1 Abstract

And why misinformation is derailing it.

VIrtual Reality Therapy (VRT) was formally confirmed to be an effective mental health intervention over 20 years ago in a study on treatments for acrophobia (Rothbaum et al.). That landmark research opened up a door to applying VRT as an intervention for posttraumatic stress disorder (PTSD), acrophobia, and other psychiatric conditions through a post-diagnosis therapy session. However, in comparison to the amount of research on VRT as a post-diagnosis intervention, little work has explored its application as a preventative treatment. Over 60% of college students have analyzed to be qualified for the conditions of mental health issues in 2020-2021, making stress regulation vitally important (Lipson et al.). Stress can possibly affect one's individual life, relationship, and health in long term. Since stress has been shown to result in different types of psychiatric disorders (Davis et al.), the regulation of stress could potentially serve as an effective precaution against mental illness. There are 4 major types of self-regulating: Self-monitoring (alson known as self-assessment), self instruction (also known as self-talk), goal setting, and self-reinforcement. (IRIS | Page 2: Self-Regulation) People tend to choose one that suits their living style and schedules, however, there is still a lot of students that doesn't have the habit to regulate stress deu to duration, cost, and efficacy concerns. Thus, this project tends to explore the attributes of self-regulation on VR technology. Relaxation methods in VR have been proven effective in reducing subjectively reported stress (Kim et al.). However, effectiveness and practicality are two separate issues, which may be why VR-based relaxation has not been widely adopted.

After interviewing college students, uncertainty over the long-term effectiveness of VR-based relaxation exercises, lack of motivation, and time requirements were identified as their three primary concerns towards VR-based relaxation methods. Therefore, this project is dedicated to exploring, in the addition of current VR-based relaxation methods with visuals and audios, how auditory, olfactory, and thermal senses affect the performance of stress regulation with different VR-based relaxation methods (body scan, 360-degree video, guided meditation, and breathing exercises) in people with high stress through a survey. Hypothetically, auditory, olfactory, and thermal can increase the motovaiton and engagement of the overall VR-based relaxation methods resulting in a higher adoption of VR self-regulation. The testing in the project is a pilot program that targets a small group of students who don't experience cybersickness (also known as digital motion sickness), in which people feel dizzy after using digital touchpoints such as mobile, computer, or VR headset. In the future, we aim to recruit more students in collaboration with the on-campus library where it has a resting area with nap pods and seats for rapid recharge for students that comes to study for exams, research, and assignments etc. If the VR-based relaxation methods are proven to be engaging and motivating with the addition of olfactory, audio, and thermal sense in our study participants, the project can be moved forward to two directions. First, extend a discussion on the possibility of incorporating this therapeutic and preventive treatment into the library's relaxation room. Second, extend the target group to high school students to understand how can it be applied to younger age students and find out if there is any similarity and/or differences on the result from the college students.

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2. History/Prior Art

The history of VR Therapy
The utilization of VR Therapy (VRT) as a specific type of Cognitive Behavioral Therapy (an clinical intervention that is commonly applied on the mental disorders in particular to depression and anxiety) can be traced back to the first study in the 1990s when VRT was studied in psychiatric treatments (Maples-Keller et al.). In 1996-1997, a thorough study was conducted on an intervention involving a daily hour-long therapy session over the course of 12 weeks on a 37-year-old woman with a severe and incapacitating fear of spiders, and demonstrated the efficacy of tactile augmentation in the treatment of arachnophobia (Carlin et al.). Almost 30 years after the first study of VRT, a systematic review that surveyed 70 relevant studies conducted on applications of virtual reality for psychiatric disorders pointed out that VR has been found effective when used as an intervention for different psychiatric disorders (Cieślik et al.). Therefore, VR seems like a promising technology with increasing applications on mental health area within the healthcare sector.

Advantages of using VR technology in therapy
How has the healthcare sector benefited from VRT? VRT has been intensively applied to exposure therapy, as VR technology offers a fully-controlled threshold for therapists, a high level of immersion in the virtual environment for users, and the ability to simulate the majority of the situations if needed (S. Herz) .The efficacy of VRT in onsite therapy sessions with therapists can be found in many existing studies. However, this project seeks to study the impact of VR on stress regulation (seen as a type of therapy) in settings that the user can reproduce on their own.

