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Intuitive Game Design as digital therapeutic tool for silver-generation

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Abstract

The purpose of this study is to implement game content within the generative artificial intelligence module Chat-GPTs, grounded in the humanistic discourse of self-reflection. This content aims to empower the dignity of the silver generation, which has been marginalized by digital technology. Simultaneously, we intend to prototype a digital psychotherapeutic tool. The development of a flexible device that adapts to the silver generation's living environment and temporal constraints is also part of our plan. However, there are still few commercially available products, and digital therapeutics developed in the form of content are virtually nonexistent. The goal is to implement game content that allows the elderly, who have been marginalized by digital technology, to find their true dignity. Simultaneously, we plan to commercialize a prototype of digital psychotherapy that can flexibly adapt to the range of living environments and time constraints of the elderly. This study has been extended based on the game content 'Daily Run' created by Hyein Kwon, an undergraduate student at Kyungil University.

Keywords: Chat GPT, game, silver generation

1. INTRODUCTION

The media technology environment, epitomized by generative artificial intelligence, is increasingly recognized for its positive impact on fundamental qualitative changes in human life by providing optimal information in a timely manner. However, the rapidly evolving media technology can paradoxically exacerbate the exclusion of the middle-aged population (hereafter referred to as the "silver generation").

The emergence of new media platforms has indeed expanded people's access to a wealth of information, enabling knowledge expansion and swift adaptation to change. Additionally, these platforms embrace diversity by allowing the sharing of individualized content, catering to various interests. Unlike traditional media (such as newspapers, radio, and TV), where information is broadcast at specific times, new media ensures continuous exposure to stored information, fostering interaction and engagement regardless of time constraints. The rapid aging of the global population has brought gerontological research to the forefront, particularly in the context of understanding physical frailty among the "old-old" adults, typically defined as individuals aged 75 and above [1].

As we navigate this dynamic landscape, it is crucial to strike a balance between harnessing media's positive functions and addressing potential challenges, including the risk of excluding certain demographic groups. By

promoting responsible media practices, transparency in algorithms, and fostering healthy relationships between news portals and media outlets, we can create an environment where media serves its essential purpose while safeguarding democratic values and individual rights.

2. Working Process
2.1 Prototyping

This study has been extended based on the game content "Daily Run" created by Hyein Kwon, an undergraduate student at Kyungil University.(Fig.1) The game content aims to address the digital exclusion faced by the silver generation (middle-aged population) by providing a platform where they can rediscover their true dignity. Simultaneously, we are developing a digital psychotherapeutic prototype that adapts flexibly to the silver generation's living environment and time constraints. In the context of caregiving, agility is a competency that empowers care workers to be flexible and adaptive, significantly enhancing connectivity with caretakers.[2]

Figure 1. Hyein Kwon's work 'Daily Run' as prototype

The prototype was developed using the Unity game engine. It was an extension of the game content called "Daily Run," created by Hyein Kwon, an undergraduate student during the 2023 fall semester as part of a 'game development tools' course. The game's mechanics were inspired by a consistent movement direction—left to right and up and down—based on the player's gaze. redictably, university faculty's perspectives on the integration of ChatGPT in higher education are twofold. While some embrace the technology with enthusiasm[3]. ontent using VR devices also requires encouraging users to reconnect. However, compared to PC, console, and mobile platforms, VR devices have a problem with reconnection rates being lower than other platforms due to the problem of poor accessibility to the device [4].

Unity provides a powerful platform for prototyping, allowing rapid iteration and testing of game concepts. Artists and designers can freely express their creativity using tools like the Asset Store, ProBuilder, PolyBrush, 2D animation tools, and terrain tools. For developers, Unity's visual scripting, C# scripting, and asset workflows facilitate efficient collaboration and high-quality implementation of gameplay experiences. The goal is to reach essential milestones faster by creating engaging prototypes that capture the essence of the game vision.

2.2 Previous case and further issues

Digital psychotherapeutic tools, also known as internet-based psychotherapy treatments, are software-based medical devices designed for disease prevention, management, and treatment. These tools utilize platforms such as smartphone apps, games, virtual reality (VR) content, and chatbots to deliver therapeutic interventions to patients. For reference, game users call this 3D motion sickness because it often occurs when enjoying 3D content, but this is not strictly speaking correct since motion sickness sometimes occurs in 2D content as well [5]. While traditional medical devices were primarily hardware-focused, recent advancements in digital healthcare technology have underscored the importance of software-based medical devices. We also find that ChatGPT can serve as a useful research assistant, helping them to generate citation and references, perform statistical analysis, proofread for spelling, grammar, punctuation, and formatting errors, and translate international references to their mother languages [6].Digital psychotherapeutic tools are being researched and commercialized in various fields, including psychiatry, addiction treatment, insomnia management, ADHD, dementia, and autism spectrum disorders. Their global significance lies in providing patients with convenient access to treatment regardless of time and location.

Key advantages of digital psychotherapeutic tools include shorter development cycles compared to traditional medications and reduced side effects. As a result, they play a crucial role in the healthcare sector. These tools represent a promising area of innovation in medicine, and ongoing research and development are essential for their continued progress. Remember, digital psychotherapeutic tools empower patients by offering accessible and personalized interventions, contributing to a more patient-centric approach to healthcare. As Neumann et al. (2023) suggested, this technology is not likely to disappear in the future [7].

Attention Training Games
BrainLeap Technologies' Attention Arcade™ consists of six games that each train different aspects of attention:

Dr. Mole & Mr. Hide
The goal of Dr. Mole & Mr. Hide is to hit bandit moles as they pop out of the ground and to avoid looking at the professor moles. As the game progresses, the moles appear more quickly and from more locations. Eventually they even parachute from the sky! The game trains the ability to quickly and accurately orient the player's gaze and attention to a sudden event, and to monitor a wide range of view. As the game gets harder, inhibitory control is also developed as the player avoids looking at the professor moles.

