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# RxVR for Young People with Depression and Dysthymia: A Realist Review

**Maria Rae** **Judi Parson**

Deakin University

***Abstract***

*One of the most prevalent mental health issues of young people in Australia is depression. With an under resourced and inadequate mental health system, this means that many young people are not receiving assistance for their disorder. One option to help overcome this stigma of therapy and make it more accessible and engaging for young people is the utilisation Virtual Reality (VR) games and applications. This study aimed to identify the clinical reasoning behind the use of VR for young people experiencing depression and dysthymia. Due to the lack of research in this area, a realist review was deemed to be a suitable method of review. Several databases were searched systematically and tested for relevance and rigor using the Mixed Methods Appraisal Tool (MMAT) (Hong et al., 2018). This tool is used to assess the methodological quality of various types of studies, qualitative, quantitative, and mixed methods. Data were then organised into Context-Mechanism-Outcome (C-M-O) configurations and contextualised within the framework of the Therapeutic Powers of Play (TPOP). It is theorised that there are several different contexts in which VR would be effective at helping to reduce symptoms of depression, such as the use of personalised avatars, immersion and presence, enjoyment and accessibility. Due to the nature of this review, C-M-O configurations were not able to be tested and further research in this area needs to be undertaken.*

*Keywords: Virtual Reality (VR), systematic realist review, Therapeutic Powers of Play (TPOP), Mixed Methods Appraisal Tool (MMAT), Depression*

## Introduction

In 2021 the Victorian Royal Commission reported that the mental health system in Victoria was under resourced and inadequate despite a high number of Australians experiencing psychological distress (Armytage et al., 2021). One group of interest were young people, aged 12-25 years, who are not only less likely than other age groups to ask for help, but once they have sought assistance it has been reported that young Australians have difficulty finding a mental health care provider or to gain access to services (Armytage et al., 2021; Slade et al., 2009). The earlier intervention is sought and engaged in the more effective it will be, giving the young person a better chance to grow into a healthy and happy adult (Australian Government, 2021). One study in the UK found that only a quarter of children and young people with a mental disorder had been in touch with a mental health service (Vizard et al., 2018). This is concerning as by the age of 14 approximately half of the mental health issues we will experience in our lives have already commenced (Kessler et al., 2005). This is reflected in the nearly 32% of young Australians who report high levels of psychological

Correspondence concerning this article should be addressed to Dr. Judi Parson, Waterfront Campus - Deakin University, 1-12 Gheringhap Street, Geelong 3220 VIC, Australia.
Email: judi.parson@deakin.edu.au

distress, with suicide being the leading cause of death for 15-25-year-old Victorians (ABS, 2020; AIHW, 2021; Headspace, 2018). The most common mental illness in young people is depression with around 25% of young Australians experiencing depression before the age of 25, and 70% experiencing a reoccurrence of depression within 5 years (AIHW, 2021; Zhou et al., 2015).

Major depression is characterised by the presence of at least 5 symptoms with one of these being either a depressed mood (or irritability in adolescents), and/or a loss of pleasure or interest (American Psychiatric Association (APA), 2013). Another less severe but chronic form of depression known as Persistent Depressive Disorder (PDD), or dysthymia, can occur. Dysthymia occurs in 1.6-8% of young people (Nobile et al., 2003), it differs from major depression as symptoms are present for 1 year (2 years in adults), compared to 2 weeks for major depression (APA, 2013). Although less severe, outcomes of dysthymia are worse, with a longer duration of 2.5-3.4 years as well as attempted suicide rates in young people ranging between 9.5% and 19% (Nobile et al., 2003). It is also common for major depression to occur 2-3 years after the onset of dysthymia further supporting the need for early intervention, with one study showing that 94.2% of participants with early onset (before the age of 21) dysthymia having at least one major depressive episode by the end of the study (Nobile et al., 2003). With depression and dysthymia being such a common occurrence in young people, it is important to understand the barriers they are facing in seeking and accessing help.

Studies into the help seeking behaviour of teenagers have found that the most significant barriers they face are holding negative beliefs about mental health services as well as perceiving a stigma attached to seeking help (Velasco et al., 2020). Young people may also have difficulty expressing themselves through traditional talk therapies and therefore be less likely to engage (Falconer et al., 2019; Kottman, 2010). The restrictions imposed due to COVID-19 as well as excessive wait times and costs for initial and ongoing consultations, have further impacted the ability to access services, resulting in an increase the incidence of ill mental health (Kowal et al., 2021; Mulraney et al., 2021). To overcome these barriers teenagers have reported the need for autonomy, a good rapport and connection with their service provider and having previous positive experiences (Velasco et al., 2020; Wisdom et al., 2006). To facilitate young people's access to digital interventions it was found that interventions need to be accessible, convenient, easy to use and understand, create a sense of anonymity, as well as having appropriate features which they deem to be helpful and useful (Liverpool et al., 2020).

One method of treating depression in young people is using play therapy. The Association for Play Therapy (APT, 2015) define Play Therapy as 'the systematic use of a theoretical model to establish an interpersonal process wherein trained play therapists use the therapeutic powers of play to help clients prevent or resolve psychosocial difficulties and achieve optimal growth and development'. Play therapy allows clinicians to communicate with their clients through the language of play by utilising a range of different media such as toys, games, and technology (Kottman, 2010; Shen, 2017). For a summary of play therapy evidenced based practice see Bratton et al., (2005) & Ray and McCullough (2015; revised 2016). However, most play therapy research has been undertaken with children between the ages of 3 to 12 years old therefore further research for older populations is warranted. While play and play therapy are often thought of as being something that only young children partake in, play is important across our whole lifespan, and it is only the type of play that changes across time (Mellenthin, 2018). When one engages in play, the entire brain is activated facilitating the establishment of important neuron connections which promotes positive development (Mellenthin, 2018). By utilising the language of play clinicians can establish a rapport with young clients who may otherwise have difficulty expressing themselves, play therapy can also activate what is known as the therapeutic powers of play (Kottman, 2010).

Therapeutic powers of play are the change agents. These therapeutic powers transcend gender, language, culture, and age and can be organized into four different categories: facilitation of communication, increasing personal strengths, enhancing social relationships, and fostering emotional wellness (Mellenthin, 2018; Schaefer & Drewes, 2013). Within these four categories are the 20 specific agents of change, it is these agents that facilitate change through play therapy (Stone, 2020). See list of therapeutic powers of play in Table 1. While all play can be therapeutic, by intentionally selecting appropriate play activities clinicians can enhance these therapeutic powers (Mellenthin, 2018). Therefore, it is important for clinicians to understand which toys/play media will be appropriate for clients and how these toys can be used to effectively activate the therapeutic powers of play. When talking about selecting a toy, many in the general public would immediately picture physical toys such as a doll or ball. However, with the development of technology clinicians now have a growing range of digital toys at their disposal. The therapeutic powers of play can be used a framework to facilitate or enable clinical reasoning when selecting an intervention.

