Winning The Game Against Depression: A Systematic Review of Video Games for the Treatment of Depressive Disorders

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Abstract

Purpose of review To review the evidence about video game-based therapeutic intervention for people diagnosed with depressive disorders.

Recent findings Psychotherapy has been proved to reduce depressive symptoms and is a key element in the treatment of depressive disorders. However, geographical, economical and stigmatized concerns are barriers to access to psychotherapy. New technologies and videos games can overcome some of these barriers by providing teleconferencing evidence-based therapy as time as they may offer an interactive entertainment.

Summary Overall, video game-based interventions were useful and effective in reducing symptoms of depressive disorders. Seven of the studies were published in the last 5 years, which reflects the increased research interest in video game-based interventions for depression. Overall, when adherence was reported, rates of acceptability and feasibility were high.

Keywords Systematic review · Depression · Serious games · Video games · eHealth

Introduction

More than 300 million people suffer from depression, equivalent to 4.4% of the world's population [1]. Lifetime prevalence of depression ranges from 5 to 20% [2]. Depression is often associated with other psychological issues such as anxiety [3] or substance abuse [4]. Depressive disorders are also commonly comorbid with chronic medical conditions [5].

Psychotherapy has been reported to reduce depressive symptoms and constitutes a key element in the treatment of depressive disorders [6]. However, there are some barriers to access to psychotherapy. The most frequently mentioned reasons for not seeking and/or getting psychotherapy are geographical barriers, high cost, and concern about the stigma associated with consulting a mental health professional [7, 8]. Thus, it is critical to find ways to make psychotherapy more accessible for the treatment of depression because of its efficacy [9, 10], particularly when face-to-face consultations are not possible, such as during the lockdown periods caused by the COVID-19 crisis. New technologies can overcome some of these cited barriers [11]. Thus, teleconferencing, mobile applications or web-assisted therapy are effective ways to offer evidence-based treatment that address mood and anxiety disorders [9, 10, 12]. Video games can be another way to deliver psychological treatment. There are defined as controlled entertainment activities that enhance interaction with a user interface to visual feedback on a video device [13]. Gamification, that is a key element of video games, is a valuable strategy for improving patients' motivation and engagement [14]. Gamification consists of applying the principles of games to non-game contexts such as cognitive-behavioral therapy. This can be achieved by

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introducing elements such as reward for task completion, games of skill [15]. Video games have proven useful for the treatment of a wide range of mental disorders, such as attention deficit/ hyperactivity disorder [15], autism [16], and anxiety disorders [17]. Video games can have particular advantages for young population as they usually include a playful interface that motivates the patients to keep using it as a modality of treatment [18]. Thus, they may be a useful adjuvant therapy for the management of depression.

A previous review examined the positive effect of exergames on relieving depressive symptoms [19], while another study focused on the potential effects of casual video gaming on depression and anxiety [20]. There is also a previous systematic review about serious games for the treatment of depressive disorders [21].

However, there are no recent systematic reviews on video games for depression. This a rapid-advancing area, where constant update is needed.

Here, we review the literature evidence about video game-based therapeutic interventions for people diagnosed with depressive disorders. We sought to answer the research question: “How effective and acceptable are video games for the treatment of depressive disorders?”. We discuss the implications of our findings for clinical practice and future research.

Methods

This review followed the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) guidelines [22]. The review protocol was registered in the PROSPERO database (registration number CRD42020175546).

Inclusion/Exclusion Criteria

Inclusion criteria were:

1. Original studies published in peer-reviewed journals that report measurable outcomes.
2. Studies that included in their sample people with depressive disorders (diagnosis established either by a clinician or through questionnaires) or depressive symptoms (assessed either by a clinician or through questionnaires)
3. Studies that tested video game-based interventions in people with depressive disorders/symptoms, offering outcomes on the effectiveness and/or feasibility of such interventions. Effectiveness in any significant area was considered, such as reduction in symptoms, increase in quality of life, increase in functionality, better prognosis, and greater adherence to medication. Feasibility

was considered in terms of response rate, engagement, drop-out rate, study completion, and compliance and user satisfaction.

