Developing a VR Exposure Therapy Tool for Treating Social Anxiety in Therapeutic Settings

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Abstract

This study presents the design and evaluation of a therapist-guided virtual reality (VR) tool to support exposure therapy, with a focus on social anxiety disorder (SAD). While VR has been shown to be effective in clinical research, existing tools rarely meet the practical needs of therapists, particularly in remote or blended therapy formats. This project addresses these limitations by developing a multiplayer VR prototype that enables therapists and clients to interact in real time, customize exposure scenarios, and progress through anxiety inducing situations in a controlled environment.

The study followed a mixed-methods approach, including an online survey (n = 33), semi-structured interviews with licensed therapists (n = 3), and playtesting sessions (n = 11). These findings emphasize a strong need for emotional safety, realism, and therapist control in digital therapy tools. Participants rated the prototype highly for usability, clarity, and perceived therapeutic value.

This project contributes to the growing field of therapeutic game design by demonstrating how VR can extend exposure therapy into digital formats while maintaining key clinical principles. It also offers a foundation for future development of customizable, therapist-supported systems that can enhance accessibility and patient engagement in mental health treatment.

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1. Introduction

Therapists play a central role in guiding patients through structured, evidence-based interventions. With the growing demand for more accessible and flexible therapeutic options – especially in remote and digital formats – there is an increasing need for tools that support therapy in virtual settings. The rise of online therapy platforms such as *Mindler* and *Kry* in Sweden, and the global shift toward remote therapy after the COVID-19 pandemic, have demonstrated that online therapy can be effective and widely adopted (Wright & Caudill, 2020; Anderson et al., 2013). However, therapists still lack specialized tools that support certain treatment types, such as exposure therapy, in online contexts.

Virtual Reality (VR) has emerged as a promising technology that could support therapeutic work by offering immersive, customizable environments. Commercial VR headsets are becoming more affordable and popular, with global revenue projected to grow by 6.5 billion USD (+56%) from 2024 to 2029 (Statista, 2024). Prior research by Chowdhury & Khandokar (2023) has shown that VR Exposure Therapy (VRET) can be just as effective as traditional in vivo exposure in reducing anxiety symptoms. Meta-analyses have further confirmed its potential across anxiety-related disorders (Carl et al., 2018).

However, despite this promise, very few therapists make use of VR in clinical practice – only 6.25% in the US according to Ong et al. (2024). This low adoption rate is not necessarily due to lack of interest; in fact, over 80% of therapists rated VR therapy as moderately to extremely useful. The barriers include lack of training, equipment costs, limited reimbursement policies, and – most importantly – the absence of therapist-centred VR tools (Meyerbröker, 2021; Chung et al., 2022).

Existing VR therapy tools, such as *Psious*, *Oxford VR*, and *Bravemind*, are typically designed for solo use by patients, often in clinic-based settings with minimal interaction capabilities (Freeman et al., 2017; Rizzo et al., 2012). These tools usually lack support for real-time therapist interaction or online multi-user functionality, limiting their potential for integration into dynamic therapeutic practices. No tools to date allow therapists and clients to interact remotely in a shared VR space. This is a major gap, especially considering the increase in blended and remote treatment modes (Lau et al., 2024), and one that this thesis aims to address. By involving therapists directly in the design process, this project develops a VR prototype that fits into therapeutic workflows and supports multiplayer exposure scenarios, guided by the therapist in real time.

One specific use case where VR shows particular promise is Social Anxiety Disorder (SAD). SAD is one of the most frequent anxiety disorders, with lifetime prevalence rates of up to 12% (Kessler et al., 2005). Exposure therapy is a form of Cognitive behavioural therapy (CBT), which is considered a first-line treatment for social anxiety disorder due to its strong evidence base for long-term efficacy (National Institute of Mental Health, n.d.). It can, however, can be logistically difficult to implement. VR offers the opportunity for clients to practice anxiety-

provoking situations – such as public speaking or group interactions – in a repeatable and safe environment (Parsons & Rizzo, 2007), potentially lowering the barrier to treatment.

This thesis focuses on the design and evaluation of a VR exposure therapy prototype intended for therapist-guided sessions. It is important to note that the tool itself is not a treatment, nor a stand-alone therapeutic solution. Rather, it is a supportive clinical tool designed in collaboration with therapists, for use in therapeutic settings – both in-person and online.

1.1. Research Aim and Questions

The goal of this project is to understand therapist needs and develop a working prototype of a VR exposure therapy tool tailored for therapeutic use. This leads to the following research questions:

RQ1) How can a VR exposure therapy tool be designed to meet the practical needs of therapists and patients in treating social anxiety disorder?

RQ2) Which social situations do therapists and patients identify as most relevant for practicing in VR exposure therapy?

RQ3) How do users experience the prototype in terms of usability, clarity, and perceived usefulness for therapeutic purposes?

1.2. Problem Statement

Traditional exposure therapy requires therapist supervision and real-world access to social environments, which can be difficult to replicate in an online context. Additionally, remote therapy has historically been less effective for treatments that depend on environmental triggers, such as SAD (Andersson, 2015). Existing VR tools are typically single-user experiences, not designed with therapists' clinical needs in mind, and rarely allow for real-time interaction between clinician and client.

This project addresses those limitations by designing a multiplayer VR tool that allows therapists and patients to enter and interact within the same virtual environment remotely. This includes scenario customization, therapist control over exposure levels, and features such as shared PowerPoint slides. By focusing on usability and therapist feedback, this project aims to prototype a tool that is clinically meaningful and usable.

1.3. Scope and Limitations

Given the time constraints of the thesis timeline, the prototype was limited to a public speaking scenario and the development of a basic main menu for selecting scenario settings. While multiplayer functionality and some customization features were implemented, advanced features such as biometric tracking, voice integration and progress monitoring are left for future development. Only one playtest session and a limited number of therapist interviews could be conducted with the available timeframe. However, these steps still offer important insights into the early-stage design of VR tools for therapeutic use.