**Table 1.**
**Therapeutic powers of play (TPOPs)**

| Facilitates communication | Increases personal strengths | Enhances social relationships | Fosters emotional wellness |
|---|---|---|---|
| Self-expression<br>Access to the unconscious<br>Direct teaching<br>Indirect teaching | Creative problem solving<br>Resiliency<br>Moral development<br>Accelerated psychological development<br>Self-regulation<br>Self-esteem | Therapeutic relationship<br>Attachment<br>Social competence<br>Empathy | Catharsis<br>Abreaction<br>Positive emotions<br>Counterconditioning fears<br>Stress inoculation<br>Stress management |

In 2020 the world was greatly impacted by the COVID-19 pandemic. This meant that social restrictions were put in place and various cities were sent into a lockdown, many workplaces and schools were shut and restrictions limited individuals to a 5km radius of their home. Combined with bans and restrictions to visitors in the home, as well as limits on public gatherings many individuals were left isolated and cut off from friends and family members. At the time of writing, Melbourne, Australia is the most locked down city in the world (Boaz, 2021) and adolescents have spent much of the past two years completing their schooling remotely, only being able to connect with their peers in a virtual setting. As a result of these lockdowns many individuals including adolescents have experienced a rise in ill mental health (Pierce et al., 2020). Due to the developmental level and characteristics of young people the stress elicited from the pandemic and the resulting lockdowns may be heightened (Ellis et al., 2020). Young people are still trying to develop their sense of self, relying heavily on their peers and significant others for feedback and praise (Maree, 2021). We have also seen much development in the way that technology is used, with online learning, socialisation, and telehealth interventions. It is possible that hybrid models of online and face to face education may become the new normal (Li & Lalani, 2020). This generation is not unfamiliar to technology as they have grown up in an era where the growth in this industry has been exceptional. To further support the engagement of young people in therapy it is important to ensure that you are relating to them in a method that they are familiar and comfortable with, in young people this may be through the utilisation of technology (Stone, 2020).

One emerging form of technology that has the potential to be used therapeutically with young people is Virtual Reality or VR. VR can have several different interpretations, however in this instance it is defined as the use of a head mounted display (HMD) to immerse the user into an interactive 3D environment. Environments that are created in VR applications have been found to have positive effects on mood by eliciting a sense of awe and in the way that they are able to control and direct the users' experiences has been found to be better than utilising memory or imagination and thus allowing a high level of self-reflection (Chirico et al., 2018; Riva et al., 2016). By enabling the user to explore, create and interact in an immersed environment several the bodies systems can be engaged such as the autonomic, polyvagal, sympathetic, and parasympathetic systems (Kowert & Quandt, 2021; Spiegel, 2020).

VR, like any toy found in a playroom, is the medium that allows the therapeutic intervention to take place (Stone, 2019). Most commonly VR apps for health care are designed for things such as physical exercise, motor rehabilitation, and pain related conditions (Tao et al., 2021). At this time no VR apps have been developed specifically for the treatment of depression, however apps that include elements such as meditation or social integration may help treat some of the symptoms of depression. Casual video games have been found to reduce symptoms of anxiety and depression after a single session of as little as 30 minutes (Pine et al., 2020). It was found that games that were able to elicit a state of flow would focus players attention and take it away from anxious or depressive thoughts, suggesting that therapeutic benefits of video games could be linked to a combination of engagement combined with cognitive and physical challenges, along with a clear reward for achievement (Pine et al., 2020). VR apps and games have the added advantage of being able to fully immerse the user in the environment, however it remains unknown if VR games are more effective than casual video games when used to treat depression in young people (Halldorsson et al., 2021). While VR headsets started out as expensive devices with few programs to work with, over the past few years they have become much more affordable making

them more accessible and leading to more research, uses and applications (Davies & Bergin, 2021).

Young people are fairly to extremely interested in the use of VR and evidence supports its use in therapeutic settings for purposes such a distraction from procedural pain and exposure therapy for phobias (Ang et al., 2021; Ridout et al., 2021; Riva & Serino, 2020). A survey conducted following the first COVID-19 lockdowns found that VR use increased in all people regardless of age and gender and individuals reported feeling VR helped to keep them occupied and had potential benefits for both their physical and mental health (Siani & Marley, 2021). It was also found that utilising avatars in talk therapy helped reduce communication barriers and promote treatment seeking (Rehm et al., 2016). Shamri Zeevi (2021) investigated the use of a VR application for art therapy with young people and found it to be an effective medium for working with this age group, allowing young people to express themselves and to interact and make mistakes with no implications in the real world.

While little is known about the effectiveness of VR in treating depression in young people, there is some research into its use with adults. One study involved users delivering compassion to a young child, they then switched roles and the participant became the young child receiving the same compassion they had just given (Falconer et al., 2019). Results of this study found that after three repetitions users experienced a significant reduction in severity of depression and self-criticism. This is just one example of the way in which VR can facilitate an experience where users can be transported into the simulated body of another and experience an immersive event from multiple perspectives, something not possible in the real world. Some studies that have reported on VR therapies have not used the same interpretation of VR but have instead utilised computer-based programs to create a virtual environment, without the immersion of the HMD. These studies reported on the effectiveness of the use of avatars in therapy finding this type of intervention to be suitable for young people while also highlighting a need for more research in this area (Falconer et al., 2019; Rehm et al., 2016; Van Rijn et al., 2018). Overall, there is a lack of research investigating the effectiveness of VR interventions with the targeted population. Those that have included young people have examined VR programs intended for the young person to use independently, rather than in conjunction with a therapist such as Lindner et al., 2019 recommend that more research needs to be done in this area to ensure that the level of intervention provided by VR apps will be able to deliver an appropriate level of treatment to users who may delay seeking further treatment in preference of utilising a self-administered app. To enhance the therapeutic power of VR play the use of these apps should be cautioned, with more benefit being obtained by a therapist selecting an appropriate intervention and working with the young person.

When looking at different VR applications for use within therapy there are several different options. Some applications are made to target a specific mental health issue such as PTSD and include psychoeducation and exposure therapy, some apps focus solely on mindfulness, and others allow the therapist and client to connect virtually using avatars. There are apps that incorporate direct or indirect teaching, and then there are apps that appear to be simple commercial games, but which can be used therapeutically to activate the therapeutic powers of play and the core components of change. With such a vast array of applications already available and constantly changing, it is important that therapists have a framework to assist them with the selection and utilisation of appropriate VR applications. Hence the aim of this realist review is to examine the clinical reasoning for the inclusion of therapeutic VR apps for adolescents with dysthymia or depression.

## Method

### *Study Design*

A realist review was considered an appropriate study design as it would help to address a significant gap in research, identified from an initial scoping of the literature. A realist review also allowed the researcher to include grey literature and draw from other related research and to help provide clinical reasoning and theory development about "what works, for whom, and under what circumstances" (Wong et al., 2013). This realist review is reported using Realist and Meta-narrative Evidence Synthesis: Evolving Standards (RAMESES) criteria (Wong et al., 2013). The exclusion criteria of the initial literature search produced no suitable results, inclusion criteria were then widened to allow for a broader range of evidence, details of inclusion/exclusion is listed in Table 1. This allowed knowledge from several different sources to be pulled together to form a supporting evidence base of how different VR interventions can be used for young people, and how and why it can assist to treat their depression or dysthymia. In this realist review, the relationships between VR games/apps and outcomes for young people experiencing depression or dysthymia were examined.

### *Theory Identification*

The first step of a realist review is to develop a programme theory, comprised of delineating the Context-Mechanism-Outcomes (C-M-Os) to explain how a programme is believed to work (Pawson & Tilley, 1997; Wong et al., 2013). After reviewing relevant evidence, the C-M-O configurations are then examined and refined (Pawson et al., 2005). An initial scoping of the literature was performed to gather an idea of what research existed and to gain an understanding of some of the underlying theories and evidence. From this several themes were extracted, and a systematic search of databases was performed. Reference lists of relevant articles were also utilised to find further literature, and discussion with experts helped to identify further sources and grey literature.

