Health Policy / Sağlık Politikası

# Designing and Developing a Compacted Immersive Virtual Therapy Environment: RelaXRoom

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**ABSTRACT**

**Purpose:** This study discovers the potential of IVR systems to provide mental health support by investigating current applications and results of research. It analyses the required functionalities and design components to structure a blueprint of an IVR prototype called RelaXRoom.

**Methods:** This technical paper employs the stages of rapid prototyping methodology to develop a compact immersive therapy environment and to present the working principle and features of RelaXRoom to escalate a debate among the researchers. The design components of RelaXRoom were determined after applying an online short survey to 667 about mental support, analysing related literature and interviewing two therapists to offer self-meditation, ill-structured supportive group or peer-to-peer therapy opportunities in a single app.

**Results:** RelaXRoom was designed as a compact virtual therapy environment to support individuals` mental and social well-being. RelaXRoom is a smart system that uses Wit.ai for speech recognition and analyses the mood of users using the data table. If the user wants to participate in either group or peer-to-peer therapy, RelaXRoom assigns them to a virtual room depending on their moods or considering their particular needs.

**Conclusion:** Integrating a therapist pool to pick one considering their rate and professionality, anonymity, payment system, and virtual buddies for every online user may enhance quality, privacy, feeling of presence and embodiment during the therapy sessions. RelaXRoom has the potential to be a facilitator for diagnosing people's problems and supporting their well-being.

**Keywords:** Virtual reality, therapy, design, immersive

Zeynep TAÇGIN

**Kompakt bir Sürükleyici Sanal Terapi Ortamının Tasarlanması ve Geliştirilmesi: RelaXRoom**

**ÖZET**

**Amaç:** Bu çalışma bireylerin mental ve sosyal iyi olma hallerinin desteklenmesi için sanal terapi platformu olarak tasarlanan RelaXRoom platfomunda bulunması gereken özellikleri belirlemeyi amaçlamaktadır. İhtiyaç analizi aşamasında geliştirilmiş olan kapsayıcı sanal gerçeklik sistemleri, yazılımlar ve araştırma sonuçları incelenmiştir.

**Yöntem:** Hızlı prototipleme metodolojisinin aşamaları uygulanan bu teknik makalede, ihtiyaç duyulan tasarım bileşenleri belirlendikten sonra daldırıcı bir sanal gerçeklik uygulaması olarak geliştirilen RelaXRoom prototipinin çalışma mantığı ve özellikleri tanıtılarak, sanal gerçeklikte terapi ortamlarının taşıması gereken özelliklere ilişkin araştırmacılar arasında tartışmanın alevlenmesi beklenmektedir. RelaXRoom'un tasarım bileşenleri 667 kişiye mental desteğe ihtiyaç duymaları ile ilgili çevrimiçi kısa anketin uygulanması, ilgili literatürün analiz edilmesi ve iki terapist ile yarı yapılandırılmış görüşme yapılması sonucunda elde edilen verilere içerik analizi uygulanması sonucunda belirlenmiştir.

**Bulgular:** Kendindelik egzersizi, yapılandırılmamış grup terapisi ve birebir terapist ile düzenlenen terapi seanslarının tek bir uygulamada bir araya getiren RelaXRoom, kullanıcıların anlık durumlarının belirlenmesinde uygulama başında, kendilerini nasıl hissettiklerini tanımlamalarını istemektedir. Ses tanıma için Wit.ai kullanan bu sistemde algılanan veri, kullanıcıların duygu durumu analizi için tanımlanmış örnek cümlelere sahip verisetinden beslenmektedir. Kullanıcıların belirlenen anlık duygu durumları kendilerine uygun diğer kullanıcılarla bir araya gelmeleri veya kişiselleştirilmiş bir deneyime sahip olmaları için uygun grup terapisi veya birebir terapi seanslarına atanmalarında da kullanılmaktadır.