4. Studies in English language only.

Exclusion criteria were:

1. Protocols for Randomized Clinical Trials (RCTs), and other studies that do not provide measurable outcomes.
2. Interventions that target caregivers or healthcare providers only

There were no restrictions regarding publication date.

Search Strategy

We conducted a systematic literature search in three databases: PubMed, Web Of Science, EMBASE and clinicaltrials.gov. Last search date was March 20, 2020. There were no restrictions by date.

The following search terms were used: (depressive OR depression OR mood OR dysthymia) AND (“video game” OR “serious game” OR exergame OR videogame OR “video games” OR “serious games” or exergames OR videogames).

The references of included studies were also screened.

Study Selection Process

The articles were selected if they were of relevance to the research question, met the inclusion criteria, and were of sufficient methodological quality. Eligible studies were critically appraised. Cochrane Collaboration’s tool was used for assessing risk of bias in RCTs [23].

Studies were independently reviewed for inclusion by two authors (CGG and MM). Any inconsistencies were resolved with the involvement of a third author (APS). Agreement between reviewers was measured by intraclass correlation coefficient (ICC).

Quality Assessment

Quality of all eligible studies was assessed independently by two reviewers (MR and MM). Discussion between reviewers resolved all discrepancies. Aspects assessed included methodological design, risk of bias, and quality of reporting. We used the Cochrane Collaboration’s tool for assessing risk of bias for randomized clinical trials.

Data Extraction

Data were identified, checked, and mined by two independent authors (MR and MM). Using pre-made tables, the following variables were collected: author; design; country;

year of study publication; sample size; age of the sample; gender distribution of the sample; measures; name of the videogame, platform and features; type of intervention; and main findings.

Our main outcome was effectiveness of video game-based therapeutic interventions for the treatment of depression. Our secondary outcome was feasibility of such interventions.

Results

Results of the Bibliographical Search

The initial search revealed 1,847 results. After screening, full text review and study selection, 12 articles were finally included in the review (see Fig. 1). ICC among reviewers was 77.6% (95% CI 68.0%–85.4).

Characteristics of the Reviewed Studies

Table 1 summarizes the characteristics of the reviewed studies [24–35].

Sample size of the reviewed studies ranged between 9 [35•] and 932 [25•]. The most common design was the Randomized Clinical Trial (RCT). Most studies employed control group [26–30, 32, 33]. In five studies, there were a majority of male participants [24, 25•, 26, 32, 35•]. Mean age across studies ranged from 9.1 to 78.7 years. Overall, rates of acceptability and feasibility were high, although many studies did not report these data (see Table 1).

Characteristics of the Video Game-based Interventions

Table 2 summarizes the main findings of the studies.