2. Background

2.1. Literature Review

Virtual Reality Exposure Therapy (VRET) has received increasing attention as a modern alternative to traditional exposure therapy, particularly for treating anxiety disorders. In their systematic review, Chowdhury & Khandoker (2023) analysed six randomized controlled trails and concluded that VRET is as effective as in vivo (real-world) exposure in reducing social anxiety symptoms. Despite its potential, adaptation remains low. Ong et al. (2024) report that only 6.25% of therapists in the United States have used VR tools in practice, even though 83% rated VR as moderately to extremely useful for simulating social scenarios.

Barriers to broader adoption include a lack of training, high equipment costs, concerns about disrupting the therapeutic relationship, and unclear reimbursement models (Meyerbröker, 2021; Chung et al., 2022). Felsberg et al. (2025) argue that the development of user-friendly, affordable tools that integrate into therapists' existing workflows is essential for increasing uptake. Importantly, most existing VR tools – such as Amelia Virtual Care and Psious – are designed for use by a single patient in a clinic setting, often pre-programmed without therapist presence in the virtual space. They are not built for remote, multiplayer interaction between therapist and client, a gap this thesis aims to address.

Designing effective VR-based exposure therapy tools requires balancing immersion with psychological safety. Anderson et al. (2013) emphasize that key success factors for exposure therapy include a sense of control, predictability, and gradual exposure. These principles have been reiterated in VR contexts: Herrero et al. (2014) found that customizable settings and real-time therapist support reduce dropouts and increase efficacy. Similarly, Powers and Emmelkamp (2007) concluded that progressive exposure, starting with low-intensity scenarios, is more effective than immediate immersion into high-anxiety contexts. These findings informed the inclusion of adjustable environment settings, audience sizes, and presentation formats in this prototype.

Tracking therapeutic progress is another area where VR offers unique potential. Traditionally, progress is measured through self-reports and therapist observations, but Heimberg et al. (2010) introduced the Social Anxiety Session Change Index (SASCI), which offers a more structured, quantitative way to monitor improvements. In VR, physiological metrics such as heart rate or gaze tracking can offer real-time, objective feedback, a feature supported in principle by research from Parsons and Rizzo (2007). Several therapists interviewed during this project expressed interest in such features, particularly for supplementing subjective session notes.

Designing believable yet psychologically safe social environments is also crucial. The National Institute of Mental Health (n.d.) highlights that common social anxiety triggers include public speaking, talking to authority figures, and group interactions, which were also mirrored in the

conducted survey of this project. These situations area situational and require not just visual believability, but also contextual interactivity to feel authentic. To support user needs, the prototype allows for scene customization based on these common triggers, aligning with therapist feedback and academic guidance on anxiety-specific scenario design.

In conclusion, the literature supports the feasibility and promise of VR exposure therapy while highlighting major gaps in current implementations. There is a lack of therapist-controlled, multi-user VR tools specifically designed for remote use, and existing programs often do not integrate therapist feedback into the design. This thesis addresses these gaps by developing and evaluating a customizable, therapist-led VR tool that supports remote therapy sessions – providing a foundation for future research and development in this space.

2.2. Theoretical Framework

This project is based on two theoretical foundations: exposure therapy principes and design theory related to player experience and emotional safety. Together, they guide both the structure of the VR tool and its intended use within a therapeutic context.

2.2.1. Exposure Therapy Framework

Exposure therapy is a behavioural treatment strategy that aims to reduce fear and avoidance by gradually and repeatedly exposing individuals to anxiety-provoking situations in a controlled and safe environment. According to Craske et al. (2014), repeated exposure helps individuals re-evaluate their feared stimuli and form new, non-threatening associations. Over time, this process leads to habituation and reduced anxiety responses.

In the context of SAD, exposure therapy often involved confronting feared social situations such as public speaking, initiating conversations, or being observed by others (Heimberg et al., 2010). VRET builds on this model by simulating these situations digitally, allowing for more control, repeatability, and customization (Parsons & Rizzo, 2008). This project draws on these principles by enabling therapists to gradually increase exposure levels (e.g., audience size or engagement level) and to create a safe progression of scenarios tailored to individual needs (Powers & Emmelkamp, 2007).

Furthermore, key features known to enhance exposure therapy outcomes, such as predictability, perceived control, and therapist presence, have been integrated into the prototype (Anderson et al., 2013). This ensures that users are not overwhelmed, and that each session can be adjusted in real-time, either during in-person sessions or online via remote access.

2.2.2. Player-Centred Design & Emotional Safety

From a design perspective, this project applies principles from a player-centred design and emotional safety in interactive systems. The VR tool emphasizes usability, accessibility, and psychological safety throughout the experience.

Designing for therapeutic use requires sensitivity to user vulnerability. This includes giving users agency to control their exposure (e.g., starting in a familiar environment), providing clear transitions (e.g., the onboarding space in the therapist's office), and avoiding overstimulation or sudden changes that trigger anxiety. The interviews conducted with therapists reinforced the importance of having a "safe start" or familiar environment, which was implemented as the main menu area designed as a calm therapist office.

Moreover, the therapist's ability to adjust exposure levels supports a responsive and adaptive experience that not only mirrors traditional therapy but makes it more flexible. These design choices follow Herrero et al.'s (2014) guidance on creating emotionally secure virtual environments for therapy.

Finally, the inclusion of real-time therapist presence within the VR world draws from both exposure therapy's emphasis on guided treatment and multiplayer design principles that emphasize social presence and co-regulation in shared virtual spaces (Geraets et al., 2019). By allowing therapists to join the virtual world, either to participate or observe, the tool supports trust, customization, and feedback, with are essential elements for successful therapeutic engagement.

2.3. Tool Overview

The developed prototype is a multiplayer VR application designed to support therapists in guiding clients through customizable social scenarios. The tool allows two users to interact in the same virtual space: one in VR (the client) using a headset, and the other in first-person mode on a standard computer (the therapist).