**Sonuç:** RelaXRoom'da terapist havuzu oluşturularak kullanıcıların puanlaması ve terapistlerin uzmanlığına göre seçim yapabilmesi, ödeme sistemlerinin entegre edilmesi ve utangaç bireylerin anonim olarak oturumlara katılabilmesi ile kişisel verilerin korunmasının sağlanması gibi çeşitli fonksiyonların entegre edilmesi gerekmektedir. Kullanıcılardan elde edilecek verilerle tutarlılığı artması planlanan RelaXRoom, bireylerin mental olarak desteklenmeleri veya problemlerin teşhisinde kullanılma potansiyeline sahiptir.

**Anahtar kelimeler:** Sanal gerçeklik, terapi, tasarım, sürükleyici

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A crisis like the pandemic caused us to switch our habits fastly, and applied obligations for protection affected many people's mental health. According to Dozois (1), depression increased two-fold, and anxiety increased four-fold in Canada during the pandemic. Another study from Poland evaluated the distinguishing depressive, anxious, suicidal and stressed behaviours of university students. The results revealed increased symptoms for all variables apart from emphasising the vulnerability of females (2). Robb, de Jager (3) sought the answer to the same question for determining the effects of a pandemic on the older British people, and the results were again similar. Anxiety and depression profoundly increased in the participants. Zhou, Zogan (4) analysed the tweets using machine learning algorithms to detect the emotional changes of Australians. The results not only revealed the increasing depression dynamics of people but also showed the correlation between depression tendency and increasing case numbers all around the country. The results of summarised studies and more points out that the depression level of individuals has evolved depending on the sharp changing numbers of cases.

The researchers have tried to find either the positive or negative impacts of this pandemic from different perspectives. According to the researchers, the relapsing mental well-being of people may have several reasons. Most were forced to cope with the physical separation from their loved ones, families or friends (5) during the pandemic, and almost everyone became lonelier than ever (6). Lee, Cadigan (7) indicated that loneliness and reduced social support are the main reinforcers of depression. Wondering about our health and reduced opportunities for well-being triggered anxiety. People started to feel unsafe because of the disease, misinformation, and rumours raised a variety of stressors around all of us (5). The other studies showed that loneliness makes us both depressive and anxious (8). The most people become more lonely, depressive, anxious because of the social isolation, social distancing (3), and other lockdown regulations.

This study discovers the potential of IVR systems to provide mental health support by investigating current applications and results of research. It analyses the required functionalities and design components to structure a blueprint of an IVR prototype called RelaXRoom. This technical paper also presents the working principle and features of RelaXRoom to escalate a debate among the researchers.

## Therapy Techniques

Therapists may prefer different techniques considering the requirement of their patients, such as cognitive-behaviour therapy, non-directive supportive therapy, behavioural activation therapy, psychodynamic therapy, problem-solving therapy, interpersonal psychotherapy, and social skills training (9). Non-directive supportive therapy is an ill-structured technique for helping people to vent both their experiences and emotions by offering empathy (10). If we consider loneliness as the problem, in this case, social techniques like non-directive supportive therapy or group therapies may help.

It is possible to apply the different therapy techniques from distance or face-to-face. Today, even therapies moved to the virtual worlds because of the social distancing rules or switching habits. Many therapists moved their sessions to video or teleconference systems to provide sustainable mental support to their patients. Neither therapists nor patients have a consensus regarding the effectiveness of these applications. According to the finding of MacMullin, Jerry (11), technology use was more integrated with psychotherapy practice, and psychotherapists were more confident and comfortable with telepsychotherapy than the literature predicted. The meta-analysis of Inchausti, MacBeth (12) points out that telepsychotherapy may provide benefits to several people, including health care workers, individuals with new mental health distress as a function of COVID-19 diagnosis, or losing family and loved ones to the illness, or the psychological effects of prolonged physical distancing; and individuals with existing mental health conditions. Online therapies may be effective considering the technological adaptation, attitudes, past experiences, and demographic features of both therapists and patients (13). Before applying online techniques for therapy, the therapists should select the most adequate platform for their sessions, considering the usability, digital security and patient preferences. Patient agreeability, consistency and reflection upon patient-therapist dynamics are the other factors to conceive (6).