Fig. 1 Flow chart of the bibliographical search

Table 1 Characteristics of the Reviewed Studies

Study	Design	Duration	Country	Sample size	% Male	Population (N)	Mean Age (SD) (years)	Completion and compliance
Higgins et al. 2011 [24]	NRCT	4–7 weeks	Australia	16	75 ^a	Sixteen participants from rural setting and small community organized in four group based on intra-group similarities	13.68 ^a	NR
Cheek et al. 2018 [25•]	RCT	Single session of assessment	USA	932	92.6 86.8	Three hundred and fifty adult veterans drinkers (score at least 3 or 4 on AUDIT) and 582 adult veterans, both group participants play video games at least 1 h per week	28.4 (3.4) 28.7 (3.4)	NR
Grant et al. 2018 [26]	RCT	8 weeks	USA	24	62.5 ^a	Twenty-four participants who expressed symptoms of anxiety or have a diagnosis of anxiety disorder (12 intervention, 12 waiting list control group)	12.88 (2.42)	Six participants dropped out before the intervention
Knox et al. 2011 [27]	RCT	6 weeks	Germany	50	30.8 ^a	Fifty participants with a diagnosis of major depression or dysthymia (21 intervention, 29 waiting list control group)	46	NR
Kuhn et al. 2018 [28]	RCT	4–7 weeks	New Zealand	187	37.2 ^a	One hundred and eighty-seven adolescent participants seeking help for depressive symptoms (94 intervention, 93 TAU)	15.55 (1.54) 15.58 (1.66)	9% of participant dropped out
Merry et al. 2012 [29]	RCT	4 weeks	Japan	72	38.9 ^a	Seventy-two elderly participants (intervention, active control group)	69.14 (3.70) 68.88 (3.73)	Two participants dropped out from intervention group
Nouchi et al. 2016 [30]	NRCT	12 weeks	Brazil	47	0 ^a	Forty-seven elderly woman living in community-dwelling (22 intervention, 10 faller and 12 non-faller, 25 control, 12 fallers and 13 non-faller)	73.6 (5.4) 68.7 (4.8) 69.9 (4.3) 68.9 (3.3)	Five dropped out before the final evaluation
Rodrigues et al. 2018 [31•]	NRCT	12 weeks	USA	19	31.5 ^a	Nineteen elderly participants with subsyndromal depression	78.7 (8.7)	86% of participants completed the entire intervention
Rosenberg et al. 2010 [32]	RCT	4 weeks	USA	59	50.8 ^a	Fifty-nine participants with diagnosis of clinical depression (30 intervention, 29 control)	29 31	NR

Table 1 (continued)

Study	Design	Duration	Country	Sample size	% Male	Population (N)	Mean Age (SD) (years)	Completion and compliance
Russoniello et al. 2013 [33]	RCT	4 weeks	USA	49	18.3 ^a	Forty-nine participants with diagnosis of clinical depression (26 intervention, 23 control consisting in second psychiatric medication)	41 (13.3) 45 (12.2)	90% of participants completed all session and assessments
Russoniello et al. 2019 [34•]	Qualitative study	Single session	New Zealand	26		Twenty-six young Maori (indigenous New Zealand) participants with their family	NR	NR
Shepherd et al. 2015 [35•]	Qualitative study	8 weeks	Estonia	9	55.6 ^a	Nine pediatric participants with a diagnosis of cancer, (diagnosed no more than 1 year ago)	9.1 (1.5)	90% of participants completed the entire study

AUDIT = Alcohol Use Disorders Identification Test; NR = Not Reported; NRCT = Non-randomized clinical trial; RCT = Randomized clinical trial; SD = Standard deviation; TAU = Treatment As Usual; USA = United States of America; y = years.

^aPercentage calculated from data.

^bMean age and standard deviation data for all the sample.

Most of the video games were specifically designed for the treatment of depressive disorders (i.e., were “serious games”) and were not commercially available, although two of the games were based on two popular, commercial games: *The Dance Central* for Kinect for Xbox 360 [30] and *Sports game package* for Nintendo Wii [31•]. Two of them used a casual video game [32, 33]. Most video games ran on a computer (six out of twelve) [24, 26–28, 33, 34•], one ran on a smartphone [35•], and one used a touch panel screen [29]. The most common type of intervention (four out of twelve) was cognitive behavioral therapy (CBT) [24, 25•, 26–28], two studies used physical activation [30, 31•] two studies used casual gaming to improve mood, decrease stress, and tackle rumination [27, 32], and three other used specific interventions: one used biofeedback to decrease anxiety and depressive symptoms [26], and another one used cognitive training to decrease depressive mood [29].

