2bn 5
Gastrointestinal	$0.2bn 19	$0.5bn 14	$0.6bn 16	$0.7bn 8	$0.2bn 6

Chart 4: Grand View Research Report Segmentation of the Healthcare Gamification Market

Healthcare Gamification Market
Report Segmentation

Regional Outlook
North America
Europe
Asia Pacific
Latin America
Middle East & Africa

Application Outlook
Education
Therapeutics
Prevention

Healthcare Gamification Market

Type Outlook
Exercise Game
Serious Game
Casual Game

End-use Outlook
Enterprise Based
Consumer Based

Source: www.grandviewresearch.com

Therapeutics), By End-use, By Region, And Segment Forecasts, 2023 – 2030", aimed to map and characterize the general healthcare gamification market potential. The report profiled key companies and products such as Fitbit, Inc.; Ayogo Health, Inc.; Evolv Rehabilitation Technology S.L.; BI Worldwide (Bunchball, Inc.); Akili Interactive Labs, Inc.; Cognifit, Inc.; Mango Health; and Nike, Inc., The report segmented the healthcare gamification market into four dimensions: (1) "Regional outlook", dividing its insights between North America, Europe, Asia Pacific, Latin America, and the Middle East and Africa; (2) "End-Use outlook", looking at either an enterprise-based market or a consumer-based market; (3) "Application outlook", applications targeting educational purposes, applications targeting therapeutic purposes, and applications targeting preventive purposes; and (4) "Type outlook", characterizing the gamification applications into exercise games, serious games and casual games (see Chart 4). The report's overall estimation of the global healthcare gamification market size in 2022 was valued at USD 3.15 billion, and, based on historic data for 2018 through 2021, forecasted its expansion at a CAGR of 22.6% over 2023 to 2030 worldwide, and at a CAGR of 20.9% by 2030 in the US alone (see Chart 5 below). This,

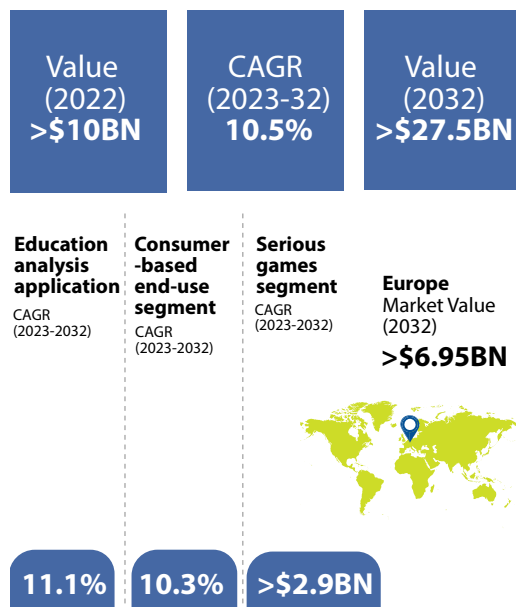according to Grand View Research, would translate into a revenue forecast of USD 15.9 billion in 2030.

Even less optimistic analyses of the market still predict impressive growth. A report titled "Healthcare Gamification Market - By Game Type (Casual Games, Serious Games, Exercise Games), By Application (Prevention, Therapeutic, Education), By End-use (Enterprise Based, Consumer Based) & Forecast, 2023-2032", published in December 2022 by Global Market Insights, a US-based market research and consulting company, focused on the CAGR and attributes of the gamified healthcare market. Though its initial evaluation of the market for 2022 stands at USD 10 billion, the CAGR for 2023 through 2030 is estimated at 10.5% (see Chart 6 below). The report specifies the market's growth drivers, being: 1) increasing prevalence of chronic diseases, 2) the emergence of health consumerism, 3) an upsurge in social media and smartphone usage, 4) growing acceptance of gamified models in healthcare, 5) an increasing shift to business-to-consumer models and outcomes-based models, 6) significant influence from the millennial generation, and 7) the growing use of

Chart 5: Grand View Research Findings Regarding U.S. Healthcare Gamification Market CAGR 2023-2030
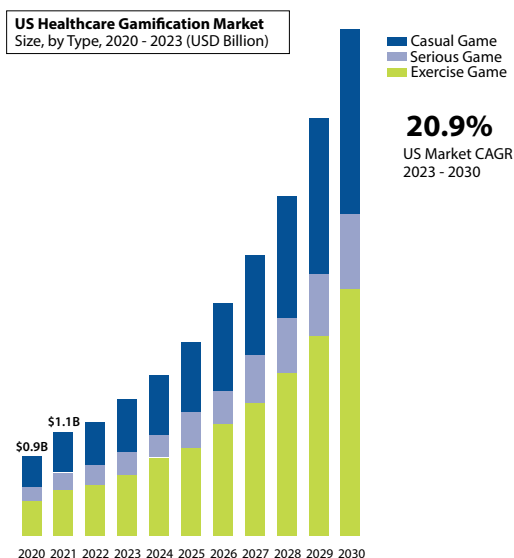
Chart 6: Global Market Insights Healthcare Gamification Market Report Findings