From the initial scoping of literature several (C-M-O) configurations were developed (see Results). These configurations provide possible explanations for the outcomes of a given intervention, in this case for the potential benefits of VR use with young people with depression/dysthymia (Pawson & Tilley, 1997; Wong et al., 2013). The Therapeutic Powers of Play (TPOP) were used as a framework for explaining the relationship between the use of VR games and applications and the management of depression and dysthymia in young people (Table 1) (Schaefer & Drewes, 2013). Each of the identified key themes identified during the initial scoping was then examined using the TPOP framework. This helped to illustrate how each mechanism works across each of the categories of powers and provided a basis of the programme theory.

### *Literature Selection*

The selection of documents to include in a realist review is different from typical review methods (Pawson et al., 2005). As realist reviews are typically conducted when there is a gap in the literature it allows for the inclusion of a wide range of academic literature from peer reviewed research studies, academic journal articles to grey literature (Pawson et al., 2005; Wong et al., 2013). This means that when documents are reviewed for inclusion, they are examined for their ability to provide information relating to the target population, contextual factors, underlying mechanisms and outcomes related to the interventions (Pawson & Tilley, 1997).

Realist review methodology require an iterative search of the literature (Wong et al., 2013). Several searches of electronic databases were conducted throughout the review. Hand-searching and citation chaining were also performed to supplement these searches.

### *Literature Appraisal*

Documents were assessed for rigour using the Mixed Methods Appraisal Tool (MMAT) (Hong et al., 2018). The MMAT details sections for different methodologies and scores each document out of 4, with 0 meeting no criteria and 4 meeting all criteria (Hong et al., 2018), allowing the credibility of each piece of evidence to be adequately determined (Wozney et al., 2017). All 12 documents met the appraisal criteria for rigour. To determine relevance each article they were read by both authors to ascertain if it provided information on the context, mechanism or outcomes identified in the initial programme theories. Following asynchronous reading of the papers

**Table 2.**
**Search Strategy**

| Search terms | Inclusion Criteria | Exclusion Criteria |
|---|---|---|
| Concept 1: VR OR Virtual Reality | Studies involving HMD VR applications | Studies focusing only on adult populations or young children |
| Concept 2: Depression OR Major Depressive Disorder OR Dysthymia OR Mental Health | Studies including target population (young people with depression and/or dysthymia) | VR interventions that did not include HMD, such as CAVE environments or desktop-based interventions |
| Concept 3: Adolescents OR Young People OR Teen* | Studies including a general target population, that included both HMD VR and its effectiveness of treating depression or it's symptoms | Studies not relevant to the treatment of depression or dysthymia |

the authors engaged in rich discussions to ensure consensus. Four documents were found to have no relevance to the study and were excluded at this stage.

### *Data Extraction*

All articles were downloaded as full text and hard copies of grey literature were obtained. All sources were read through several times. Data extraction took place in multiple phases. The first phase included the extraction of the authors and year of publication, methodology used, population demographics, VR hardware and software, and findings related to outcomes of VR in relation to depression. The second phase involved extraction of data in relation to contexts, and the third phase involved extraction of data in relation to the TPOP. This extracted data aided in generating information to support and refine the initial theories and provided useful insights into the effectiveness of VR when used with young people with depression.

### *Analysis and Synthesis*

The purpose of the data synthesis stage was to refine the initial programme theories (Pawson et al., 2005; Wong et al., 2013). This multiple staged process was completed iteratively to ensure familiarisation of records and then extracting all the data relating to contexts, mechanisms and outcomes (Pawson et al., 2005). Patterns in the data were identified and refined to support or refute the C-M-O configurations.

## Results

An outline of the document search and appraisal process is represented in Figure 2. After removal of duplicates, a total of n = 478 documents were reviewed to determine their eligibility for inclusion in this review. Of these, n = 12 documents were considered suitable for inclusion: peer reviewed journal articles (n = 9), and grey literature documents (n = 3). Publication of these documents occurred between 2018 and 2022. Table 3 includes the year, title, authors and country of each of the selected documents. The distribution of articles based on year of publication is represented in Figure 3.