Video Game-based CBT

Video game-delivered CBT for treating depression was generally effective. Three of the studies used the same video game: *SPARX*. In the study by Kuhn et al. [28], intervention group showed a significant mean reduction in the children’s depression rating scale (difference 2.73, 95% confidence interval −0.31 to 5.77; $p < 0.05$), and also, a higher remission rates than those who received treatment as usual (difference 17.3%, 95% confidence interval 1.6% to 31.8%; $p < 0.05$). The other two studies [24, 34•] found high level of acceptability and satisfaction from *SPARX*, and participants considered the game as positive and useful. For their part, in the study by Russoniello et al. (2013) [32], intervention group showed a significant reduction in depressive symptoms ($MD = 2.82$, $SE = 1.23$, $p < 0.05$) after a 4-week CBT program.

Video Game-based that Enhance Physical Activity

Physical activity was another way through which video games aimed to improve depressive symptoms. For instance, in the study by Rodrigues et al. (2018) [31•], a sport game package reduced depressive symptoms (−34.5%, $p < 0.05$), and improved mental health-related quality of life (6.15%, $p < 0.05$) and cognitive achievement (5.07%, $p < 0.05$) but did not improve physical health-related quality of life.

Casual Gaming

Casual gaming also proved effective in reducing depressive symptoms. Thus, in the study by Russoniello et al. (2019) [33], it was found that the intervention group, who played the popular game *Plants vs Zombies*, showed a significant improvement in treatment-resistant depression symptoms

Table 2 Features and effectiveness of the video game-based interventions

Study	Name of the video game and platform	Characteristics	Type of therapeutic intervention	Procedure	Main findings
Higgins et al. 2011 [24]	SPARX (Computer-based)	Single-player, three-dimensional interactive fantasy-based game	CBT	30-min, 7-module that could be completed 1 or 2 times a week	From interview transcript: Participants perceived the game as useful, particularly for those who use computer game generally, which put the game in a high level of acceptability and satisfaction. Personalization was particularly valued
Cheek et al. 2014 [25•]	NR	Online assessment about habits of playing videos games	NR	NR	Young adult veterans drinkers reported playing video games fewer hours per day (mean 2.3 (SD 1.8); no drinkers participants mean 3.5 (SD 3.2); $t_{925} = -7.4$; $p < 0.001$) and per week (mean 12.8 (SD 13.5); no drinkers participants 18.4 (SD 21.9); $t_{929} = -4.8$; $p < 0.001$) than no drinkers participants. Participants with positive screen for a mental health issue who had received any type of therapy, since discharge spent 2.67 more hours per week (95% CI 0.14–5.20) and 0.48 more days per week (95% CI 0.14–0.82) playing video games than participants with any positive screen who had not received any type of therapy since discharge
Grant et al. 2018 [26]	<i>Freeze-Framer 2.0</i> and <i>Journey to the Wild Divine</i> , (Computer-based)	Single-player, aimed to teach relaxation with psychoeducational content	Relaxation through biofeedback (with monitoring of HRV and SCL). Psychoeducation	Eight sessions	After intervention, the intervention group showed significantly lower rates of anxiety and depression scores on all standardized tests: MASC total [F(2,23) = 12.18, $p < 0.001$; partial $\eta^2 = 0.54$], Somatic/Autonomic scale [F(2,23) = 6.74, $p < 0.05$; partial $\eta^2 = 0.39$], Tense/Restless scale [F(2,23) = 5.31, $p < 0.05$; partial $\eta^2 = 0.34$], Trait Anxiety subscale [F(1,23) = 3.95, $p < 0.05$; partial $\eta^2 = 0.327$] a

Table 2 (continued)