Upon launching the application, users start in a 3D-modeled therapist office (Figure 1), which functions as a main menu and onboarding space. This neutral environment helps orient the client and allows time for adaptation before entering anxiety-inducing situations. The idea for this transitional space was inspired by therapist interviews, where it was describes as a way to create emotional safety at the beginning of a session (see 4.2.2. Interview Analysis).

Figure 1: Therapist office

Once inside the virtual therapist office, the therapist and the client can choose different scenarios. Currently implemented is the public speaking exercise, where they can adjust the following settings:

2.3.1. Environment

Users can choose between four different environments. First, the conference room offers an intimate space with seating for up to nine people, including the therapist. The low ceiling and small size of the room offers a comfortable starting place for clients who are just beginning of exposure exercises. A classroom setting expands capacity to around 35 seats, with bright lighting and fixed desks. This environment allows clients who are still in school or work there to find familiarity to their real life. For larger-scale practice, the lecture hall holds roughly 100 attendees, featuring elevated seating, a raised podium, and projection screens. This is useful for clients targeting university-style presentations. Finally, the auditorium accommodates up to 300 virtual participants in a spacious, dimly lit venue with professional stage lighting and a balcony level. This simulates large-scale speaking engagements such as conferences or public ceremonies. Selecting the appropriate environment allows therapists to tailor special scale and atmosphere to each client's comfort level, therapeutic goals, and current situation.

2.3.2. Audience size

Within each environment, audience size can be adjusted in four increments: no audience (0% of the seats filled), small (roughly 20%), medium (50%), and large (100%). Adjusting the number of avatars present directly influences the previewed social density, enabling therapists to introduce clients gradually to larger crowds. For example, a client may begin

with an empty room to focus on voice projection and slide timing, then progress to a small group where perceived interpersonal observation emerges, before eventually confronting a full room to practice maintaining composure under maximal social pressure. This idea of gradual exposure matches both the research (2.1. Literature Review; Smith, 2025) and insights from therapist interviews (4.2.2. Interview Analysis).

2.3.3. Audience behaviour

In the final version, the tool will offer four behavioural profiles for the virtual audience: neutral, engaged, distracted, and challenging. Each of them is designed to provoke different aspects of public-speaking anxiety. In neutral mode, avatars sit attentively, remaining largely expressionless to create a baseline speaking experienced. The engaged profile introduces subtle positive feedback (nodding, smiling, and note-taking) to help clients build confidence. A distracted audience occasionally looks at their phones, whispers to neighbours, shifts restlessly, or makes interrupting noises, encouraging clients to maintain focus despite minor disruptions. Finally, the challenging setting features avatars who frown, fold their arms, or ask pointed questions, simulating an impatient audience that targets more advanced exposure goals. This was not only wished by survey respondents (4.2.1. Survey Analysis), but also by therapists (4.2.2. Interview Analysis).

2.3.4. Audience representation

In addition to size and behaviour, therapists can tailor the demographic of the virtual audience by selecting the age profile: younger adults (18-35), older adults (50+), or a balanced mix. Younger audiences feature modern styles and casual seating arrangements, evoking settings like meetups or university seminars. Older audiences appear in more formal clothing in traditional seating, simulating professional gatherings or conferences. A mixed demographic blends both together. In addition to age groups, therapists can also adjust gender of the audience. One therapist noted that this further targets exposure for clients who only feel anxious when interacting with one specific gender (4.2.2. Interview Analysis).

2.3.5. Presentation style

To mirror the variety of public-speaking contexts, therapist can choose among four presentation styles. In solo mode, the client speaks alone. This teaches them to manage their anxiety without any external support. The co-presentation option allows the therapist to join on stage, providing real-time guidance or helps building confidence. Practice more offers a relaxed setting where the client can rehearse content at their own pace, pausing or restarting as needed without audience pressure. Lastly, Q&A mode allows clients to engage with the audience by asking unpredictable questions, teaching them to think on the spot and practice quick responses. This exercise boosts adaptability and reduces fear of the unknown.

2.3.6. Speech content options

The tool supports flexible content delivery by offering two speech modes: Pre-written and improvisation. Pre-written mode, clients can choose from several built-in speeches or upload custom ones. They then deliver the prepared script while being observed by the therapist. Alternatively, in improv mode clients have to come up with a speech for a randomly selected topic on the spot, with or without the help of presentation slides. This simulates unpredictable real-world speaking demands and reinforces adaptive thinking under pressure.

These settings allow therapists to tailor the experience based on a client's therapeutic goals and level of comfort. Audience size and reactions are critical variables in public speaking anxiety (Anderson et al., 2013), and adjustable settings support gradual exposure, which is a key principle of successful treatment (Chowdhury & Khandoker, 2023).

The navigation and interaction flow of the tool is summarized a diagram, which can be seen in 8. Appendix F – Flowchart. It shows the key stages a user moves through – from entering the main menu environment, selecting a scenario, customizing its parameters, and beginning the therapy session.

3. Methodology

3.1. Design Philosophy

The design of this VR exposure therapy tool is grounded in emotional safety, gradual challenge, and client-therapist collaboration. Users are provided with mechanics to control their engagement with scenarios, such as options to pause or leave at any point. Interaction with a live therapist is included to facilitate dynamic and responsive therapy sessions. Overall, the design philosophy emphasizes creating a safe space for patients to confront their fears over time.

3.2. Development Process

The tool was developed using Unity as the game engine, with Mirror for networking (allowing two users to join the same session) and the XR Interaction Toolkit for VR input. Blender and Substance Painter were used to create and texture 3D assets, while Adobe Illustrator was used for UI design. An HTC Vive headset was used for VR testing, with one player in VR and the other in first-person mode as the therapist.

The development followed an iterative research-through-design approach. The initial structure was sketched in a flowchart (see 8.6. Appendix F – Flowchart), followed by implementation of a functioning menu, scenario selection interface, and the public speaking scenario. Core mechanics, such as slide switching, audience spawning, and exposure configuration, were implemented and adjusted based on internal testing.