## VR in Therapy

The idea of using VR for supporting therapy sessions is not new. According to Glantz, Durlach (14), if we integrate the multimodal sensorimotor technologies into IVR environments and use them for supporting therapies, we may have several benefits in favour of both the clients and therapists through the enhanced presence in VR.

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Imagining, experiencing and remembering are essential components of several psychotherapy techniques and environments. Experiencing or visualising through IVR may help us to re-evaluate the events and restructure our well-being. Because of that, IVR may offer an accurate solution to both patients and therapists by creating an individualised supportive therapy environment. Designing the therapy environment regarding the patients' requirements and controlling the scenarios into structured virtual worlds may shift the therapy habits and techniques of the future. According to Riva (15), the value of well-designed VR therapy environments will create new opportunities and challenges for reinforcing the quality of professional practice.

There are several scientific studies regarding using VR for therapies, although fewer of them produce innovative VR environments or interfaces as supplementary material for their treatment. Matsangidou, Otkhmezuri (16) designed and developed MUVR for patients who have eating disorders. Five psychotherapists played an active role in the design of MUVR that reflects the virtual avatar considering the users' original body size and edits the weight of the avatar considering the actual appearance. MUVR also uses a cartoon cube character as a virtual therapist. The findings showed that MUVR is viable for treating eating disorders, and the patients felt more comfortable thanks to the cartoon design of the therapist. The research of Kiefl, Figas (17) discusses the effects of graphical styles of VR-supported psychotherapy on the users' emotional states. The findings gathered from 74 healthy students showed that the graphic design of the IVR therapy environment can create a positive emotional change and relaxation. These recommendations emphasise the significance of the design component of an IVR environment.

Numerous studies prove the effectiveness of using IVR for both preventing and treating stress or anxiety (18). The disadvantages of COVID-19 on health workers inspired Pallavicini, Orena (19) to design MIND-VR as a psychoeducation tool that supports the well-being of healthcare employees. IVR systems are highly effective for the treatment of social anxiety. The experimental research of Hur, Shin (20) is the first research that uses fMRI brain scanning to analyse the brain responses of 21 participants who have a social anxiety disorder. The results revealed that overall symptoms of the participants with social anxiety were reduced after undergoing VR-based therapy. Streck, Stepnicka (21) developed a Neomento project as an exposure therapy VR environment for patients with social anxiety.

Van Gelderen, et al (2018) have used visual and audio as multi-sensory inputs for personalising the VR and optimising the effectiveness of trauma-focused psychotherapy, called Multi-modular Motion-assisted Memory Desensitization and Reconsolidation (3MDR). The results showed that VR provided presence and in-session attention facilitated memory retrieval of the participants.

According to the study by Seabrook, Kelly (22), VR is a supportive tool for formal therapy sessions and an effective material for self-guided concepts like meditation. They designed and developed Mindfulness for the Oculus Go users as a 360 video-based VR app for the general population. Thirty-seven participants experienced Mindfulness in the controlled environment to gather data using State Mindfulness Scale and Simulator Sickness Questionnaire. The state mindfulness of participants had a significantly positive effect after experiencing the VR environment. Besides, every Oculus Quest user may easily experience the demo or paid version of the meditation VR app, call as TRIPP, after installing it from Oculus Store. TRIPP presents an immersive visual and interactive user experience for well-being. Several big companies all around the world use TRIPP to support their employees. Also, several researchers use TRIPP for clinical trials in the field of anxiety reduction, depression and substance use disorder.

The literature review of this research indicates the positive impacts of using IVR to support peer-to-peer therapy, social therapy or self-meditation, also thematic IVR applications for healing our mental or social requirements. As a matter of course, therapists may use different kinds of supportive VR apps considering the selected treatment technique. Although, therapist-dependent IVR environments require physical proximity and guidance. When we look at the current research on well-being and supportive therapy techniques, it is possible to notice the positive impacts of ill-structured therapy techniques like social group therapy, psychodynamic therapy or therapeutical alliance.