Study	Name of the video game and platform	Characteristics	Type of therapeutic intervention	Procedure	Main findings
Knox et al. 2011 [27]	<i>Boson X</i> , (Computer-based)	Single-player, fast-paced action computer game aimed to reduce rumination	NR	NR	After playing game, the intervention group showed a significant lower rumination [$F_{(1,44)} = 72.65$, $p < 0.05$, $\eta^2 = 0.123$], and a significantly higher subjective cognition in [$F_{(1,44)} = 162.31$, $p < 0.05$, $\eta^2 = 0.090$] than the passive control group. However, there were no significant differences in BDI, PHQ-9 scores between the two groups
Kuhn et al. 2018 [28]	SPARX (Smart, Positive, Active, Realistic, X-factor thoughts), (Computer-based)	Single-player, 3-dimensional interactive fantasy game	CBT	30-min, 7-module that could be completed 1 or 2 times a week during 4 to 7 weeks	Intervention group showed a significant mean reduction in the children's depression rating scale; mean reduction of 10.20 compared to 7.59 for control group, (difference 2.73, 95% confidence interval – 0.31 to 5.77; $p < 0.05$), and they showed higher remission rates ($n = 31$, 43.7%) than in the treatment as usual arm ($n = 19$, 26.4%), (difference 17.3%, 95% confidence interval 1.6% to 31.8%; $p < 0.05$)

Table 2 (continued)

Study	Name of the video game and platform	Characteristics	Type of therapeutic intervention	Procedure	Main findings
Merry et al. 2012 [29]	<i>PSTG & KQTG</i> (Active Control Group) (Both via touch panel screen)	Single-player, brain active games to improve cognitive functions in the elderly	Cognitive training	5 min–5 times a week during 4 weeks	After intervention PSTG group showed improvement in processing speed, Cd score [$F(1,67)=6.05$, $\eta^2=0.08$, $p<0.05$] and the SS score [$F(1,67)=6.63$, $\eta^2=0.08$, $p<0.05$], and inhibition; rST score [$F(1,67)=6.61$, $\eta^2=0.09$, $p<0.05$] and the ST score [$F(1,67)=7.41$, $\eta^2=0.09$, $p<0.05$] compared to KQTG (active control group) However, there were no significant differences in reasoning, shifting, short term/working memory, and episodic memory Moreover, PSTG has showed a reduction in the depressive mood score [$F(1,67)=6.09$, $\eta^2=0.05$, <i>adjusted</i> $p<0.05$] compared to KQTG but did not change other emotional measures
Nouchi et al. 2016 [30]	<i>The Dance Central</i> (Kinect for Xbox 360)	Single-player, dance exercise game, aimed to reduce depressive symptoms and risk factors for falling, and improve neuromotor training	NR	40 min–3 times a week during 12 weeks	The intervention faller group showed a decrease in depressive symptoms compared to both control fallers ($p<0.05$) and intervention non-fallers ($p<0.05$) There were no significant differences for the other variables analyzed
Rodrigues et al. 2018 [31•]	Nintendo <i>Wii Sports game package</i>	Single-player, exergame, aimed to reduce Subsyndromal depression symptoms	NR	35 min–3 times a week during 12 weeks	There was a significant reduction in depressive symptoms (-34.5%, $p<0.05$), mental health-related quality of life (6.15%, $p<0.05$) and cognitive achievement (5.07%, $p<0.05$) but not physical health-related quality of life

Table 2 (continued)

Study	Name of the video game and platform	Characteristics	Type of therapeutic intervention	Procedure	Main findings
Rosenberg et al. 2010 [32]	Casual videogame (CVG) (Computer-based)	Single-player, gameplay to reduce depression symptoms	CBT	30 min–3 times a week during 4 weeks	Considering score in PHQ-9 scale, the intervention group showed a significant reduction in depressive symptoms at the end of study (MD = 2.82, SE = 1.23, $p < 0.05$)
Russoniello et al. 2013 [33]	<i>Plants vs. Zombies</i> (PzZ)(Computer-based)	Single-player, casual video-game, aimed to reduce TRD symptoms and improve heart rate variability		30–45 min–4 times a week during 4 weeks	Group intervention showed a significant improvement in treatment-resistant depression symptoms compared to the control group. (Wald $X^2 = 32.5$, $p < 0.001$). Sixteen participants of the intervention group did not meet the criteria for clinical depression Changes in heart rate variability indicators showed an increase in parasympathetic engagement and balance in the intervention group compared with the control group (MD = -1.2, SE = 0.55, $p < 0.05$)
Russoniello et al. 2019 [34•]	SPARX (Smart, Positive, Active, Realistic, X-factor thoughts) (Computer-based)	Single-player, three-dimensional interactive fantasy-based game	CBT	30–60 min—single session of prototype	From semi-structured interview: participants considered SPARX as positive and useful to be inserted as a computerized therapy for indigenous young people and families

