A narrative literature review: the application of video games as therapeutic tools for psychological therapy

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Abstract

Objectives: Video games (games played by electronically manipulating images produced by a computer programme on a screen) are being developed with a specific focus on treating mental health. This narrative review briefly discusses the history of video games and mental health. It then provides a critical discussion on the application of video games as therapeutic tools, then discusses the notion of 'serious games' (*games* designed for a primary purpose other than entertainment) and their applicability.

Conclusions: Serious games have preliminary evidence to support their use practically in the clinical treatment of mental illness. Future randomised control trials are necessary to further explore their efficacy and potential areas of application.

Keywords: serious games, psychological therapy, video games, mental health, psychotherapy

The media provide strong commentary on the role and influence of video games. As an industry, video games produced close to US$120 billion in revenue during 2018.[1]

Video games are games played by the electronic manipulation of images by a computer programme reproduced on a screen. *Serious games* are video games developed for a serious purpose, typically for health or education.

Video games, whether they be played on computer, console, mobile or other, continue to make up a growing industry. Serious games have more recently emerged, and research is being conducted on their usefulness in treating mental health. Despite this, relatively little is discussed in Australian psychiatry journals about the applicability and usefulness of serious games.

Video games' history as a therapeutic tool

In the 1960s, it was felt that computer programmes would be unable to offer treatment for mental health due to its limited language ability. Weizenbaum illustrated this with his satirically inspired ELIZA, which emulated Rogerian psychotherapy. The programme parroted the input of the user in a manner that stimulated conversation. Weizenbaum's intention to display the superficiality of computer conversation backfired, and the interactions were so convincingly human that ELIZA became famous

and at the time was said to be 'the most widely quoted computer programme in history'.[2] Later research into its effectiveness as a therapeutic tool is limited to one small study that explored simulated psychotherapy with ELIZA on undergraduate students, which suggested it did offer some psychological relief to its users.[3]

Studies in the 1970s looked at acceptability of computers as therapists. A notable example studied participants' responses to discussing intimate subjects with a computer and compared these conversations with a doctor acting as a therapist.[4] They were surprised to find participants were open to interacting with computers and suggested that computers may have a role in therapy.

A significant video gaming boom occurred in the early 1980s as more affordable home computer systems emerged.[5] There are several instances of computers providing cognitive behavioural therapy (CBT) and psychoeducation. Notable examples include a computer programme that provided homework as an adjunct to CBT for depression[6] and MORTON, a computer programme that gave a six-week course of CBT for treat-

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Figure 1. ELIZA transcript.http://www.le-grenier-informatique.fr/medias/images/eliza-title.jpg

ment of depression.[7] The main perceived limitations were the computer programmes' inadequacies in understanding, processing and responding to human conversation.

In the 1990s, fewer studies focussed on video games as a therapeutic tool and instead more research was devoted to its adverse effects.[5] It was not until the 2000s where video games as a therapeutic tool were more meaningfully explored. It was in this period that a wide variety of studies researched video games as treatments for mental illness.

The application of casual video games as a therapeutic tool

Intervention with casual video games (CVGs) can be seen as early as the 1980s. Examples include whether playing CVGs reduced nausea and anxiety for children undergoing chemotherapy.[8] There were significant effects in reducing anxiety, and similar studies noted effects comparable to giving oral midazolam.[9]

Pine et al. (2020)[10] conducted a systematic review that included 13 randomised control trials (RCTs) looking into the effects of CVGs on depression. Of the various outcome measures, 12 of the 13 studies showed positive effects on mental health with use of CVGs. Secondary measures showed a high rate of adherence to prescribed regimens of gameplay, and that even a single session of gameplay could reduce anxiety and depressive symptoms. The most promising RCT showed on average participants played for 10 min longer than their prescribed regimen of 30 min three times a week.[11]

Pine et al. (2020)[10] discussed that CVGs share similar characteristics: (i) giving immediate feedback, (ii) use of bright colours and (iii) directing the players with clear goals with a gradual increase in difficulty. These features are described by Chen (2007)[12] as 'flow theory', a type of operant conditioning that gradually delivers the player information in manageable chunks and immerses that player in the game. The theory behind this is that the player, while in the 'flow', has their attention allocated to the demands of the game, and this prohibits their ability to simultaneously experience anxiety.[10]

The number of studies thus far into CVGs is limited and the scope of their outcomes broad. However, its high acceptability, low cost and potential beneficial effects show promise. CVGs may also offer an intervention associated with less stigma and easier access compared to traditional therapy.

Examples of serious games, their evidence and their application to psychiatry

Serious games are video games developed for a serious purpose, most commonly for health or education.

A systematic review[13] included 34 RCTs that measured the effect of serious games on physical health and mental health related outcomes. They found a positive effect post-intervention, with a medium effect size ($g=0.51$, $p=.03$). A more focussed systematic review[14] included 10 RCTs measuring effects of serious games on various mental health disorders. They reported a moderate effect size ($g = 0.55$, $p < .001$) for all outcomes. A previous systematic review[15] showed a significant moderate effect size for serious games on depression symptoms ($d = -0.47$) and demonstrated that those who received the intervention

received no significant benefit from additional involvement with a therapist.

The Australasian SPARX, a serious game that utilises CBT principles to target depression, displayed promise in its original RCT.[16] They reported a significant reduction in depressive symptoms (43.7%) when compared to the treatment as usual group (26.7%) ($p = .03$). SPARX's modern adaptation, SPARX-R, was used to explore the effectiveness of SPARX-R in preventing depression among high school students.[17] The RCT involved 540 final-year high school students within Sydney, who were randomly allocated to SPARX-R or the control intervention. The treatment group showed significant reductions in depression symptoms compared to controls at post-intervention ($d = 0.29$) and at 6 months post-baseline ($d = 0.21$). This is one of the first studies to explore the use of serious games as a preventive tool in those at higher risk of depression.

Virtual reality exposure-based therapy (VR-EBT) has most prominently focussed on treatment of phobias and post-traumatic stress disorder (PTSD). Recent systematic reviews concluded that VR-EBT showed similar efficacy to in-vivo exposure therapies for agoraphobia and specific phobias.[18,19] When compared to waitlist controls, VR-EBT was superior to waitlist control groups and equally effective to traditional psychotherapeutic approaches for PTSD.[19] A recent RCT[20] studied 43 veterans who had received previous treatment for PTSD. The participants walked on a treadmill while engaging with trauma-related images and music. The simulated walking towards trauma-related images decreased avoidance and increased in-session attention. There was high engagement in sessions and an associated significant improvement of PTSD related symptoms with a large effect side ($d = 0.83$).

Serious games and VR-EBT each have numerous positive small studies demonstrating equivalence and superiority to traditional therapy. Despite this, making meaningful clinical interpretations that might affect practice are limited by a lack of large-scale RCTs and significant heterogeneity between the studies – primarily related to inconsistency with methodology and controls.[13,14,18,19]

Conclusion

The main benefits of CVGs and serious games are their acceptability and the current evidence showing a positive effect on treating mental illness in a number of instances. Additional benefits include their high level of adherence when prescribed as a regimen, low cost and ease of access in comparison to traditional therapy.

Despite this, the use of serious games and CVGs as therapeutic tools remains limited in clinical settings, and few therapists practise them as a part of their clinical work. The limited number of large-scale RCTs may deter organisations and clinicians from utilising video games in a clinical setting for mental illness. Larger randomised control studies are required in order to better inform clinicians on their efficacy and applicability.

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