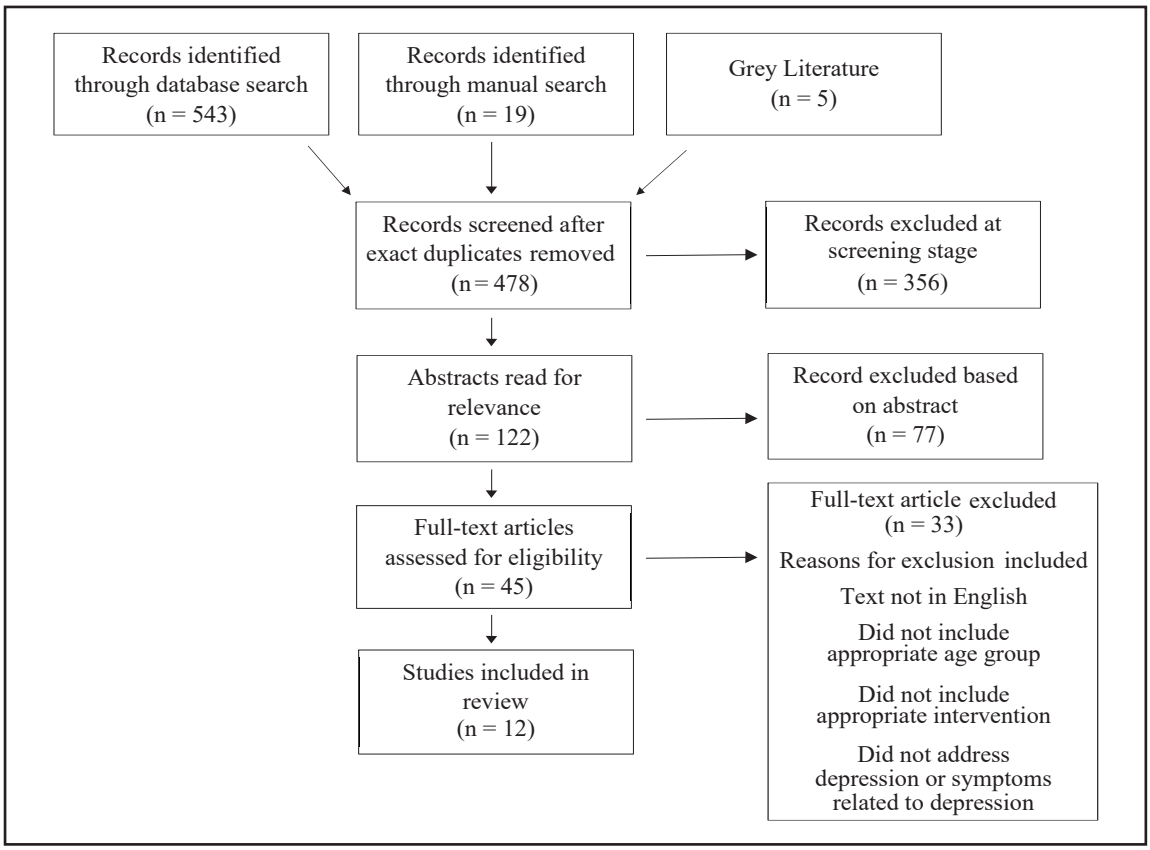



**Figure 2: PRISMA flow diagram**

**Table 3.**
**Document Characteristics**

| Year | Article | Author | Country |
|---|---|---|---|
| 2020 | Virtual Reality in the Assessment, Understanding and Treatment of Mental Health Disorders | Riva & Serino | Italy |
| 2019 | Virtual Reality Interventions for Personal Development: A Meta-Analysis of Hardware and Software | Howard | USA |
| 2019 | How to Treat Depression With Low-Intensity Virtual Reality Interventions: Perspectives on Translating Cognitive Behavioral Techniques Into the Virtual Reality Modality and How to Make Anti-Depressive Use of Virtual Reality - Unique Experiences | Lindner et al. | Sweden |
| 2021 | Recreational Therapists Consider Leisure Motivation when Evaluating Virtual Reality Games | Isaacs, Nelson & Trapp | USA |
| 2020 | Artificial Intelligence and Depression: How AI powered chatbots in virtual reality games may reduce anxiety and depression levels | Ren | Canada |
| 2018 | Designing Awe in Virtual Reality: An Experimental Study | Chirico et al. | Italy |
| 2021 | Freely Available Virtual Reality Experiences as Tools to Support Mental Health Therapy: a Systematic Scoping Review and Consensus Based Interdisciplinary Analysis | Best et al. | Ireland |
| 2019 | Apps, Avatars, and Robots: The Future of Mental Healthcare | Miller & Polson | Australia |
| 2019 | Virtual Reality in Art Therapy: A Pilot Qualitative Study of the Novel Medium and Implications for Practice | Kaimal et al. | USA |
| **Grey Literature** | | | |
| 2021 | Therapeutic Extended Reality in Play Therapy With Children: Modalities for Change, H. G. Kaduson and C. E. Schaefer (Editors) | Lamb & Etopio | USA |
| 2022 | The Universe of You: Using Remote VR to Improve Psychoeducations Through Spatial Presence, Attention, Allocation, and Interaction. In Play Therapy and telemental health. Foundations, populations, and interventions. Stone (Editor) | Kelly | USA |
| 2020 | Digital play therapy: a clinician's guide to comfort and competence | Stone | USA |

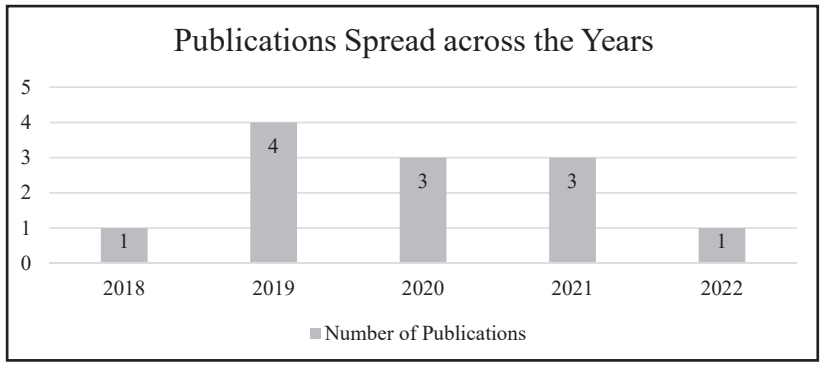


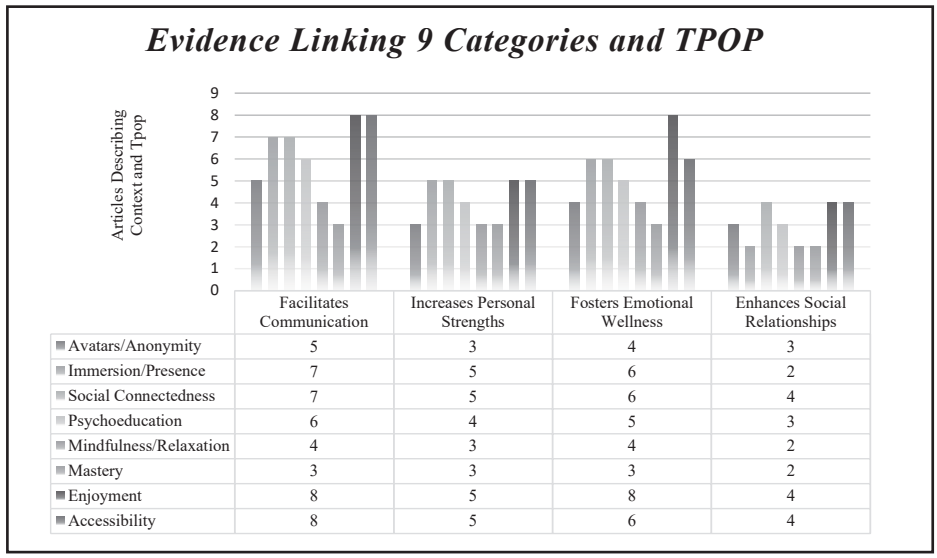

**Figure 3: Publications Spread across the Years**

**Table 4.**
**CMO Configurations**

| Context | TPOP | CMO Context-Mechanism-Outcome |
|---|---|---|
| **Avatars (Anonymity)** | Facilitates Communication | Use of avatars in VR allows young people to feel a sense of security and anonymity (C) resulting in an increase in help-seeking behaviour (M), as well as an increase in engagement in treatment which will improve treatment outcomes in young people (O) |
| | Enhances Social Relationships | By remaining anonymous using avatars in VR (C), young people will feel more comfortable opening up and will be able to establish a better therapeutic relationship (M) with the therapist if used in an individual setting and/or others if used in a group setting (C), this will allow the young person to open up and speak more freely throughout therapy sessions (O) |
| | Increases Personal Strengths | Avatar use (C) allows the young person to feel secure enough to engage fully in the therapy resulting in accelerated psychological development and an increase in self-esteem (M), these skills will be able to be utilised in other contexts in the young person's life and help them to deal with their depressive symptoms (O) |
| | Fosters Emotional Wellness | By being able to use avatars within their therapy sessions (C), young people can use their avatar to gain some distance from treatment and to help them deal with stressors and situations that they may not be capable of confronting in real life (M), improving the effectiveness of treatment (O) |
| **Immersion/ Presence** | Facilitates Communication | When a young person is fully immersed in their VR game (C) it will allow them to access their unconscious and promote self-expression (M), this can in turn help to facilitate communication within the therapy session (O) |
| | Enhances Social Relationships | Immersion in a VR game (C) it can facilitate the way in which the young person relates to a character or characters within the game and help them to develop their social competence and sense of empathy (M), these skills can then be transferred to the young persons social life and by improving social relationships the young person will be able to form important connections with their peers (O) |
| | Increases Personal Strengths | Becoming fully immersed and feeling as though they are truly part of a game or virtual environment (C) can prompt a young person to practice their self-regulation and creative problem skills (M) which will in turn aide the young person in identifying and dealing with symptoms of depression or dysthymia |
| | Fosters Emotional Wellness | Complete immersion in a game or virtual environment (C) will provide a young person with a place to go to manage their stress levels (M) and elicit positive emotions (O) |
| **Social connectedness** | Facilitates Communication | VR apps and games can be played in a way in which the young person can virtually connect to others (C), this can help to alleviate feelings of isolation and to allow them to take part in group therapies (M) this increase in engagement will boost treatment outcomes (O) |
| | Enhances Social Relationships | If a young person had the ability to connect more regularly with peers through VR (C), then they will have more opportunity to practice their social skills (M) thus increasing their level of social competence (O) |
| | Increases Personal Strengths | Young people often rely on their peers for validation and to give them someone to model their sense of right and wrong from, by connecting to others through VR (C) it can help to promote self-esteem and moral development (M) which can assist the young person with managing their symptoms (O) |
| | Fosters Emotional Wellness | Connecting to peers is important for the development of young people, by connecting virtually through VR apps and games (C) it can help to elicit positive emotions in a young person (M) and decrease levels of depression (O) |
| **Psychoeducation** | Facilitates Communication | VR games can include psychoeducation in both direct and indirect ways (C)(M) allowing the young person to be more aware of their symptoms and learning new strategies around how to manage them (O) |
| | Enhances Social Relationships | VR games that include elements of psychoeducation (C) can assist young people to build on their social competence and empathic skills (M) which will help them to connect with others and support their development (O) |
| | Increases Personal Strengths | VR apps and games that include a level of psychoeducation (C) can assist with self-regulation, creative problem solving, accelerated psychological development and self-esteem (M) by teaching the young person through both direct and indirect methods different strategies (C) which will help the young person to manage their own symptoms (O) |
| | Fosters Emotional Wellness | Techniques taught through apps and games via psychoeducation (C) can assist with stress management (M), and being able to better manage stress levels will allow the young person to focus more on their therapy (O) |