Case study on VR with Multi-senses: Audio, tactile, olfactory, and thermal
Virtual Reality is considered an immersive experience due to the sense of presence provided through multi-sensory inputs (Regrebsubla)(Craig et al.)(Grau) (Srivastava et al.)(Ivy Wigmore). Tactile, olfactory, and audio inputs have been found to effectively enhance one's sense of presence as well as the memory of the environment, whereas visual input with the increase of details was found not to play a key role in augmenting one's feeling of "being real" (sense of presence) and memory of the virtual environment (Dinh et al.). In tactile research, user feedback indicated that the stronger the cues from a fan or a heat lamp, the higher the sense of presence created (Dinh et al.) (Brooks et al.). (Brewster et al.) Another study showed that olfactory inputs can provoke emotional memories in exposure therapy in stimulus settings compared to settings without the addition of scents (Herz and Schooler). In the audio category, research has shown the auditive factor to have a greater augmentation effect on the sense of presence than pure visual cues (Hruby). One such study published in Computers in Human Behavior Journal confirmed that the stimulation of the tactile and olfactory senses could enhance the potential of Virtual Reality MIP (mood-induction procedure) settings to promote relaxation and build a sensation of presence (Serrano et al.)(Obrist et al.).

VR-based relaxation methods
The utilization of VR Therapy (VRT) as a specific type of Cognitive Behavioral Therapy (an clinical intervention that is commonly applied on the mental disorders in particular to depression and anxiety) can be traced back to the first study in the 1990s when VRT was studied in psychiatric treatments (Maples-Keller et al.). In 1996-1997, a thorough study was conducted on an intervention involving a daily hour-long therapy session over the

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3. Motivation

This project stands at the intersection of emerging technology, social impact, and design, which is the area I am interested in working on. The MDes program has paved the way to learn new technologies and tackle social topics in the design discipline. I am particularly passionate about mental health because I realized that I never had a chance to look into it when I was in my home country. Even though people are now more willing to discuss mental issues in public like Serena Williams came upfront about her mental stress and how she cope with it over years, a stigma still remains (Chandel). Being able to take care of one's mental health should be affordable, yet treatment is still expensive. The other major problem with mental health is that people only deal with it after receiving a diagnosis, whereas mental health should be seen as a part of one's well-being that requires continuous attention. Even as the level of stress has increased in modern society, mental health has continued to be overlooked by the entire society, myself included. This could lead to mental disorders that negatively impact an individual's life and their relationships with their surroundings. To promote the importance of mental health, I want to enhance awareness of it and transform mental health into a topic that everyone is comfortable dealing with in day-to-day life. The virtual environment represents a new dimension of interaction and opens up new ways of living in the future. A benefit of using VR as a medium to regulate stress is the ability to detach from the real environment while helping individuals enter a virtual environment that brings peace and mindfulness. Meanwhile, VR devices are evolving every day and could potentially become accessible and affordable to everyone in the near future.

I am additionally fascinated by the positive social outcomes that emerging technologies can bring. This project aims to find the threshold that provides just enough motivation and engagement to utilize VR technology for a positive purpose. Virtual Reality has been applied to the entertainment industry, as well as other areas, such as healthcare, education, coworking, etc. Our project's goal is to reduce users' risk of developing mental disorders by providing an engaging and inviting preventative mechanism for stress regulation, rather than the treatments for existing mental conditions, with the support of emerging technology.

Personalization

Tracking dashboard

Cost efficiency

4. Process/Iterative work

Interview
After synthesizing the feedback, we identified a lack of motivation and personalization and the uncertainty of the effects on mental health as some obstacles to the repeated use of VR-based relaxation methods.

Implementation
As we kicked off the implementation, we mapped out the user interface on Figma. In the next phase, we will move to Unity, SpaceXR, and Sketch Gravity to determine how we can create our prototype.