## Materials and Methods

This technical paper employs the stages of rapid prototyping to develop a compact immersive therapy environment. Designing software is time-consuming and comprehensive work. Rapid prototyping is a feasible methodology to handle the difficulties of the software design process. Using this method not only helps to reduce the time needed to complete a design and development project but also facilitates the development of high-quality products (23). The five fundamental phases of rapid prototyping are (1) analysing needs and content, (2) setting objectives, (3) constructing a prototype, (4) utilising a prototype, and (5) installing (24).

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## Analysing Needs and Content

I published a single-question survey on Instagram that asked `Do you need psychological support because of the effects of the pandemic in your life?`. The 498 of 667 participants answered this question as `Yes`. This finding indicated approximately each 3 of 4 people, who responded to the survey, require a new kind of therapy or support environment, which may be indicative of a global trend.

Pandemic-related restrictions not only affect the physical conditions of people but also affect the mental health and psychological well-being of individuals. According to several studies all around the world, people started to struggle with different kinds of mental issues like anxiety, depression, distress, displeasure, anger or post-traumatic stress disorder (1, 3, 4). The findings of another research indicate spiritual well-being and loneliness are the main predictors of psychological mental health. Depending on these factors, depressive symptomatology of individuals increased because of the COVID-19 pandemic (25).

The majority of therapists moved their sessions to the online environment to support their patients from home. Some countries like the US organised `telepsychology revelation` and started to use digital platforms for providing mental health care delivery during and after the pandemic (26). If the preparedness of therapists and patients regarding technological acceptance and adaptation is accurate, there are several benefits of video conference sessions (6, 11, 13).

The effectiveness of the virtual environment can be evaluated by considering interaction types, interface, usability, adaptability, feedback or personalised scenario of the structured world. This is why it is always possible to design and develop more effective virtual therapy sessions.

## Setting the Objectives

What are the components of an effective therapy environment? Firstly, the literature emphasises the significance of ill-structured therapies like a therapeutical alliance for feeling more comfortable and confident during the sessions. Someone like you may be more helpful than someone who analyses you depending on the theoretical knowledge. Social group therapy is another ill-structured supportive technique for solving problems like loneliness through sharing and comprehending someone else's experience, which may provide an evaluation of the situations from another field of view. Secondly, video conference-based peer-to-peer therapies either have some deficiencies or

benefits related to the presence, technological adaptation or personal habits of the users.
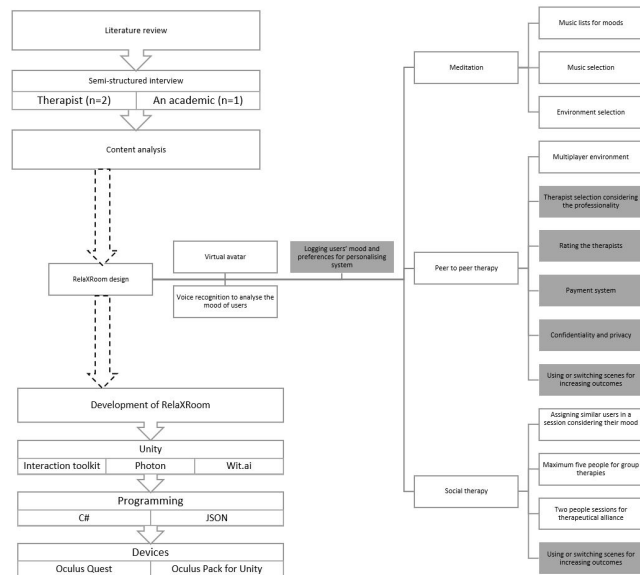


**Figure 1.** The followed phases and applied functions of RelaXRoom

Interaction of video sessions is highly restricted; therefore, some therapists use supplementary materials such as images, audio or video to increase the expected outcomes. Immersive visuals and sounds are reachable today thanks to VR technologies. Third, the benefits of meditation have been known for centuries, and there are successful projects like TRIPP for supporting meditation under the scopes like focusing, sleeping, calming or relaxing. After synthesising the points above, the researcher interviewed two therapists and a psychology professor to determine the fundamental design components of an ideal VR therapy environment. The semi-structured interviews were recorded and transcribed using word processor software. After the content analysis, the blueprint of RelaXRoom was designed as a comprehensive virtual solution, as seen in Fig 1.