| Context | TPOP | CMO Context-Mechanism-Outcome |
|---|---|---|
| **Mindfulness/ Relaxation** | Facilitates Communication | VR apps and games that include a mindfulness/relaxation component (M) can assist a young person to access their unconscious and promote self-expression (O) |
| | Enhances Social Relationships | Partaking in mindfulness and relaxation through VR alongside a therapist (C), can help to improve the therapeutic relationship (M) which in turn will increase treatment outcomes (O) |
| | Increases Personal Strengths | When a young person engages in VR games that assist them to relax and promote mindfulness (C) it helps them to clear their mind and improve their creative problem skills, as well as assisting them with their self-regulation (M) which can help the young person to better engage in their therapy (O) |
| | Fosters Emotional Wellness | Practising mindfulness and relaxation techniques (C) can allow a young person to relax and can work to assist in the management of their stress levels (M), by helping to relieve some stress it can also elicit feelings of a more positive nature (O) |
| **Mastery** | Facilitates Communication | VR games that include psychoeducation can result in indirect and direct teaching of the management of depressive symptoms (C) when mastery is achieved within the VR game (mastering a specific skill, completing a challenge or level) (M), the therapist can then use this to talk with the young person about what they have learnt, these skills can then also be transferred to real life and assist the young person to manage their own symptoms (O) |
| | Enhances Social Relationships | VR games that are used within a therapy session alongside a therapist (C) can help to improve the therapeutic relationship between young person and therapist (M) when there is a mutual experience of mastery (C), this can help to increase engagement in therapy and improve treatment outcomes (O) |
| | Increases Personal Strengths | Partaking in a VR game that requires the young person to master different skills (C) helps to improve their resilience and creative problem solving, and ultimately their self-esteem (M), this will assist the young person to build on their coping strategies and assist with the management of their symptoms (O) |
| | Fosters Emotional Wellness | When participating in VR games/apps that include different levels or tasks that are achievable yet not too easy (C), by achieving a sense of mastery and accomplishment (M) positive emotions are elicited and symptoms of depression or dysthymia are decreased (O) |
| **Enjoyment** | Facilitates Communication | By participating in a game that is found to be enjoyable by the young person (C) it allows them to access their unconscious thoughts and feelings and to express themselves in ways of their own choosing (M) increasing their ability to engage with their therapist and improve treatment outcomes (O) |
| | Enhances Social Relationships | When a young person engages in a VR game that brings them a sense of joy (C), this feeling of pleasure (M) is shared with the person/therapist who is also present/connecting through the virtual environment. This can result in a strengthened therapeutic relationship and sense of attachment (M) which will increase the young person's engagement as they will feel more connected to their therapist and more comfortable within their sessions (O) |
| | Increases Personal Strengths | When a young person experiences enjoyment through a VR game or app (C) it will improve their self-esteem, their ability to self-regulate and will help to accelerate their psychological development (M) which will then assist the young person to manage their symptoms (O) |
| | Fosters Emotional Wellness | Experiencing enjoyment within a VR game or environment (C) will elicit positive emotions, and assist with stress management (M) which will help to decrease depressive symptoms in young people (O) |
| **Accessibility** | Facilitates Communication | Being able to choose from an array of different VR apps and games (C) allows a young person a degree of self-expression (M), it will also allow the therapist and young person to be together in an environment that would not typically be possible (C). This will improve engagement and treatment outcomes (O) |
| | Enhances Social Relationships | Having access to free or cost-effective VR games (C), means young people will have more opportunity to connect with each other and practice their social skills (M), this will result in a decrease of depressive symptoms and an increase in engagement (O) |
| | Increases Personal Strengths | Ability to access games outside of therapy sessions (C) can lead to an increase in use (O), resulting in accelerated psychological development (M) and improvement of treatment outcomes (O) |
| | Fosters Emotional Wellness | Being able to access a VR app or game at home, when they need it (C), means that young people will be able to engage in games that improve their mood (M) and allow them to deal with symptoms of their depression or dysthymia when they need it (O), instead of having to wait until their next therapy session |

36 CMOs were formed during initial programme theory identification, these were organised into 9 separate categories according to the identified contexts (Table 4). The 9 contexts identified were; avatars/anonymity, immersion/ presence, social connectedness, psychoeducation, mindfulness/relaxation, mastery, enjoyment and accessibility. Findings from each context are reported individually and then are contextualised within the TPOPs framework. Each article was read several times to determine whether or not it provided evidence for contexts and TPOPs (Figure 4). Lastly, implications and considerations for clinical use are identified.




| | Facilitates Communication | Increases Personal Strengths | Fosters Emotional Wellness | Enhances Social Relationships |
|---|---|---|---|---|
| Avatars/Anonymity | 5 | 3 | 4 | 3 |
| Immersion/Presence | 7 | 5 | 6 | 2 |
| Social Connectedness | 7 | 5 | 6 | 4 |
| Psychoeducation | 6 | 4 | 5 | 3 |
| Mindfulness/Relaxation | 4 | 3 | 4 | 2 |
| Mastery | 3 | 3 | 3 | 2 |
| Enjoyment | 8 | 5 | 8 | 4 |
| Accessibility | 8 | 5 | 6 | 4 |

**Figure 4: Evidence Linking 9 Categories and TPOP**

## Discussion

### *Avatars/Anonymity*

Avatars are characters within the virtual environment (Miller & Polson, 2019). Within the context of VR therapy avatars can have several uses and benefits. Avatars can be personalised to represent the user, but they can also be used to represent a therapist and can be programmed to interact with the user and respond to their inputs (Miller & Polson, 2019; Ren, 2020; Riva & Serino, 2020). When used as a representation of the user, avatars can provide young people with a degree of anonymity, allowing them the opportunity to engage in therapy without fear of the stigma often associated with attending a face to face (in person or online) therapy session (Miller & Polson, 2019). As there is not such a negative stereotype attached to playing games, offering support in a VR setting may have the ability to reach young people from a greater demographic (Ren, 2020).

Not only do avatars afford young people with a sense of anonymity, but the process of personalising their own avatar can have its own benefits such as increasing enjoyment and engagement in the process, which may assist in a decrease in levels of depression (Miller & Polson, 2019; Ren, 2020). Avatars can also be used to meet up and interact with others in a social context promoting increased self-expression and empathy (Lamb & Etopio, 2021; Lindner et al., 2019).

Avatars can also be used to represent a virtual therapist within the VR environment. Virtual therapists, also known as AI chatbots, are controlled by the computer (Riva & Serino, 2020). They are programmed to replicate face-to-face exchanges and can detect the young person's depression level (Miller & Polson, 2019; Ren, 2020). Some of the benefits of using AI chatbots, is that they can be available to the patient 24/7, can enhance patient responses, improve social relational behaviours, and can increase engagement by reaching a larger demographic and increasing levels of immersion (Miller & Polson, 2019; Ren, 2020). While there are many advantaged to using AI chatbots there is also the risk that some may not feel as reassured as they would if talking to a trained professional, the chatbot may lack empathy or may struggle to understand long and complex messages meaning it is possible that an incorrect response may be given and increase the level of depression felt by the user (Miller & Polson, 2019; Ren, 2020).