3.3. Survey

3.3.1. Participants

Participants were recruited online via social media and online forums. Additionally, flyers with QR codes (see 8.1. Appendix A – Survey Flyer) were printed and distributed in various public places, such as Uppsala Universities G building on campus Gotland. A total of 33 people completed the survey. The sample was diverse in age, ranging from 18-55 (MD = 26 years, SD = 8,1 years), with most (57,6%) being 18-24 years old (Figure 2). 54,5% stated that they have or are currently attending therapy or counselling. 9,1% preferred not to answer this question (Figure 3). No prior VR experience was required.

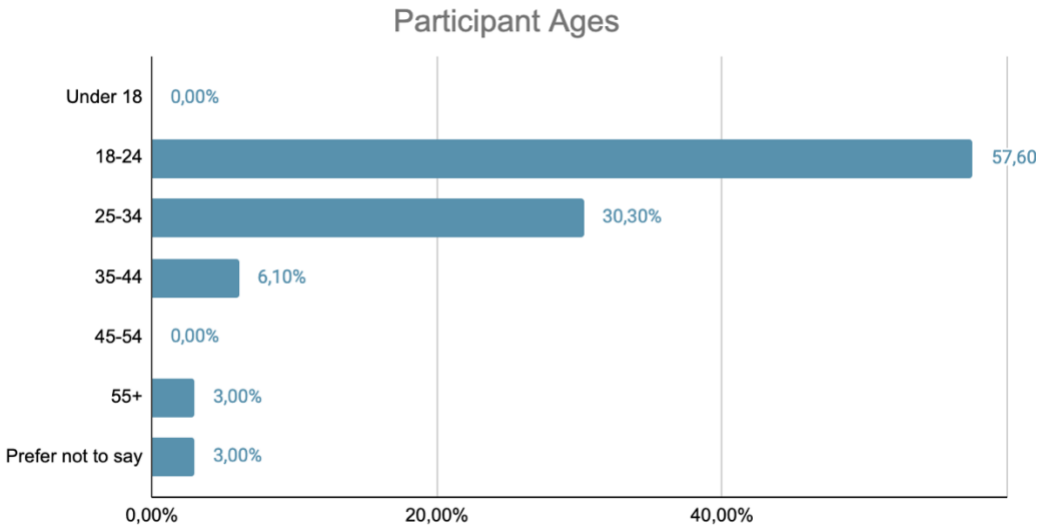

Figure 2: Age groups of survey participants.

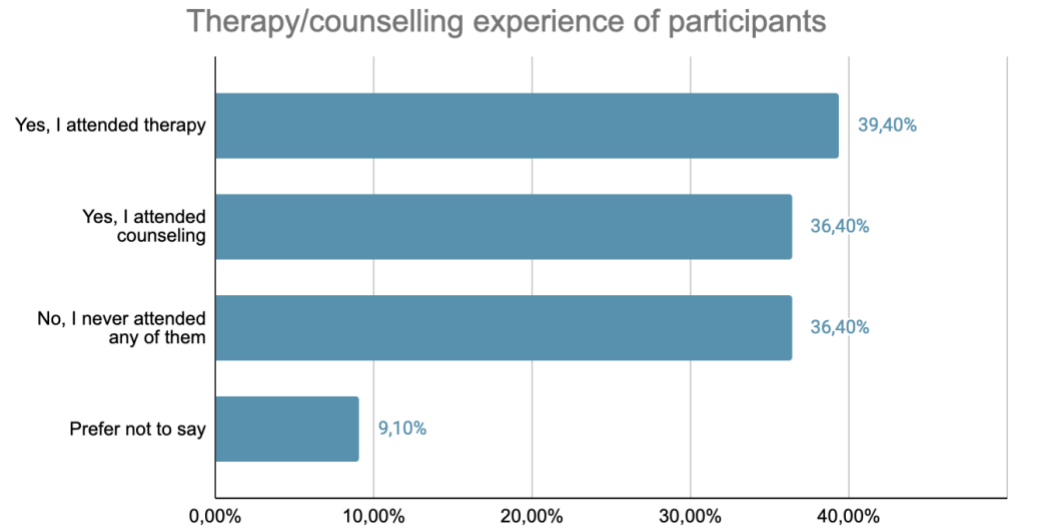

Figure 3: Therapy and/or counselling experience of participants.

3.3.2. Materials

The survey was conducted using google forms and included both quantitative (multiple choice, Likert scales) and qualitative (open-ended) questions. The structure was divided into four sections:

1. Social anxiety-related experiences (e.g., “Do you ever avoid social situations due to discomfort or nervousness?”)
2. Digital tool and VR usage (e.g., “Have you ever tried Virtual Reality (VR) before?”)
3. Preferences for a VR exposure therapy tool (e.g., “If you were to use a VR tool to practice social situations in a therapy setting, what features would be important to you?”)
4. Demographics and interest in future playtest participation (e.g., Have you ever attended therapy or counselling?”)

A full list of questions can be found in 8.2. Appendix B – Survey Results Raw Data.

3.3.3. Data Analysis

After the survey period ended, all responses were reviewed to ensure they were complete and valid. Any duplicate or invalid entries were removed to maintain the quality of the dataset. The analysis consisted of two main components: quantitative analysis of the closed-ended questions and qualitative content analysis of the open-ended responses.

For the quantitative data, responses to multiple-choice and Likert-scale questions were compiled and visualized using Google Sheets. Each item was first categorized according to its topic, such as comfort with social situations or willingness to use VR in therapy. Mean scores were calculated for Likert-scale questions to help identify trends across the dataset, such as which social situations participants found most uncomfortable. These numerical summaries helped determine which features and scenarios were most relevant for the design of the VR tool. The results were then visualized in the form of bar graphs and charts to facilitate interpretation and comparison.