Table 2 (continued)

Study	Name of the video game and platform	Characteristics	Type of therapeutic intervention	Procedure	Main findings
Shepherd et al. 2015 [35•]	<i>Triumph</i> (Smartphone)	Single-player, engaging game environment that delivered psychological and treatment support, aimed to reduce the psychological negative impact of chronic mental illness	Self-Determination Theory and the Player Experience of Need Satisfaction model	10 min a day during 60 days	From semi-structured interview: 67% of the participants still carry on gaming after study (10/15). Psychological support and mini games were the components most used and the education module was one of the preferred by the participants. The average of received psychological support or psychoeducation was 66.6 times There were a statistically significant reduction in general health problems ($t_7 = -4.4$; $p < 0.05$)

CBT=Cognitive behavioral therapy; KQTG=Knowledge Quiz Training Game MASC=Multidimensional Anxiety Scale for Children; PHQ-9=Patient Health Questionnaire-9; PSTG=Processing Speed Training Game; SCL=Skin Conductance Level; SE=Standard Error; SPARX=Smart, Positive, Active, Realistic, X-factor thoughts; TRD=Treatment Resistant Depression Symptoms.

compared to the control group (Wald $X^2 = 32.5$, $DF = 1$, $p < 0.001$). After playing the game, 16 of 26 participants of the intervention group did not meet the criteria for clinical depression.

Additionally, Knox et al. (2011) [27] used the casual game Boson X to target rumination. They found that intervention group showed a significant lower rumination ($F_{(1,44)} = 72.65$, $p < 0.05$, $\eta^2 = 0.123$). However, there were no significant differences in standardized tests scores for depression between the two groups.

Other Types of Interventions

Specific interventions such as biofeedback and cognitive training were used to treat depressive symptoms. For instance, in the study by Grant et al. (2018) [26], a computer game to teach relaxation through biofeedback techniques showed a significant reduction in anxiety and depression scores ($F(2,23) = 12.18$, $p < 0.001$; partial $\eta^2 = 0.54$). Furthermore, cognitive training was effective in reducing depressive mood score ($F(1,67) = 6.09$, $\eta^2 = 0.05$, *adjusted* $p < 0.05$), although it did not change other cognitive measures [29].

Discussion

Overall, video game-based interventions were useful and effective in treating depressive disorders. However, the limited number of studies identified in this systematic review highlight that video games for depression represent a novel area of research. Nevertheless, as shown in this systematic review, seven studies were published in the last 5 years, which reflect the increased research interest in gamification for depression.

This is consistent with previous reviews that have shown a positive effect of video games for the treatment of depression symptoms. Thus, the review by Primack et al. (2012) [19] explored the use of exergames and found that eight of the nine articles reviewed had a significant effect in ameliorating depressive symptoms. Moreover, Pine et al. (2020) [21] found promising results in serious game treating depression; however, the studies they examined were only addressed to young population and some of the studies yielded mixed results.

Mechanisms of Serious Games for Improving Mental Health Symptoms

Why are video games effective in treating depression? Patients may perceive video games not as a treatment but as a reward, so adherence and engagement rates may increase. Video games in this review used various techniques to make treatment more appealing, such as videos, mini games,

puzzles, or social interaction. Adolescents and young adults could be particularly benefited by the rewarding effect of playing videogames [15]. Studies have shown that mini video games such as coloring or exploring a fantasy land with a certain psychoeducational content can enhance coping skills and increase motivation [26, 35•].

Thus, video games are a suitable vehicle for administering different psychotherapeutic interventions. CBT was the most frequent theoretical framework intervention adhered to video games. The effectiveness of CBT for the treatment of depression is well-documented [36], and computerized versions of this therapy have been used with success [37].