### *Immersion/Presence*

The wearing of a HMD when using VR, and ability to include and evoke a range of different senses through haptic feedback and sound, helps to remove distraction and sensory information from the real world creating a sense of immersion, which in turn helps the user to feel as though they are truly there provoking a sense of presence (Best et al., 2021; Kaimal et al., 2019; Lindner et al., 2019). VR allows users to interact with a realistic three-dimensional environment using hand movements and gestures in a fluid and realistic way (Lamb & Etopio, 2021; Lindner et al., 2019). This ability to interact so naturally with the virtual environment promotes not only immersion, but greater self-expression within the environment (Lamb & Etopio, 2021).

Immersion in the VR environment can have many benefits such as altering the range of expression exhibited by the user following VR use, increased emotional arousal, cognitive and emotional engagement and concentration, as well as a reduction in anxiety (Howard, 2019; Kaimal et al., 2019; Ren, 2020; Tian et al., 2021). One of the main benefits of immersion, is its ability to increase the users feeling of presence (Kelly, 2022; Lindner et al., 2019). It is the VR HMD in combination with movement, sight and sound, which facilitates the user's immersion into the virtual world (Kaimal et al., 2019; Ren, 2020). The more realistic and interactive an environment is, the more the user can be immersed in the environment, and the more likely they can transfer any skills learnt within the VR environment to the real world (Lamb & Etopio, 2021).

When a user feels as though they are truly present in the VR environment, it can be a powerful means for personal transformation and have a positive effect on therapeutic outcomes (Howard, 2019; Riva & Serino, 2020). These positive outcomes may be a result of the increased concentration resulting from the feeling of presence, as well as a decrease in external distractions (Howard, 2019; Kelly, 2022; Ren, 2020). When users truly feel present within VR they may often forget where they are in the real world, allowing therapists to gain a more realistic understanding of the young person's behaviour (Lamb & Etopio, 2021).

Presence within the VR environment can be increased through the inclusion of tracking hardware, interactivity and realism of the environment and the use of three-dimensional graphics (Howard, 2019; Ren, 2020; Tian et al., 2021). When investigating the feeling of presence experienced within different VR environments the more realistic and natural settings (forest and mountains) was found to evoke a stronger sense of presence than less realistic settings (earth view) (Chirico et al., 2018) demonstrating the effectiveness of realistic VR environments.

While presence and immersion can have their benefits, there are times when realistic VR settings may not be appropriate. VR can be disorienting and confusing for individuals who may experience hallucinations or delusions and have difficulty distinguishing VR from reality (Kaimal et al., 2019). Less realistic environments may promote greater fantasy play and be suitable for individuals who do not feel as comfortable in a realistic setting and need the security of an environment that is not as confronting (Lamb & Etopio, 2021).

### *Social Connectedness*

Social connectedness using VR apps includes any way in which the young person is connected to another using VR. This could include playing a game in conjunction with others whether they be in the same room or connecting remotely. It could also involve meeting up with friends or family in a virtual space and 'hanging out' or attending support groups. Social connectedness can also refer to increasing connection with the therapist when used in the therapy session or connecting with virtual therapists or chatbots which can simulate a real-life social interaction. One of the benefits of VR is that it can connect individuals living in distant locations, allowing them to feel as though they are together in the same place, allowing them to share different activities such as board games and karaoke (Best et al., 2021; Isaacs et al., 2021; Lindner et al., 2019; Miller & Polson, 2019; Riva & Serino, 2020). This type of interaction can promote greater self-expression and empathy and can make the VR experience more engaging and enjoyable for the user (Lamb & Etopio, 2021; Miller & Polson, 2019).

When used in conjunction with a therapist, VR can allow the therapist to observe the young person's behaviour within the virtual environment without being seen (Lamb & Etopio, 2021), this can help to increase the connection between the young person and therapist as the therapist will be able to gain a deeper understanding of the young person. The therapist can also be present to supply immediate feedback and to assist the young person to utilise the VR technology proficiently, in order to increase the effectiveness of the intervention (Best et al., 2021; Kaimal et al., 2019).

Social connectedness can also be accommodated

through the development of social skills. VR has been considered as being a suitable mode for social skills training and has already been shown to be promising for individuals with autism and schizophrenia (Lamb & Etopio, 2021; Lindner et al., 2019). Social skills can be promoted and taught using programmed Chatbots, as well as through interactions with peers or therapists within the virtual environment (Lindner et al., 2019; Miller & Polson, 2019; Ren, 2020).

Another way that VR can be used to increase social connectedness is by connecting young people to others as a form of peer-support or group therapy. Apps such as Grove VR allow users to join or create support groups that cover specific concerns (Best et al., 2021). Apps could also utilise the user's data to suggest various virtual social groups or gatherings that the young person may be interested in (Lindner et al., 2019).

***Psychoeducation***

Psychoeducation refers to the conceptualisation of symptoms, as well as instructions for exercises and a potential rationale for treatment (Lindner et al., 2019). It has been found to be an effective practice when used to treat depression and dysthymia (Kelly, 2022). With even passive psychoeducation having a small anti-depressive effect (Lindner et al., 2019). Within the VR environment psychoeducation has been found to be particularly effective as it allows for the user to become immersed in their therapy, and the therapist can control the environment so that the young person can experience a scenario rather than just perceiving it (Lamb & Etopio, 2021; Lindner et al., 2019). By placing the young person in a life like scenario within VR it can promote positive emotional associations which can then be generalised to the real world (Lamb & Etopio, 2021; Riva & Serino, 2020).

Psychoeducation can take place in VR through direct methods such as the adaptation of cognitive behavioural therapy (CBT) strategies and the utilisation of AI chatbots and avatars. While long term effects of reducing symptoms of depression have not been investigated, CBT in VR has been found to reduce anhedonia using mental imagery and the targeting of deficit reward sensitivity (Lindner et al., 2019). Avatars and chatbots can help to support CBT within VR and provide the young person with further assistance to help make the exercises more concrete and easier to execute (Lindner et al., 2019; Miller & Polson, 2019; Ren, 2020).

Learning within VR can also take place indirectly. The medium allows young people the opportunity to act out different play narratives and fantasies and affords them the ability to try different challenges within a safe environment, prompting the adoption of different strategies and learning from their own setbacks (Lamb & Etopio, 2021). The therapist being present in the VR environment alongside the young person can also help to support learning, as the therapist can encourage the young person to try different strategies, model appropriate behaviours, or deliberately make errors so that the young person can witness the response of others (Best et al., 2021).

Whatever the method of psychoeducation, VR is a good medium to support it as the immersive and interactive nature of VR can increase the young persons ability to engage, attend and retain the psychoeducation (Kelly, 2022). It can also aid as a visual booster and replace mental imagery, as both the therapist and the young person will be able to see and experience a scene together (Lindner et al., 2019).