In the case of open-ended questions, a qualitative content analysis was conducted. This followed the guidance of Elo and Kyngäs (2008), Erlingsson and Brysiewicz (2017), and Luo (2023), using a structured and transparent coding process. First, all open-text responses were compiled into a single document and reviewed to become familiar with the content. Any irrelevant or placeholder responses, such as “N/A” or “-”, were excluded. Meaningful phrases were then highlighted and labelled with initial descriptive codes (e.g., “realism,” “pause button,” “therapist support”). These codes were further grouped into broader categories reflecting thematic concerns, such as “desired features,” “emotional safety,” or “reasons for avoidance.” Frequency counts were used to track how often certain themes appeared, and representative quotes were selected to illustrate key findings. The coded results were organized into tables (8.2. Appendix B – Survey Results Raw Data), which were used both for reporting and to guide design decisions.

Finally, a process of triangulation was conducted to strengthen the validity of the findings. This involved comparing and cross-referencing patterns from the survey data with insights from the literature review and the therapist interviews. For example, participant interest in audience customization and scene control was not only a repeated theme in open-ended responses but also aligned with feedback from therapists who emphasized the need for realism and therapist-guided control in exposure therapy. Similarly, user concerns about emotional safety and needing the ability to exit a scenario were mirrored by both academic literature and the professional insights gathered during interviews (2.1. Literature Review, 4.3. Interview Results). This comparative process helped ensure that the conclusions drawn from the survey were consistent with existing knowledge and grounded in multiple sources of evidence.

3.4. Interviews

3.4.1. Participants

Three licensed therapists participated in the interview portion of this study. They were selected through snowball sampling, with recruitment focused on practitioners in Sweden and the United States. Each therapist was currently practicing and had direct experience working with adult clients. All interviews were conducted in English via Microsoft Teams.

Therapist 1 (T1) is a licensed psychodynamic therapist based in California, United States. He has 11 years of clinical practice experience and currently works full-time in private practice. Over the past five years, he has shifted his entire caseload to online sessions. On average, he sees 20 to 22 clients per week. His primary areas of clinical focus include emotional regulation, anxiety disorders, and self-esteem issues. Although he is not currently offering exposure therapy, he expressed strong interest in incorporating new technologies, particularly for clients who face barriers to in-person interaction.

Therapist 2 (T2) is a licensed psychologist based in Sweden. She received her license in September 2024, following a year of practical training in cognitive behaviour therapy (CBT). She currently works for a private mental health company that offers digital therapy through its own platform. On average, she manages approximately 15 clients per week, communicating with them primarily through asynchronous text-based messages. Her clinical work focuses on CBT-informed treatment plans, with particular emphasis on anxiety, avoidance behaviour, and exposure-based techniques. T2 noted that digital tools are already embedded in her workflow but emphasized the need for more interactive and immersive solutions.

Therapist 3 (T3) is a licensed therapist based in California, United States. He began his therapeutic training in 2012 and became fully licensed in 2019. He works as an independent practitioner and sees 15 to 18 clients per week, with roughly half of his sessions conducted online. His therapeutic orientation integrates humanistic and behavioural approaches, and his clinical expertise includes trauma processing, social anxiety, and life transitions. T3 reported using gradual exposure techniques regularly and expressed enthusiasm for tools that could enhance remote therapy by improving engagement and observational detail.

All three therapists were given an informed consent form before participation and were informed of their right to withdraw at any point without consequence. Their perspectives helped shape both the design of the VR prototype and the interpretation of findings. Demographic details such as age and gender were not collected systematically, as the focus of the interviews was on professional experience and therapeutic context.

3.4.2. Materials

A semi-structured interview guide was developed specifically for this study, consisting of 15 open-ended questions grouped into six thematic areas. These included: (1) therapist background, (2) use of digital tools in therapy, (3) exposure therapy practices, (4) social anxiety triggers and therapy structure, (5) opinions on desired features and the future of VR therapy, and (6) cultural and accessibility considerations. The aim was to elicit rich qualitative data about therapists' clinical routines, attitudes toward VR, and design-relevant insights that could inform prototype development.

All interviews were conducted via Microsoft Teams with the participants' prior consent. At the end of each session, participants were offered a short demonstration of the VR prototype, followed by an informal discussion in which they were invited to share immediate feedback on its clinical relevance, design, and potential use cases.

3.4.3. Procedure

Participants were recruited using a snowball sampling method, beginning with professional contacts in Sweden and the United States. Therapists who agreed to participate were sent a detailed information sheet and asked to sign a digital consent form before the interview. Each interview session lasted approximately 30 to 45 minutes.

To ensure participant comfort and open discussion, interviews were conducted in a conversational tone, following the semi-structured guide while allowing for natural follow-up questions. Due to technical limitations, full audio recordings and verbatim transcripts could not be obtained. Instead, detailed notes were taken live during the interviews and immediately reviewed for completeness after each session. This note-based approach still allowed for accurate content analysis while maintaining participant privacy and data security.

3.4.4. Data Analysis

After conducting the interviews, the collected notes were first cleaned to correct any spelling or grammatical errors. Following this, a qualitative content analysis was performed, drawing on established approaches outlined by Elo and Kyngäs (2008), Erlingsson and Brysiewicz (2017), and Luo (2023).

The first stage involved familiarization with the data. All interview notes were read multiple times to develop an overall sense of the content and to become immersed in the data. During the next stage, open coding was conducted by highlighting specific phrases and ideas that appeared meaningful or recurrent. These segments were labelled with initial codes that captured their essence, such as "realism importance" or "cost barrier."

Following this, the identified codes were grouped into broader, overarching categories to begin forming a thematic structure. Categories such as "desired features," "adoption barriers," and "current practice" were developed by clustering similar codes together. Once

grouped, these categories were reviewed and refined to ensure consistency and to confirm that each coded item clearly fit the intended theme.

The final step involved quantifying the frequency of each category to assess its relative importance across all three interviews. This process allowed for the identification of dominant themes and their alignment with the project's research questions. These themes were used to inform the design decisions of the prototype and were cross-referenced with survey findings to enable triangulation of insights.