Integration
We will be combining audio, visual, and interaction in this project. By breaking down integrations, we aim to utilize existing 360 video, guided meditation, and body scanning, and import them into the project.

Testing
In the testing phase, we plan to leverage the napping pod in the library and have an open table for students to try out the relaxation methods. We want to seek feedback from students on which mindfulness exercise they prefer and the rationale behind their preferences through an in-app survey and standalone interview if they offer us permission to follow up with them.

5. Final design

Mindscape

a personalized, relaxing, multi-sensory experience
in a space where emotions are safe

Personalization

Tracking dashboard

Cost efficiency

Concept
We envision the final design to be an installation where students can try out VR-based relaxation methods such as body scanning, guided meditation, breathing exercises, and 360-degree video with the corresponding audio, olfactory, and thermal senses that align with the visuals in VR.

Goal
A pre-exercise and post-exercise survey will be deployed to understand the level of relaxation in each category with and demonstrated beforehand in order to capture the most direct reaction and feedback. Since we hope to deploy the installation in the library as a pilot program, we will simulate a quiet space with ambient noise similar to the environment in a real library.

User experience flows
We mapped out each step that users would go through from the start to the end in order to understand what design components are included in the entire test for this research.

Interaction
This is a mock-up I created with a plugin called "DraftXR" to demonstrate how it would feel in the virtual environment. The work is still in progress and I am currently taking classes on LinkedIn learning for the development of Unity.

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6. Discussion

We aim to test out the threshold of personalization that affects engagement and motivation to revisit VR-based relaxation methods. During the dry run, we saw a lot of reflections on the audio and visual alignment in guided meditation; therefore, in our next iteration we are planning to reuse some of the clips, but add audio that aligns with the visuals. Since some users reported the weight of the VR headset to be heavy, we are also considering shortening the entire VR experience as a potential interim solution to avoid the distraction of the weight from the hardware.

360-degree video
The 360-degree video on YouTube VR is free on Oculus App. The testers reported the quality of the video is not high-resolution so they feel hard to follow. On the other hand, the audio doesn't align with what you see in the video which results in a bad user experience. Except for those two parts, users still respond to an overall positive relaxing experience in particular to the feeling of "awe" when they stand at the top of the mountain surrounded by gigantic scenery.

Guided meditation
The guided meditation videos have been reported to be relaxing for 4 out of 8 testers. The reason is the cue from the audio can help users find mindfulness. However, the other half of users reported that they prefer ambient music since the audio doesn't always align with the visual in guided meditation.

Body scan
The body scan is reported to be relaxing in 3 out of 5 users. Users claimed that a body scan is an exercise that can enhance the awareness of the entire body resulting in having gratitude for yourself.

Breathing exercise
The interactive breathing exercise we tested on the users are demo exercises from "TRIPP" and "Maloka", the first one has an interactive breathing cue that is reported to be helpful by 7 out of 8 users, the later one has a gamification design concept where users found interesting and engaging.

7. Future Work and Envisionments

The next step for this project would be to enlarge our testing group of college students with high-fidelity design with higher level of details, higher resolutions, and integrated technology on a VR headset. Progress tracking can be a metric for assessing one's well-being, which everyone can benefit from in their day-to-day practice.

The crux of this research is finding ways to increase motivation and engagement, and I've discovered that by utilizing tools like virtual reality, we can immerse individuals in distinctive and individualized stress-regulating experiences in a quick setup. In a culture that is overburdened and moving quickly, we believe that the usage of virtual reality will boost student engagement and motivation to develop a habit of preserving their mental health. As this research progresses, it is becoming clear that there are several prospects for VR utilization in the healthcare industry.

8. Conclusion

Finding where to begin can be intimidating, as it is with any technology, but especially with more immersive ones like VR. However, we should always put the objective first when integrating technology into initiatives with a social element. This entails defining precise objectives for what a particular technique or tool will enable our users in

transforming and how it will positively affect their mental health experience. In sum, we have learned a great deal from the technical issues that we have encountered in VR creation and the problem-finding phase. However, as only a few tests have been conducted so far, we have not yet drawn final conclusions.

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