***Mindfulness/Relaxation***

Mindfulness and relaxation are useful for treating depression as they can assist the young person to relax, relieve stress and evoke a mindset conducive to attending to psychoeducation (Best et al., 2021; Kaimal et al., 2019). VR apps can be used to promote a relaxed and mindful state in order to help a young person regulate themselves before or after a therapy session, as a means of stimulus avoidance, to relieve stress and to reduce negative emotions and low mood (Best et al., 2021; Isaacs et al., 2021; Kaimal et al., 2019; Lamb & Etopio, 2021; Ren, 2020). It has been found that individuals who regularly play games are less stressed and more relaxed than those who don't (Lamb & Etopio, 2021; Ren, 2020). VR environments help to take this relaxation to another level as they can elicit desired mental or meditative states through the imagery used, particularly environments that are based on nature (Kaimal et al., 2019). Being immersed in the VR environment also helps the young person to concentrate, which increases the effectiveness of the mindfulness session and reduces negative emotions (Ren, 2020). Mindfulness within the VR setting has been found to be more effective at reducing symptoms of depression and anxiety than traditional environments or mobile applications (Ren, 2020).

***Mastery***

The virtual environment is an ideal place for achieving mastery as it is what is known as a "soft failure" environment, meaning that if a young person was to attempt something in VR and fail, there will be

no catastrophic repercussions (Lamb & Etopio, 2021). By creating a safe environment where young people are not afraid of failure it means that it can appeal to young people who may be afraid of making mistakes and they can work on improving their skills by learning from their own mistakes on previous attempts and having the opportunity to try different approaches, these skills can then be transferred to the real world (Kaimal et al., 2019; Lamb & Etopio, 2021).

Achieving mastery in VR can activate reward pathways and increase access to positive reinforcement (Best et al., 2021; Kaimal et al). It can also work as a distraction for users and may help to engage them in an activity they find enjoyable which can help to alleviate some of the symptoms of depression and dysthymia (Best et al., 2021). Games such as Beat Saber and Fruit Ninja, which have a high skill ceiling, encourage the player to keep trying to achieve mastery, building their skills as they go (Isaacs et al., 2021). Repetitive play such as this, particularly when paired with re-enactment of a particular scenario, can allow a young person to relieve stress and gain mastery over previous trauma (Lamb & Etopio, 2021).

### *Enjoyment*

A lack of enjoyment is one of the symptoms of depression and dysthymia in young people. By incorporating an enjoyable element into their therapy sessions, it helps to combat this symptom. The act of playing games leads to the player experiencing more positive emotions with children and adolescents seeing an increase in their happiness index following game play (Ren, 2020). By having these games played in a VR setting this enjoyment can be further increased for several reasons. VR allows the user to personalise their environment and to connect to others making the experience more engaging and enjoyable (Best et al., 2021; Miller & Polson, 2019). The VR environment itself can enhance emotional arousal, with users reporting feelings of euphoria and joy within such a unique space (Kaimal et al., 2019). The inclusion of three-dimensional graphics and the use of HMD has been found to be significant in increasing emotional engagement and arousal than compared to a 2D or traditional environment possibly due to the increased sense of presence and immersion (Howard, 2019; Tian et al., 2021). One study examining the effects of different virtual environments found that while all environments were motivating, high mountains were able to increase participants positive mood and evoke feelings of joy (Chirico et al., 2018).

Activities that evoke enjoyment in the real world can also be completed within the VR environment, such as gardening, art making and interacting with pets (Kaimal et al., 2019; Lindner et al., 2019). When combined with movement, which is made possible in VR as the user can use their body to interact with the environment, reward pathways from the cerebellum are activated (Kaimal et al., 2019). VR has also been found to increase mindfulness and reduce negative emotions and is most effective at generating enjoyment if it contains varying levels of difficulty and is found to be rewarding for the user (Ren, 2020).

### *Accessibility*

Access to therapeutic services is a barrier to young people whether it be due to cost, stigma or lack of available services. VR can help reduce some of these impacts and make it easier for this demographic to access support. The price of standalone VR headsets has dropped drastically in the last few years making it much more affordable (Riva & Serino, 2020). Many young people may not be able to afford the costs of therapy visits VR technology has the potential to incorporate effective CBT strategies and is a more cost-effective solution, especially as there are many free applications available to support mental health which can be used whenever the user feels the desire to (Best et al., 2021; Lindner et al., 2019; Ren, 2020).

While VR applications can be used independent to therapy sessions, they would be more effective when used as a supplement to therapy rather than as a replacement (Miller & Polson, 2019). By using VR within a therapy session, the therapist can take advantage of the vast degree of settings or VR environments that the young person can be transported to, as well as having the opportunity to observe, measure and record the young person within the environment (Lamb & Etopio, 2021; Stone, 2020). VR does not only have to be used within the therapist's office but can connect the young person and therapist together from remote locations, increasing the ability for those who live in difficult to reach locations to access therapeutic services (Kaimal et al., 2019; Miller & Polson, 2019; Stone, 2020). VR can also link users to therapeutic group settings, as well as allowing those with physical limitations to virtually access locations that may otherwise be physically impossible (Best et al., 2021; Kaimal et al., 2019). VR is particularly well suited to young people who are typically already familiar with technology and find it easier to adapt to VR and its possibilities (Kaimal et al., 2019; Lamb & Etopio, 2021).

## Contextualising the Nine Categories within the TPOPs Framework

### *Facilitates communication*

All nine categories were identified within the facilitates communication domain, of note self-expression was enhanced through VR technology due to the ability for the user to personalise their experience through the selection of avatars and interactive characters as well as the ability to make choices and to create, manipulate and interact with content within the VR environment in an immersive manner (Best et al., 2021; Kaimal et al., 2019; Lamb & Etopio, 2021; Lindner et al., 2019; Miller & Polson, 2019; Ren, 2020; Stone, 2020). Through immersive VR experiences, the feeling of presence can be utilised, allowing the user to feel more engaged in the experienced and thus helping to access the young person's unconscious and to increase the effectiveness of the intervention (Howard, 2021; Tian et al., 2021). Both indirect and direct teaching are well suited to a VR environment through interactive playful narratives and the ability for the young person to experiment and attempt different strategies in a soft fail environment (Lamb & Etopio, 2021). Presence and mindfulness activities undertaken within VR can help to attune the user to the information and experiences provided to them, with even passive psychoeducation found to a small effect on alleviating depression (Lindner et al., 2019).

### *Fosters emotional wellness*

Emotional wellness is fostered through the use of VR prominently through the positive emotions elicited by interactive immersive environments. Simply being in a 3D VR environment itself can evoke feelings of euphoria and joy, when this is coupled with the feeling of presence and the ability to partake in enjoyable experiences this can then increase emotional arousal and the positive emotions felt (Kaimal et al., 2019; Lindner et al., 2019; Chirico et al., 2018; Tian et al., 2021). Similar to the effectiveness of VR environments, game play alone has been associated with a reduction of negative emotions and increased happiness (Ren, 2020). By combining the powerful effects of VR and game play, it has the potential to elicit strong positive emotions.

Stress inoculation and management, catharsis, abreaction and counterconditioning fear can also be activated through VR environments through the utilisation of mindfulness and relaxation games or elements within games, as well as through re-enactment and repetitive play within the safety of VR where young people can work through and resolve traumas, or learn and master strategies through psychoeducation (Best et al., 2021; Lamb & Etopio, 2021; Lindner et al., 2019). Avatars could also allow the young person to partake in experiences that they may otherwise find too stressful or confronting, and they can use the avatar to distance themselves from the situation while still allowing them to work through their traumas or fears.

