Tilt Brush: The Utilization of a Virtual Reality Intervention for Evaluating Self-Reported Anxiety, Depression, & Stress

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ABSTRACT
With the prevalence of anxiety, depression, and stress among young adult populations, adaptive and innovative treatment options must be considered for the future. While there are various approaches to mental health treatment, art therapy is one traditional method that has been used to treat the symptoms of mental health disorders across various health contexts and populations. Some art therapists have even integrated information and communication technologies (ICTs) into their practices. With these factors in mind and considering the prominence of ICTs use among student populations, this study seeks to understand how the immersion and presence afforded by one such technology, virtual reality (VR), can impact the outcomes of art therapy practices. Through the use of an arts-based VR application, Tilt Brush, this study compares traditional art therapy methods as they are employed in and outside of VR. Through the comparison of self-reported measures, we can better understand the possibilities and effectiveness of art therapy practices delivered via Tilt Brush VR.

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KEYWORDS

Virtual Reality; Art Therapy; Tilt Brush; Health Intervention; Anxiety; Depression; Stress; Affect

INTRODUCTION

Mental health disorders are highly prevalent among young adult populations, specifically depression and anxiety [13]. While some conditions may be isolated for individuals, it is the interplay of depression and anxiety that poses more concern. When experiencing anxiety, depression, and/or stress, some may seek help or advice, but many young adults do not seek professional help [15, 27]. As a large majority of this population has been found to experience mental health concerns, some scholars have begun exploring the utilization of Telemental Health Resources [33, 19].

One technological intervention tool allowing users to experience a fully immersive environment is virtual reality (VR). VR affords users with the capability to experience social and psychological phenomena that may translate to experiences outside of the environment [10], including those pertaining to health outcomes. While VR interventions have proven successful in research settings, it is still a new technology that is constantly being improved and redesigned. VR interventions can continue to benefit from the integration of other fields, such as art therapy.

Art therapy is a traditional method that is being incorporated into technological designs [21, 12], which has been proven for mental health treatment and used within various populations and contexts. Art is proven to offer therapeutic relief, which is why it is a reliable method for mental health treatment [3, 20, 14]. While there are studies that investigate traditional and technological methods of therapy independently, few combine all of the above.

BACKGROUND

Anxiety, Depression, & Stress

Today, college students have many responsibilities, which can result in high levels of stress, anxiety, and/or depression. In fact, the highest prevalence of mental illness was found in young adults (18-25) at 22.1%. A 2017 report from the Penn State University Center for Collegiate Mental Health found that out of 160,000+ students seeking mental health treatment, 62.2% of individuals identified concerns of anxiety, 49.7% identified depression as a concern, and 45.5% of students identified stress as a concern [26]. However, according to the National Institute of Mental Health (NIMH), a large majority of adults do not seek any mental health treatment. Nearly 1 in 5 adults in the United States is living with a mental illness, but only 43.1% have received mental health treatment over the course of one year [24]. Therefore, many students turn to different media channels and technological outlets in order to express or alleviate their feelings, specifically using outlets such as Facebook to post depressive disclosures and express their stress levels [9, 22]. Similarly, stress relief can also be found in video games. Based on their demanding, task oriented nature, it has been found that when a user has control over a specific task in their mediated environment, they are then able to experience increased mood repair [4]. While these outcomes are dependent on the amount of time a participant spends in video game play, they ultimately show that video games allow for increased affect and increased levels of arousal, corresponding to one's self reported mood [4].

Virtual Reality: Presence & Immersion

Virtual reality describes an immersive, computer-generated environment, which is able to blur the lines between real and mediated experiences [2]. While many think of VR as a form of entertainment, its capabilities stretch beyond that. For example, VR systems are being used to make a difference in the lives of patients and caregivers across various health contexts.

Extant studies have focused on VR driven therapies, to improve patient outcomes, which is cited as Virtual Reality Exposure Therapies (VRET). One example of this can be seen in the success of VR in helping to improve weight loss, as well as levels of emotional well-being, for patients recovering from Gastric Band Surgery [5]. It has also been discovered that VR is effective at reducing fears, especially in the multiple studies analyzing its effects on symptoms of Acrophobia, an extreme fear of

heights [11, 8]. Some examples of specific, VR interventions can be seen in the work regarding Phantom Limb Pain and increases in restored movement after the projection and interaction with virtual phantom limbs, and also in the improvements regarding reported levels of distress reduction following VR therapy for Schizophrenic patients suffering from auditory verbal hallucinations [25, 29].

Virtual reality offers a unique experience, as VR affords users with a sense of presence in the virtual environment. Presence refers to the perception, or illusion, that a mediated experience is not actually mediated [17]. Based on this concept, many users are able to experience real physical, psychological or emotional change if they feel that they have control over the immersive virtual environment (IVE). A key tactic that is frequently used by therapists and doctors within the medical field is that of distraction, and presence is so powerful that it ultimately creates that distraction through absence, as "being present in a virtual world takes one's attention away from his own body" [2].

While presence is a psychological concept, it relies on immersion as a technological characteristic of the IVE [30]. The level of immersion in an environment allows users to feel more or less involved in the virtual world, which ultimately increases or decreases their sense of presence in the IVE. For example, IVEs have been proven to have a positive impact on users' motivation to participate in prosocial behaviors when it comes to paper use after having to chop down trees within an IVE [1]. While this is just one more example of the effectiveness of an IVE, this area of work demonstrates that immersion and presence in VR can have a large impact on a user's physical and/or psychological behaviors.