## Constructing a Prototype

To offer an all-in-one solution to the users, I merged all modules under the huge geodesic dome, as seen in Fig 2. When the user entered the RelaXRoom, they would find themselves in this dome among compacted modules. The menu appears in front of them and asks about their mood to direct them to the accurate virtual space after the therapy type selection.
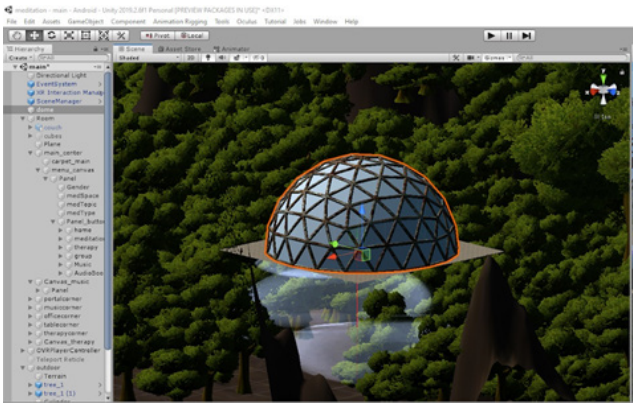
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**Figure 2.** *Geodesic dome design of RelaXRoom*

RelaXRoom is developed to provide three essential therapy opportunities to its users: meditation, peer-to-peer therapy, and group therapy. The meditation functionality of RelaXRoom includes three different virtual scenes to meditate through the users can meditate at the space, mountains or a coastline. The users may switch the background music or jump from one place to another during their experience.

The second therapy environment is designed to offer peer-to-peer synchronous therapy sessions (Fig. 3c). This module works for anyone who would like to connect for the pilot version of RelaXRoom, although we plan to create a therapist pool regarding their professions in the short term. I believe using blockchain algorithms for therapist and patient selection can protect the confidentiality and anonymity of the users. Using blockchain cryptocurrencies may also enhance payment privacy for participants for future studies.

The third module of RelaXRoom offers social group therapy or meeting with a therapeutical alliance to its users (Fig. 3d). For group therapies, only five participants can be online in a single moment to share their experiences. Besides, the user can meet their alliance in a peer-to-peer session. This structure is not much different than peer to peer sessions for this version of RelaXRoom. The group therapy module brings people together, considering this version's three predetermined subs categorised as anxiety, depression, and stress.
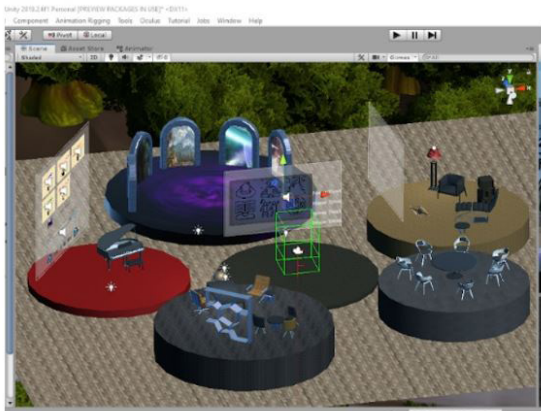