### *Enhances social relationships*

All nine categories were identified in the enhances social relationships domain, of particular note was the ability for VR to increase social competence and help develop the therapeutic relationship. Social competence is strengthened due to the ability for the young person to connect with others via an imaginal space and to practice and learn social skills through the use of avatars and other characters embedded within the VR environment (Best et al., 2021; Lindner et al., 2019). Social competence and skills such as empathy, can also be taught through overt and covert psychoeducation (Lamb & Etopio, 2021). VR also provides the young person with the opportunity to connect with others in locations and circumstances where social connectedness would not normally be possible, increasing the young person's ability to access social networks.

VR helps to strengthen the therapeutic relationship through enjoyment and immersion/presence, this can be useful for therapists who are present both physically and virtually. By feeling present within the VR environment, the young person can often forget where they truly are, allowing them to let their guard down and for the therapist to gain a deeper understanding and insight of the young person and their behaviour (Lamb & Etopio, 2021). The relationship can further be strengthened by the therapist and young person by allowing them to be immersed in a game or world together and experience mutual enjoyment and mastery. Discussions taking place between the therapist and young person following a VR experience are also beneficial for the therapeutic relationship (Miller & Polson, 2019).

### *Increases personal strengths*

The domain of increases personal strengths was supported across all nine contexts. Creative problem solving stood out as being particularly well supported

through VR due to the soft-fail VR environment in which the young person can attempt numerous strategies, and practice mastering different skills without fear of repercussions from failed attempts (Best et al., 2021; Kaimal et al., 2019; Lamb & Etopio, 2021). Upon achieving mastery within VR, the young person's confidence is increased, in turn increasing their self-esteem and allowing skills learnt to be transferred to real-life settings (Lamb & Etopio, 2021). Avatars and forms of psychotherapy can also be incorporated in order to build on these skills and increase the overall personal strengths of the young person (Lindner et al., 2019).

Presence and mindfulness incorporated within VR games and applications can also help to build the resilience, self-regulation and psychological development of the young person as it can help to evoke the desired mental states for attending to stimuli (Best et al., 2021; Howard, 2021; Kaimal et al., 2019).

## Implications

Recommendations for the use of VR with young people experiencing depression and dysthymia are summarised in Table 5. Along with these

**Table 5.**
**Practice recommendations for Virtual Reality interventions**

| Context | Summary | Recommendation for considering therapeutic application |
|---|---|---|
| Avatars/Anonymity | Avatars help the young person to express themselves and to engage in content anonymously, and to interact with others within the virtual environment. | Avatars should come in a range of different types/styles or have the ability to be personalised.<br>Avatars used as therapeutic agents should not replace a real-life therapist but can be used as further support. |
| Immersion/ Presence | The more interactive and realistic the environment is, the more the young person can be immersed in and feel present within the game/application. Increasing levels of immersion and presence may increase effectiveness of intervention. | Levels of immersion/presence should be monitored and scaled depending on the needs and comfort levels of the young person.<br>Settings that are more realistic and incorporate natural elements (mountains, forests) will allow for greater feelings of immersion and presence. |
| Social Connectedness | VR can assist the young person to connect with their therapist, with peers, family members and with support groups. | VR applications should be used alongside the therapist, either by connecting together in the virtual space or having the therapist observe the young person whilst in the environment and discuss the process afterwards.<br>The young person can attend group therapy sessions virtually, allowing them some form of anonymity.<br>The therapist can help direct the young person to social groups that can further support the young persons therapy. |
| Psychoeducation | VR is an effective medium for psychoeducation. Psychoeducation does not need to be explicit within the VR environment but can occur indirectly and be embedded within the gameplay. | Games or applications selected within therapy sessions can target certain symptoms (social skills, lack of self esteem) and should be selected carefully, but should also be used with the guidance and support of the therapist. |
| Mindfulness/ Relaxation | Incorporating relaxation or mindfulness elements at the start or end of therapy sessions can help to evoke the desired mental state for attending to information and increase the desired anti-depressive effects. | Utilise a mindfulness/relaxation application or game at the start of a therapy session to evoke the desired mental state.<br>Utilise a mindfulness/relaxation application or game at any time during a session if the young person if feeling stressed or overwhelmed and needs some assistance to calm themselves. |
| Mastery | Achievement of mastery in VR can activate reward pathways and allow the young person to work through issues and traumas in a safe way. | Selecting games and applications that have a high mastery ceiling and encourage the young person to attempt different strategies.<br>Selecting games/applications that are not too easy or difficult, but can have the difficulty level scaled to meet the needs of the young person. |
| Enjoyment | VR allows a young person to participate in almost any type of activity they find enjoyable, in a realistic setting without having to worry about mess or other limitations that would be present in a typical therapy session. | Selecting a game or application that the young person finds enjoyable is important to support engagement and increase beneficial outcomes. |
| Accessibility | VR allows individuals to access therapy from the comfort of their own home. It can also be used within a session, allowing the young person to be transported to locations that would not typically be possible due to physical constraints. VR headsets are becoming more affordable. | Freely available or low-cost software will allow access to a greater amount of young people and will allow them to continue with some therapeutic work outside of therapy sessions. |

recommendations, clinicians/therapists should also keep in mind some of the potential side effects and limitations of using VR with young people. Although the cost of VR headsets has decreased in recent years, it may still present as a barrier to young people who cannot afford this outlay. This is further impacted by the limited availability of evidence-based applications (Best et al., 2021). The use of VR applications also comes with the potential side effects of motion sickness and feelings of disorientation (Kaimal et al., 2019; Lamb & Etopio, 2021). It is also important for clinicians to be mindful of time limitations when using VR with young children, and make sure that the age of the child they are working with is taken into account when planning their intervention (Lamb & Etopio, 2021).

### Strengths and Limitations

A realist review was selected for this study in order to determine the clinical reasoning for the utilisation of VR for a particular demographic. While many studies were found to examine the effects of VR on a range of demographics and mental health conditions, none of them focused specifically on young people experiencing depression or dysthymia or addressed the effectiveness of VR for this group. Due to this, the C-M-Os created from combining a range of different theories and further studies need to be completed in order to test these theories for the given demographic.

### Conclusion

This realist review was able to identify a range of theoretical C-M-Os to support the clinical reasoning for using VR with young people with depression and dysthymia. While further research is needed in this area it is recommended that when selecting VR applications, clinicians ensure that they are selecting ones that are accessible to young people outside of therapy sessions, are enjoyable, can be customised, are able to connect the young person with peers and other social networks, and contain immersive and interactive environments to gain the most benefit. It is also recommended that VR applications are not used in isolation, but in conjunction with a therapist to properly support the young person.

### Conflicts of interest

No funding was provided for this realist review and no conflicts of interest are declared.

## 摘要

**針對抑鬱症和癒症青少年的 RxVR：現實主義評論**

抑鬱症是澳大利亞年輕人最普遍的心理健康問題之一。由於心理健康系統資源不足且不完善，這意味著許多年輕人無法獲得治療抑鬱症的幫助。虛擬實境（VR）遊戲和應用是幫助克服這種治療恥辱感並使年輕人更容易接受和參與治療的一種選擇。本研究旨在確定為患有抑鬱症和癒症的年輕人使用 VR 背後的臨床原因。由於缺乏這方面的研究，現實主義綜述被認為是一種合適的綜述方法。我們系統地搜索了多個資料庫，並使用混合方法評估工具（MMAT）（Hong et al., 2018）然後將資料整理成情境 — 機制 — 結果（C-M-O）配置，並在遊戲治療力（TPOP）框架內進行情境化。根據理論，VR 可以在幾種不同的情境中有效地幫助減輕抑鬱症狀，例如使用個性化的頭像、沉浸感和臨場感、享受性和可及性。由於本綜述的性質，無法對 C-M-O 配置進行測試，因此需要在這一領域開展進一步的研究。

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