US Healthcare Gamification Market
Size, by Type, 2020 - 2023 (USD Billion)

- Casual Game
- Serious Game
- Exercise Game

20.9%
US Market CAGR 2023 - 2030

$0.9B $1.1B

2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030

Source: www.grandviewresearch.com

| Value (2022) >$10BN | CAGR (2023-32) 10.5% | Value (2032) >$27.5BN |

Education analysis application
CAGR (2023-2032)

Consumer-based end-use segment
CAGR (2023-2032)

Serious games segment
CAGR (2023-2032)

Europe Market Value (2032)
>$6.95BN

11.1%   10.3%   >$2.9BN

gamification toward HIV awareness in countries in Africa.

THE ISRAELI ANGLE

On October 7th Hamas terrorists launched a unilateral attack on Israel, brutally killing over 1,200 civilians, including infants and children, taking 240 hostages, and injuring thousands. Many of those heinous acts were broadcasted live on social media meaning that hundreds of families learned of their loved ones' tragic fate from Telegraph and Tik Tok. These events resulted in not only personal trauma for those who lost family and friends, but also a collective national trauma for the loss of security and safety that had been virtually taken for granted. Due to the large numbers of people affected and seeking help, there has been a heightened focus on the local mental health technology sector.

HealthIL data (in collaboration with Yoav Fisher, CTech), has classified circa. 63 Israeli startups in the mental health space. Insights from HealthIL and CTech indicate that these startups have collectively raised USD248 million in disclosed funding, while over 55% of these startups remain unfunded, either due to deliberate bootstrapping or an inability to attract investor interest. Moreover, nearly 90% of all startups are in their early stages, defined as Pre-A funding.

Similar observations were made by Startup

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Nation Central (SNC), a non-governmental organization studying the Israeli hi-tech landscape. SNC has identified approximately 85 Israeli "mental health startups", and its data pointed to a total private funding of USD450.43 million as of February 2024 . In its analysis publication from December 2023, SNC highlighted two significant findings: first, that over 55% of mental health startups remained unfunded, signaling a discerning investment landscape; and second, that managed-care startups, though fewer in number, have secured a significant portion of the funding, suggesting investor preference for solutions integrating patient-facing care.

While none of the aforementioned studies specifically focused on gamified mental health, a brief review has identified notable examples of tech innovators utilizing gamification in mental health solutions, such as: Mood House, which develops VR games and interactive experiences

Chart 7: Selections from SNC's Mental Health Startups' Dataset (available online) last updated February 26, 2024)
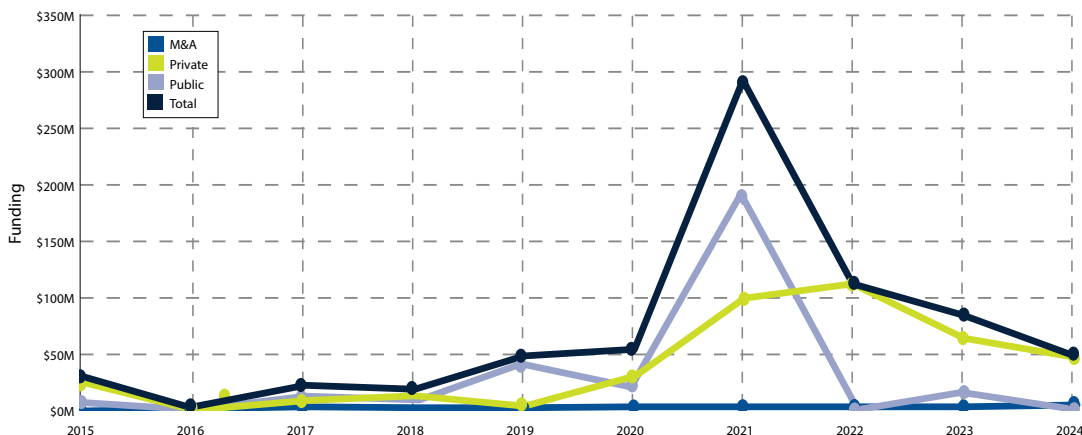
to aid in the treatment of severe mental health disorders such as PTSD and bipolar disorder; Ggtude, which provides personalized therapeutic interventions for individuals while incorporating "game-like interactions", based on cognitive-behavioral therapy (CBT) principles; and Wellplay, which utilizes psychodrama "in a digital format" to provide emotional support, as a form of innovative therapy.