Art Therapy

In addition to technology and media, creative outlets can also provide symptom relief. In a study completed in a medical center oncology unit, researchers found that one-hour of patient-directed crafting resulted in significant improvements in self-reported levels such as anxiety, depression, and well-being [23]. Additionally, literature on arts based therapies for children with Autism Spectrum Disorder shows that creative and artistic activities can contribute to increased self-image, communication, attitude, and social behavior [28]. These methods used in conjunction with other clinical practices, and for the treatment of mental illness, are known as techniques of art therapy. Work in this area allows for patients to express themselves in more of a creative way, at times when discussing issues may be too complex, uncomfortable, or impossible.

Traditionally, these sessions were delivered using activities such as drawing, painting, crafting, sculpting, etc., but some scholars in this field have embraced technological advances alongside art therapy. Additionally, technological advances have allowed for completely new developments in the field of art therapy, in addition to modifications of older methods. Some examples of this can be seen in the creation of avatars to help improve body image [12], as well as the use of telehealth art therapy groups to support individuals diagnosed with breast cancer [21].

The VR application used in this study, Tilt Brush, has been noted as a complex and dynamic option for art therapy, as it allows users to express themselves through rich visual metaphors [21]. Tilt Brush has also been used to help adolescents with cancer to immerse themselves in another creative world, ultimately improving their morale and inspiring their imaginations [31]. While these technological features do offer many creative options for a user, they may be more effective when combined with art therapy methods.

Affect

Affect, which is different from emotions, typically refers to the positive or negative aspects that are associated with things such as well-being, satisfaction, distress, etc., as they play out within various contexts [34]. Positive and negative affect have been known to correlate with levels of anxiety, depression and some reported health complaints [7, 35]. While these findings

have been found to be true throughout various studies, further research needs to be done in order to learn more about self-reported affect in regards to virtual reality use.

RESEARCH QUESTION & HYPOTHESES

The above literature highlights main areas of research that are key components to this study. Taken together, we pose the following research question and hypotheses:

RQ: Is art therapy, delivered via Tilt Brush VR, an efficient treatment method for young adults that identify with symptoms of anxiety, depression, and/or stress?

H1: Participants assigned to the Tilt Brush intervention condition will report decreased levels of Anxiety, Depression, and/or Stress.

H2: Participants assigned to the Tilt Brush intervention condition will report a greater decrease in Anxiety, Depression, and/or Stress, in comparison to those assigned to the traditional art control condition.

H3: Participants will report an increase in general affect, following use of the Tilt Brush application in the intervention condition.

METHODS

This study utilizes an experimental design to examine self-reported levels of anxiety, depression, stress, and general affect, pre- and post art-based activities implemented within a traditional control condition and a virtual reality condition. Data is being collected throughout the duration of this spring semester at the University of Cincinnati, February-April 2019. The Institutional Review Board of the University of Cincinnati has approved this study.

Students are recruited for this study on the basis of "learning more about virtual reality." All interested participants communicate their interest via email. Once participants communicate their interest, they are provided a link to the initial pre-test. The pre-test includes qualifying questions that are analyzed by the PI. In order for a participant to qualify for the research study, the inclusion criteria limit participants to be 18 years of age or older, speak English, and be enrolled at the University of Cincinnati. The exclusion criteria include having a cardiac pacemaker, as VR may affect them, and clinical diagnosis of a mental health disorder, as experimental procedures could interfere with their regimen. Once participants are cleared for qualification, they are emailed a link to sign up for a one-hour time slot.

Procedure

Participant time slots are randomly selected, and alternated based on the order in which they enter the lab. Upon entering, they are immediately taken through the informed consent process. After providing their consent, participants are prepared for the condition in which they were randomly assigned. For both conditions, participants have fifteen minutes to complete their road drawing activity based on identical prompts. During the road drawing activity, participants are prompted to reflect on their lives and represent it as a road map within the assigned condition. Participants assigned to the control condition are provided with a sheet of white 18"x 24" drawing paper and one pack of 24 assorted Crayola Crayons to use for the activity. Participants assigned to the experimental condition are fitted for the VR headset, then given a tutorial on the HTC Vive and Tilt Brush application. Once the participant is ready, the prompt is read aloud. The fifteen-minute activity is then completed, followed by the post-test survey. During this time, participants are debriefed and receive a debriefing sheet that they can take with them, which provides contact information for the PI, as well as campus contact information for Counseling and Psychological Services. Additionally, participants are then free to ask any questions to the PI that they would like, as it pertains to the overall study. Following this debriefing process, participants are instructed to not speak about the study to their peers, as it ensures confidentiality.

Measures and inventories

In addition to the demographic information, four validated scales, and some adapted versions of each, are used throughout the sections of the pre and post-tests. The first is the Depression Anxiety Stress Scale (DASS) 21 [18], which is effective when measuring levels of self-reported anxiety, depression, and stress. The second is the COPE Inventory [6], measuring self-reported disposition/coping mechanisms for participants' reactions in stressful situations. The third is the International Positive Affect Negative Affect Schedule Short Form (I-PANAS-SF) [32], which takes an inventory of participants general affect, using terms that are internationally understood. Finally, the fourth is the Tech Efficacy scale [16], which seeks to measure and understand participants' perceptions of their own efficacy when using technologies that are new or unfamiliar to them. In addition to the validated scales across pre and post tests, the post-test also includes two manipulation check questions to verify that the participant has not experienced anxiety, depression, or stress, triggered by experiment activities.

CURRENT STATUS & IMPLICATIONS

Currently, this study is in the data-collection phase, with a total of 200 pre-test responses and 114 lab conditions/post-tests completed. Upon completion of data analysis, results of this study could contribute to literature at the intersection of VR and mental health interventions. Not only could this offer insight into the practical application and implementation of therapy, but it could also provide details regarding the future development and design of technological, therapeutic applications.

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