(a) Overall view
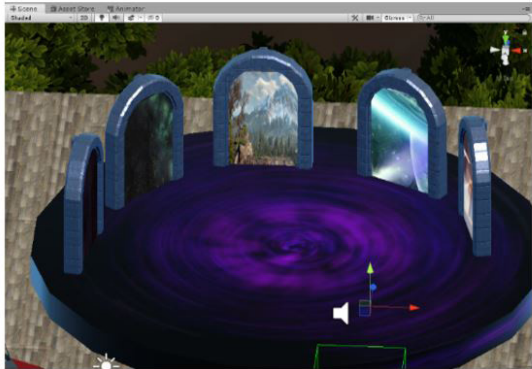


(b) Meditation portals
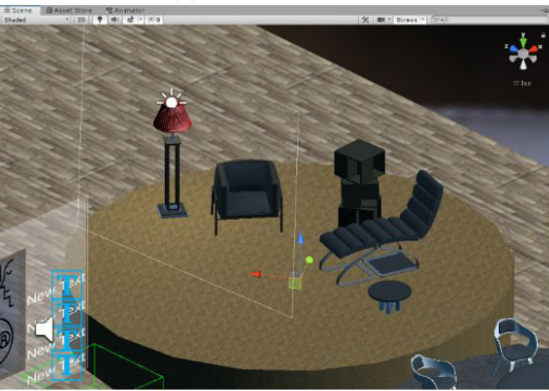


(c) Peer-to-peer therapy place



(d) Social group therapy place

**Figure 3.** *Main corners of RelaXRoom*

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## Utilising a Prototype

The first version of RelaXRoom is adaptable to the Oculus Quest and Oculus Quest 2 VR goggles. Unity Game engine version 2019.2.6f is preferred because of the opportunity to use Unity's XR interaction tool to develop multidevice adaptable AR and VR applications. This tool provides quick assets for different XR interactions, camera settings, pointers, teleport area, anchor and interactable objects, as seen in Fig. 4.
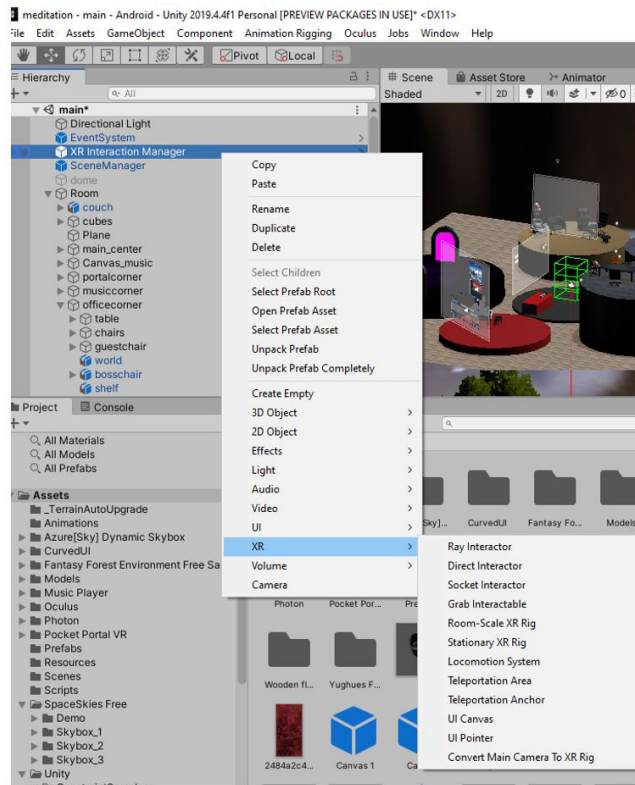


**Figure 4.** Features of XR Interaction tool

RelaXRoom is an Oculus adaptable application that uses Oculus Integration SDK and its assets on Unity. RelaXRoom includes three active portals for teleporting to the other scenes to self-meditate.