All coding and analysis were conducted using a structured spreadsheet. A full overview of category frequencies and illustrative quotes is provided in 8.5. Appendix E – Interview Analysis, while the synthesized findings are discussed in detail in Section 4.2. Interview Results.

3.5. Playtesting

3.5.1. Participants

Participants for the playtesting were recruited from the initial survey, in which respondents were given the option to express interest in trying the VR prototype. A total of eleven individuals participated in the testing phase. Of these, eight were aged between 18 and 24 years, while the remaining three were within the 25–34 age group. All participants took on the role of the client and interacted with the prototype using the Unity XR simulator. This method allowed them to simulate VR controller interactions on a standard desktop computer without requiring access to a physical VR headset. No participants played the role of the therapist during testing, as the primary aim was to assess the client-side experience of usability and clarity.

3.5.2. Materials and Procedure

The XR simulator was used to emulate VR interactions through mouse and keyboard input, enabling users to navigate menus, interact with the environment, and operate scenario functions like slide advancement. Each session began with the participant entering a 3D-modeled virtual therapist office, which served as the onboarding environment. They were then guided through the customization of the public speaking scenario, including selection of the environment type and audience size. Once inside the presentation space, they were instructed to interact with key features such as navigating PowerPoint slides using virtual controls. In addition to the core interactions, participants were encouraged to explore the virtual world freely to assess the interface's intuitiveness and environmental clarity.

After the session, each participant completed a digital post-test questionnaire consisting of 15 items. These items used a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree) to assess three main areas: usability and navigation, scenario clarity and relevance, and perceived therapeutic usefulness. The questionnaire was designed to gather quantitative feedback on key aspects of the user experience, complementing the qualitative design insights gained from therapist interviews and survey responses. The full questionnaire is available in 8.7. Appendix G – Playtest Survey Questions.

Testing sessions lasted approximately 15 to 20 minutes, depending on the participant's pace and engagement with the environment.

3.5.3. Data Analysis

All survey responses (n=11) were compiled and entered into Google Sheets for analysis. For each of the 15 items, the mean value and standard deviation were calculated to understand the central tendencies and variability of user responses. These quantitative results were used to evaluate the overall success of the prototype in meeting design goals related to usability, clarity, and therapeutic alignment. A breakdown of statistical results can be found in 8.9. Appendix I – Playtest Survey Analysis, and findings are further discussed in 4.3. Playtesting Outcomes.

3.6. Ethical Considerations

All participants were informed of their rights and provided consent before participating. No identifying information was collected in the survey, and all data were anonymized and securely stored. Participants were reminded of their right to withdraw at any time without explanation. Given the sensitive nature of anxiety-related topics, emotional safety was prioritized, and participants could exit scenarios or stop interviews at any point.

Playtesting participants were given consent forms and agreed to it by signing it at the start of the session. They were informed about the nature of the scenarios and their right to withdraw at any time without consequences. All data, including survey and interview answers, were anonymized and stored securely. The emotional wellbeing of testers was prioritized by allowing them to leave scenarios at any moment.

3.7. Positionality and Reflexivity

Having been diagnosed with SAD myself and having written my high school thesis about this topic, I bring firsthand understanding of the condition to the design process. This background gives me valuable insight into user needs but also presents the risk of bias toward my own experiences. To address this, I relied on external research, feedback from playtesters, and interviews with professionals to ensure a broader and objective approach. As a game designer, I prioritized accessibility and emotional safety to ensure that the experience is supportive to individuals with SAD, while also providing the intended therapeutic impact.

I am conscious of my dual role as both researcher and someone personally affected by the subject. While my perspective offers authenticity, I critically reflected on my assumptions throughout the project, in order to balance personal experience with academic evidence and best design practices.

4. Results

4.1. VR – Application Development Outcomes

The resulting prototype is a functional, multiplayer VR application developed in Unity, designed to support therapists in delivering customizable scenarios for therapeutic treatments, particularly exposure-based therapy for social anxiety. While the design and evaluation of this tool focused on social anxiety use cases, its technical and interaction framework allows for broader applications across multiple therapeutic modalities, including talk therapy, cognitive-behavioural interventions, and phobia desensitization.

The tool includes a range of features intended to foster emotionally safe, immersive, and adaptable environments that can be adjusted in real time by the therapist to meet individual treatment goals. This section outlines the core components of the prototype and the decisions behind their implementation.

4.1.1. Photorealistic 3D Environment and Assets

All 3D models in the prototype were created in *Blender* and textured using *Substance Painter*, with an emphasis on visual realism to enhance immersion. To inform this balance, visual design choices were made in consultation with therapist interviews (4.2.2. Interview Results; 8.5. Appendix E – Interview Analysis) and guided by literature (Anderson et al., 2013; Herrero et al., 2014) emphasizing the importance of low-stimulation, familiar environments in anxiety treatment. For example, bright and clean lighting setups, neutral colour palettes, and uncluttered layouts were used to avoid overstimulation while maintaining immersion.

Environmental props and textures were modelled after reference images of common real-world therapy and educational spaces, such as conference rooms and clinical offices (8.10. Appendix J – Reference Images for 3D Environments). This design choice was supported by therapist interviews, where participants emphasized the need for realism to evoke the right level of anxiety for exposure therapy while still ensuring the client feels safe and in control (4.2.2. Interview Results).

4.1.2. Therapist Office as Main Menu

The VR experience begins in a 3D-modeled therapist office, which functions as both a main menu and an onboarding space. The idea of starting the experience in a neutral, familiar environment was directly informed by therapist interviews. For example, one therapist stated: “There needs to be a kind of emotional doorway. Clients shouldn’t just be thrown into a scary setting” (Interviewee T1, 4.2.2. Interview Results).