TRENDS, CONSIDERATIONS AND RISKS

A glance at prevailing trends within the gaming industry provides valuable insights into potential trajectories for the gamification of healthcare, particularly in the mental health domain. Numerous online commentators have underscored the prominence of immersive technologies such as Augmented Reality (AR), Virtual Reality (VR), and Mixed Reality (MR) within the gaming landscape. Additionally, the integration of Artificial Intelligence (AI) and synchronization with the Internet of Things (IoT), whether through wearable technology or smart home appliances, emerges as a central theme in contemporary gaming advancements.

Understanding these pivotal trends sheds light on the evolving possibilities for incorporating cutting-edge technologies into the realm of healthcare gamification. In one recent example from Israel, a reward-driven smartwatch-connected app deployed to more than 500,000 members of Clalit Health Services, Israel's largest HMO, has demonstrated substantial effectiveness in increasing physical activity and reducing chronic disease incidence.

Considering the popularity of gamification of broad healthcare practices and bearing in mind current trends in the commercial gaming industry, we must not underestimate that gamification of healthcare and especially of mental-health healthcare raises some increasingly burning ethical questions and risks.

Firstly, the integration of artificial intelligence (AI) into gamified healthcare, particularly through the rising prevalence of chatbots in mental health services, raises valid concerns surrounding the precision and appropriateness of responses.

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Additionally, the incorporation of AI introduces the risk of healthcare professionals excessively relying on predictive analytics in their treatment decisions, especially given the widespread encouragement of remote care and telemedicine. As these AI-driven elements become integral to mental health care, careful consideration of their accuracy, appropriateness, and the potential legal implications is paramount for ensuring patient safety and effective healthcare delivery.

Another significant risk stems from concerns related to data privacy and security. The heightened sophistication of gamified healthcare, particularly as it infiltrates wearable devices and the Internet of Things (IoT), poses a potential breach that could lead to the collection and processing of increasingly substantial amounts of sensitive personal health information. This heightened integration of technology necessitates vigilant measures to safeguard individuals' privacy and protect against potential unauthorized access or misuse of sensitive health data. Addressing these concerns is crucial to maintaining the integrity of gamified healthcare systems and ensuring the trust and confidence of users in the protection of their personal information.

Additional considerations extend to the social context, giving rise to ethical and discrimination concerns. Questions emerge regarding equitable access to the advanced technologies essential for gamified healthcare interventions, including wearable devices and high-speed internet.

Unequal accessibility, particularly among older patient populations less familiar with such technologies, or people with mental disabilities, may exacerbate disparities in the quality of care. These disparities have the potential to lead to legal challenges concerning patient rights and preferences. Addressing these socio-technological gaps is essential to foster inclusivity, ensure fair healthcare access, and mitigate the risk of legal implications stemming from potential discrimination or inequitable care.

Finally, one cannot overlook additional challenges, prevalent in the general application of gaming in the healthcare industry, being patient-cheating as well as gradual loss of interest among users. These difficulties may also be manifested in the lack of long-term impact assessment of gamified mental health interventions on users' well-being. Patient-cheating may compromise the accuracy and reliability of the information gathered through gamified healthcare interventions. Simultaneously, the risk of users losing interest over time poses a challenge to sustained engagement, potentially diminishing the effectiveness of these gamified solutions. Continuous and long-term assessment will ensure that the intervention remains beneficial and does not inadvertently cause harm over time. Recognizing and addressing these challenges is crucial for maintaining the credibility of gamified healthcare interventions and ensuring enduring user engagement for optimal health outcomes.

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FINAL OBSERVATIONS

The future of gamification in the mental health market looks promising and dynamic, with anticipated trends including continued growth, innovation, and diversification in interventions. Increased integration with technologies like AR, VR, and AI can be expected, along with increased strategic collaborations among technology companies, healthcare providers, and mental health professionals. User-centric design principles, a focus on mental health prevention, and ethical considerations, including privacy and data use, are also expected to be prioritized in the evolving landscape of gamified mental health interventions.

We would submit that this positive outlook aside, stronger emphasis must be placed on evidence-based practices, regulatory recognition, and efforts to enhance accessibility, in order to ensure wider reach and credibility.

In 2020, the Food and Drug Administration (FDA) approved EndeavorRX, a digital therapeutic prescription video game designed for kids aged 8 to 12 who have ADHD. The game challenges players to focus on multiple tasks, targeting the symptoms of ADHD in an engaging way. This was a breakthrough in the digital healthcare sector because traditionally, FDA approval has been primarily associated with pharmaceuticals and medical devices. The agency's recognition of gamified interventions marked a significant milestone in the evolving landscape of digital health.

While addressing privacy concerns, ethical considerations, and the need for rigorous evidence-based research remain critical, as submitted in this article, there seems little doubt that by harnessing the power and versatility of gamification, the healthcare industry has been equipped with a tool that can transform the landscape of mental health treatment. ∎

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