The multiplayer parts like peer-to-peer therapy and group sessions use Photon Pun Network Framework SDK on the Unity game engine that offers a NetworkManager package to create multiplayer or cross-platform apps. Wit.ai was integrated into Unity using JSON for voice recognition. RelaXRoom uses the expression of users to analyse their gender, meditation space and moods. For analysis, Wit.ai system was trained using 75 words and two sample

sentences for each word. For instance, if the user says, "I am seriously overthinking my problems", the system recognises the "overthinking" word under the anxiety data and directs the user to the correct session, as seen in Fig. 5.
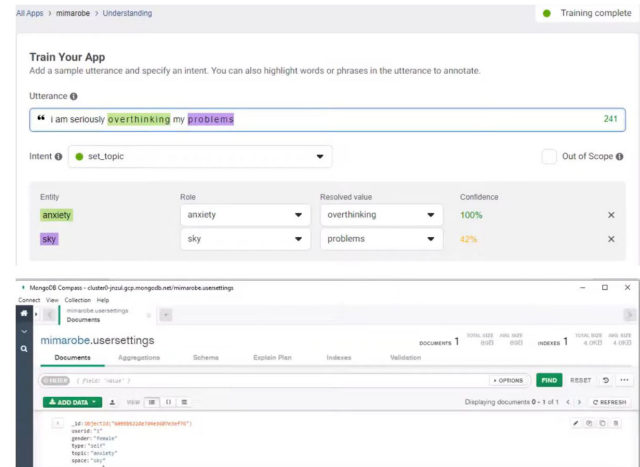


**Figure 5.** Wit.ai learning interfaces

## Results and Discussion

No one knows the long-term psychological or social effects of the pandemic, although the studies indicate an accelerated number of mental problems which has to be solved. According to the statistics, the symptoms like anxiety or depression have increased from 36.4% to 41.5% between August 2020 and February 2021 (27). People need alternative therapy opportunities with these changes. Today, telepsychotherapy or video conference therapies may offer opportunities to expand the provision in challenging environments (11), although they bring other restrictions. Despite the application of alternative techniques like tele or video therapies, the efficiencies of these sessions are still controversial (13). Considering the outcomes of IVRLEs, a well-structured virtual therapy environment may cope with the limitation of current video conference-based systems. Embodiment in VR may help patients engage in the virtual environment; even sample simulated scenarios may help them to visualise, perceive, and become more aware of the situations (28). Therapists already use several augmented or virtual reality applications to support their patients with anxiety, phobia, PTSD or autism.

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This technical paper applies the phases of rapid prototyping methodology to present a systematic design by investing the RelaXRoom as an alternative virtual therapy platform that aims to provide mental and social support to individuals with increased well-being issues. Need analysis and survey results revealed the increased therapy requirement of participants. The design components, interaction types, functionalities and upcoming preferences of RelaXRoom have structured considering the suggestion of experts and literature.

RelaXRoom offers a multiplayer IVR experience and focuses on ill-structured therapy techniques like social group therapy or therapeutical alliance due to the emphasised effectiveness of these methods. According to one of the interviewed therapists in this research, an expert should observe the group therapy sessions for emergencies for practical implementations. Meditation is one of the most recommended habits for mental well-being for ages. For this reason, RelaXRoom represents a self-meditation space with scene and music selection preferences for its users. Peer-to-peer therapy, under the consideration of an expert, is another essential module of RelaXRoom that also requires confidentiality, privacy, payment options and a therapist pool for the patients.

## Conclusion

This paper discusses therapy techniques and the shift towards online sessions by examining the use of IVR in therapy. It also presents innovative applications in mental health, showcasing its potential for personalised and immersive experiences.

This technical paper analyses the required functionalities and design features of a potential IVR environment in a therapy called RelaXRoom. The prototype of RelaXRoom developed in this study includes meditation, peer-to-peer, and group therapy sessions and explains their features.

According to the studies, IVR has positively reduced stress, anxiety, and social isolation. Leveraging IVR technology allows for comprehensive and tailored virtual solutions to meet the growing demand for mental health care. As we navigate the challenges of the pandemic and beyond, it is crucial to explore and utilise IVR systems to support mental health. Ongoing research, development, and collaboration among therapists, researchers, and technology experts are essential to unlock the benefits of IVR in enhancing mental well-being and providing accessible therapy worldwide.

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