The design of the office was based on photo references of contemporary therapy practices (8.10.1. Therapist Office). The inclusion of this transitional space is supported by exposure therapy principles emphasizing predictability and gradual engagement (Craske et al., 2014). It provides a calming environment in which clients can acclimate to the virtual setting before moving into more challenging social scenarios. This onboarding phase is also important in promoting emotional regulation and helping users familiarize themselves with navigation before beginning the exposure sequence.

Figure 4: Therapist office main menu.

4.1.3. Scenario Selection and Customization UI

A dedicated user interface (UI) panel is located within the therapist office environment. This menu allows therapists to configure session parameters, including the presentation setting (e.g., conference room, classroom, auditorium), audience size, audience behaviour, demographic characteristics of avatars, and the format of the presentation itself.

For example, therapists can increase audience density from no audience at all to a full room, change audience attitude from passive to challenging, or choose whether the client delivers a solo speech, co-presents with the therapist, or answers questions in a simulated Q&A format. These parameters were implemented to align with exposure therapy theory emphasizing gradual exposure, perceived control, and real-time adaptability (Powers & Emmelkamp, 2007; Herrero et al., 2014).

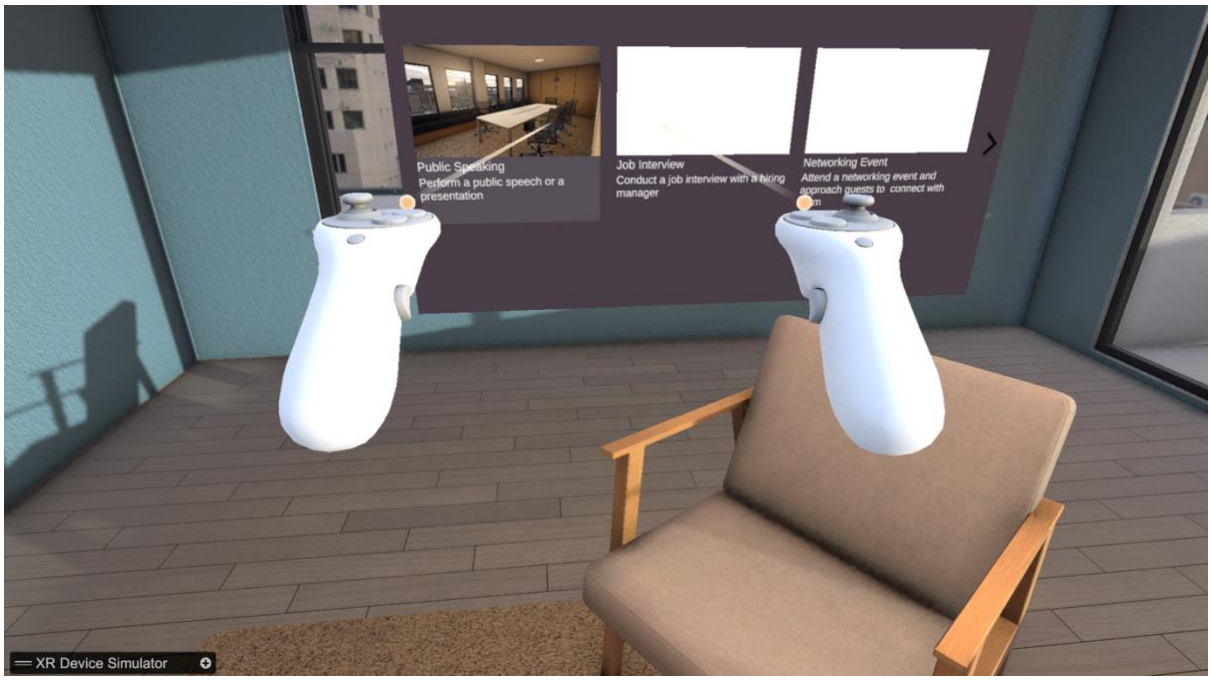

Figure 5: Level selection menu UI.

4.1.4. Multiplayer and Crossplay Functionality

A key differentiator of this prototype is its support for real-time multiplayer sessions, where one user (the client) enters the environment through a VR headset, while the other (the therapist) navigates the world using a standard desktop interface. This setup enables therapist-guided sessions in both in-person and remote formats, bridging a critical gap in existing exposure therapy tools that are typically designed for solo, clinic-based use (2.1. Literature Review).

Multiplayer functionality is enabled using the Mirror networking library, which allows real-time synchronization of actions, such as scene transitions, audience changes, and slide navigation. For example, when the client changes the slide of the presentation, the change is reflected immediately in the therapists' view. While current implementation supports only two users at a time, the underlying system could be expanded to include group therapy or supervision formats in future versions.

There are some technical limitations to this approach. Latency and connection stability may affect synchronization during remote sessions, particularly if one user has significantly lower internet bandwidth. However, in local testing, synchronization remained reliable and smooth for key functions such as avatar spawning and slide transitions.