Game Instructions
Bandit Moles are infesting Dr. Mole's garden! Dr. Mole needs your help: look at the bandits to scare them away. If you see an exclamation point (!), then Dr. Mole is coming up. Don't scare Dr. Mole!

Figure 2. Previous version as digital therapeutic tool

From its early implementation, ChatGPT's state-of-the-art language model has the capacity to reform the educational landscape as we know it [8]. The game participant is designed to play the game solely by moving their gaze comfortably. In the image below, the black circle positioned in the center represents the participant's gaze. The game is inspired by the classic "Whack-a-Mole" game. When a mole appears from one of the nine holes, the participant must fix their gaze on it. After a certain duration of sustained gaze, the mole disappears, and the game proceeds to the next level.

2.3 Interim Clinical Trial Report

The graph quantifies the attention levels of 23 participants aged 9 to 25 with attention deficit hyperactivity disorder (ADHD)**.** These participants engaged in a training study conducted at home. Notably, most participants demonstrated improvements across multiple measurement criteria. On average(Fig.3):

1. Attention switching ability improved by 68%, allowing for faster and more accurate transitions.
2. Inhibitory control showed a 55% enhancement.
3. Participants with ADHD symptoms experienced a 30% improvement in attention

Figure 3. Working on progress as digital therapeutic tool

These findings highlight the potential transfer effects of diverse cognitive training programs targeting various cognitive functions. It's encouraging to see progress in attention-related skills, especially in a home-based setting. We provide tailored training to enhance various cognitive functions such as memory, attention, information processing speed, interpersonal skills, intelligence, and spatial perception—much like exercising the brain. The difficulty level automatically adjusts to the trainee's proficiency, and it is supported across various devices. Our collaborative institution holds exclusive rights to market Brain Leap's content in South Korea. Alongside this research, we plan to enhance and develop a prototype into a Korean-specific content for digital therapeutic interventions targeting the silver generation. The cultural adaptation of the tool was conducted in accordance with guidelines provided by the Beaton et al. [8].

3. CONCLUSION

South Korea faces a significant mental health crisis, particularly among the middle-aged population. Despite the urgent need for treatment due to issues like social isolation and diminished self-esteem, many individuals avoid seeking help, even shunning hospital visits. This phenomenon arises from stigma surrounding mental health conditions and systemic discrimination. Unfortunately, this reluctance to seek treatment exacerbates the situation, leaving those who truly need care further away from it. Moreover, the availability of mental health facilities is decreasing, contributing to the worsening situation. Factors such as misinformation, social isolation, and unhealthy social comparisons can lead to extreme reliance on substances or specific stimuli. South Korea has consistently held the highest suicide rate among OECD member nations for a decade, with nearly 40

suicides occurring daily. Despite this alarming national epidemic, mental health remains a taboo topic in South Korean society. Only 20% of South Koreans seek mental healthcare when experiencing depression, and 75% of elderly individuals consider depression and other mental health issues a sign of weakness. The drivers behind this crisis are multifaceted, including the highly competitive and stressful culture surrounding work, family, and life in South Korea. Young people, in particular, face an unemployment rate three times higher than the national average, even before the pandemic. Other worries include not being able to detect students' plagiarism, unfair evaluation on their work, university professors' increased workload to verify the authenticity of student work, and adapting newly developed teaching methods appropriate for AI-implemented teaching and learning environments [9].

Attention Arcade™ Research Results

Pilot Study of At-Home Attention Training

Funded by the National Institutes of Health, BrainLeap's games were initially created and tested at UC San Diego. The pilot clinical trial included 23 individuals, aged 9-25, who had been diagnosed with autism spectrum disorder. Of those 23 participants, 13 also had symptoms of attention-deficit/hyperactivity disorder (ADHD).
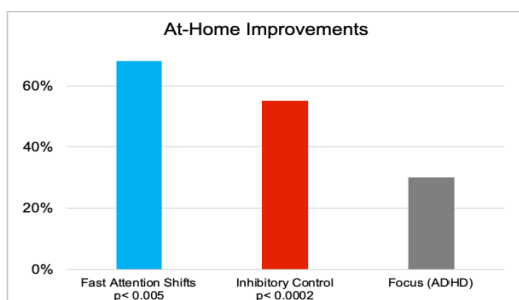
All 23 of the participants who completed the at-home training study showed improvements in at least one measure of attention and most showed improvements on multiple measures. On average, there was a 68% improvement in fast and accurate shifts of attention (Etask), a 55% improvement in inhibitory control (anti-saccade), and for those participants with ADHD symptoms, there was a 30% improvement in focus (NICHQ)*.

Figure.4 Interim anaysis

Young people, in particular, face an unemployment rate three times higher than the national average, even before the pandemic. Additionally, the massive housing crunch around the capital, Seoul, adds to the strain. These factors, combined with increasing rates of alcohol use, create a highly stressful social environment that negatively impacts the mental health of South Koreans at large. Now we are in an era of rapid development and change . Whether it is the advancement of science and technology , the change of living environment , or the evolution of thinking and consciousness, the development is continuing, and the change will never stop.[10] The consequences extend beyond individual well-being, affecting the South Korean economy and society as a whole. Efforts to destigmatize mental health issues have been limited, primarily within a portion of the country's nonprofit sector. To address this crisis, South Korea must focus on establishing a comprehensive national mental health system, forecasting demand for mental health services, and securing and developing mental health professionals. By taking these steps, we can promote long-term mental health services and enhance mental health research and development at the national level.

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