Exergames are a particular area of interest for the treatment of depression. Several studies have shown that increased physical activity is associated with lower depression scores [38–40]. A recent meta-analysis found that aerobic exercise significantly improved depression symptoms [41]. It is to consider the use of exergames because sedentary behavior can lead to metabolic disorders or increase depressive symptoms [42, 43]. There are multiple mechanisms by which exercise could improve depressive symptoms, including the capacity of exercise to increase neural regeneration [44, 45] and to decrease inflammation and oxidative stress [46, 47]. Two of the twelve studies [30, 31•] found in our review employed exergames to improve depressive symptoms, with good results [19]. Therefore, exergames could increase the access to physical activity programs that aid to reduce depressive symptoms. Of course, such interventions cannot be a substitute for outdoor sport, which has additional advantages, such as the increased likelihood of socialization or exposure to sunlight, but can be an ideal substitute for this type of physical activity in cases where the patient tends to be socially isolated, as well as mitigating the associated problems of sedentary lifestyles that other types of video games present.

Implications for Clinical Practice

Video game-based interventions do not replace psychopharmacological treatment and psychotherapeutic follow-up, which are the basis for the management of depression [48]. However, video games offer some strategic advantages and could be a useful add-on to traditional approaches. First, they do not depend on the face-to-face counselling and are cheaper and easier to implement [49]. This is particularly relevant during lockdown periods, but advantages go beyond this exceptional circumstance: people who live in remote areas, or in areas where the number of healthcare providers is limited, could benefit from video games as an adjuvant treatment [24]. In three of the articles reviewed, the participants were from areas far from urban centers [24, 28, 34•]. People at remote areas are particularly vulnerable and are at risk to develop mental health issues [50, 51]. Using video

games for the treatment of depression could help close the gap of mental healthcare provision.

Another important aspect to consider is the following question: what kind of patients and what kind of depressive disorders could benefit from these types of treatments? Regarding the type of disorder, video games and other types of complementary therapies might be more useful in lower intensity or reactive depressions, or in depressions that, being more endogenous in nature, are in a more stable phase of the illness. Regarding the type of patient, younger patients with higher literacy in new technologies may be the ideal target population [52], although there are also studies that have shown effectiveness in elderly populations [31•].

Future Lines of Research

Therapeutic interventions using video games are a promising area of research. Nonetheless, more studies with bigger sample size and longer interventions and follow-up are needed to evaluate the efficacy of the intervention over the time. This is a challenge as user typically variates video games three to four time per year [53]. Another issue to be resolved is to prevent the harmful effect of video games while increasing their benefits. One of the main concerns of video gaming is the risk of addiction. Clinicians must take these risks into account when deploying video game-based interventions. Ultimately, video games are tools that can be used for positive or detrimental purposes.

Creating ways to convert video games-based intervention is accessible, particularly for vulnerable and small communities is another consideration to that into account. In our review, one of the studies was with indigenous population living in remote area [34•]. They adapted culturally the content and promoted the use of the video game in a therapeutic framework and found high acceptability and feasibility among these population.

Because of its potential and its popularity, future research could be focused on prevention and early intervention of depressive disorders. Video games that promote good quality of life and early detection of psychological disorders are a line to be explored.

Limitations

Some limitations should be considered when interpreting the findings of this systematic review. Firstly, we found a modest number of studies that met inclusion criteria; this and their heterogeneity precludes the performance of a meta-analysis. Secondly, our research was restricted to English language, so some additional studies published in different languages could have been overlooked.

Conclusion

This systematic review offers a comprehensive picture of the effectiveness of video games for the treatment of depressive disorders. We found that video games are effective in reducing clinical symptoms of depression. Video games could be a useful adjuvant treatment with the capacity to overcome physical barriers in the implantation of psychotherapy. Future research is needed to confirm these findings.

Compliance with Ethical Standards

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