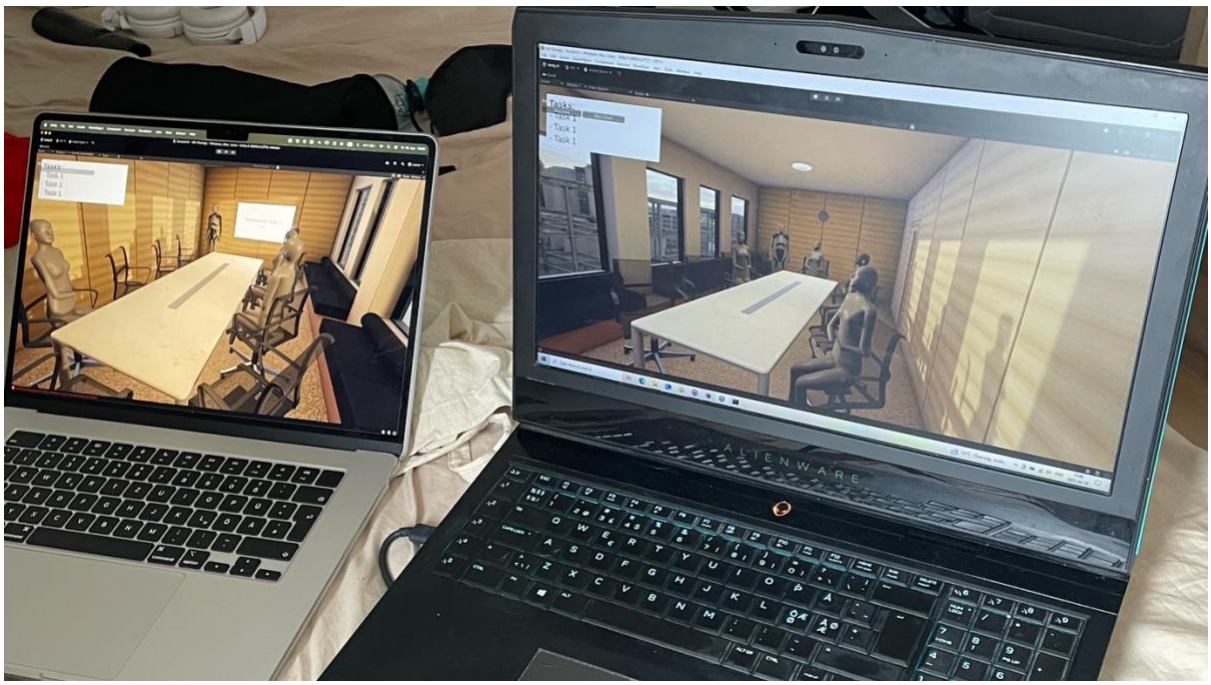

Figure 6: Users on two different laptops together in the same scene.

4.1.5. VR and Input Integration

The prototype was developed using the XR Interaction Toolkit, supporting both the HTC Vive headset for immersive VR and the Unity XR Simulator for desktop testing. This allows the tool to accommodate both users with full VR setups and those without headsets, broadening accessibility.

Interaction in VR is based on laser pointer selection through hand controllers, allowing clients to interact with UI panels, navigate menus, and toggle between settings. For therapists, traditional mouse and keyboard controls are available, supporting familiarity and reducing the learning curve for clinicians less experienced with VR systems.

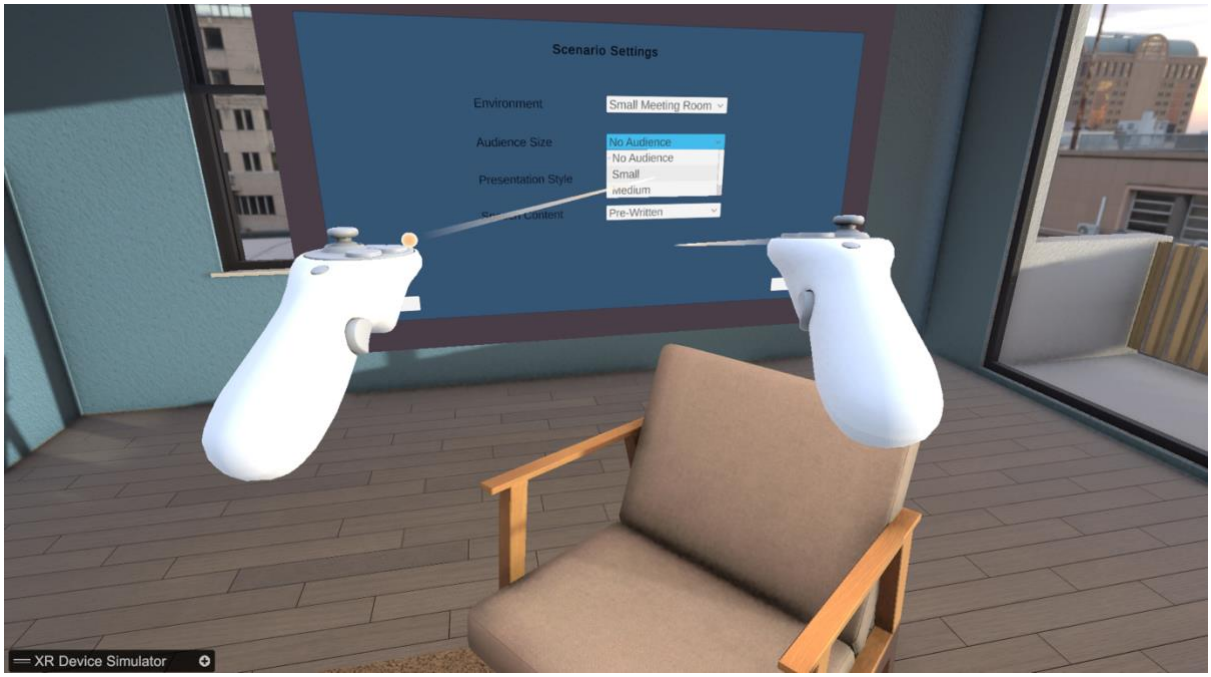

Figure 7: Laser pointer interaction with the menu through hand controllers.

4.1.6. Audience Spawn System

To simulate the core component of social exposure – being observed by others – the prototype includes a dynamic audience spawning system. The therapist can adjust the number of audience avatars present in the room using the UI panel. Available density settings include no audience (0% of seats filled), small (20%), medium (50%), and large (90%). These increments allow therapists to introduce clients gradually to different levels of social pressure, consistent with the principle of progressive exposure (Chowdhury & Khandoker, 2023). Figure 8 visualizes the difference between those settings.

Several additional features are planned for future implementation to enhance realism and therapeutic flexibility. These include configurable audience behaviour (e.g., engaged, distracted, challenging), interaction formats such as Q&A sessions or improvisational speaking, and the ability to adjust demographic characteristics of the virtual audience (e.g., age group, gender composition). These extensions reflect specific requests raised during

therapist interviews and survey responses (4.2.1. Survey Results and 4.2.2. Interview Results) and are intended to further personalize exposure scenarios to meet individual client needs.

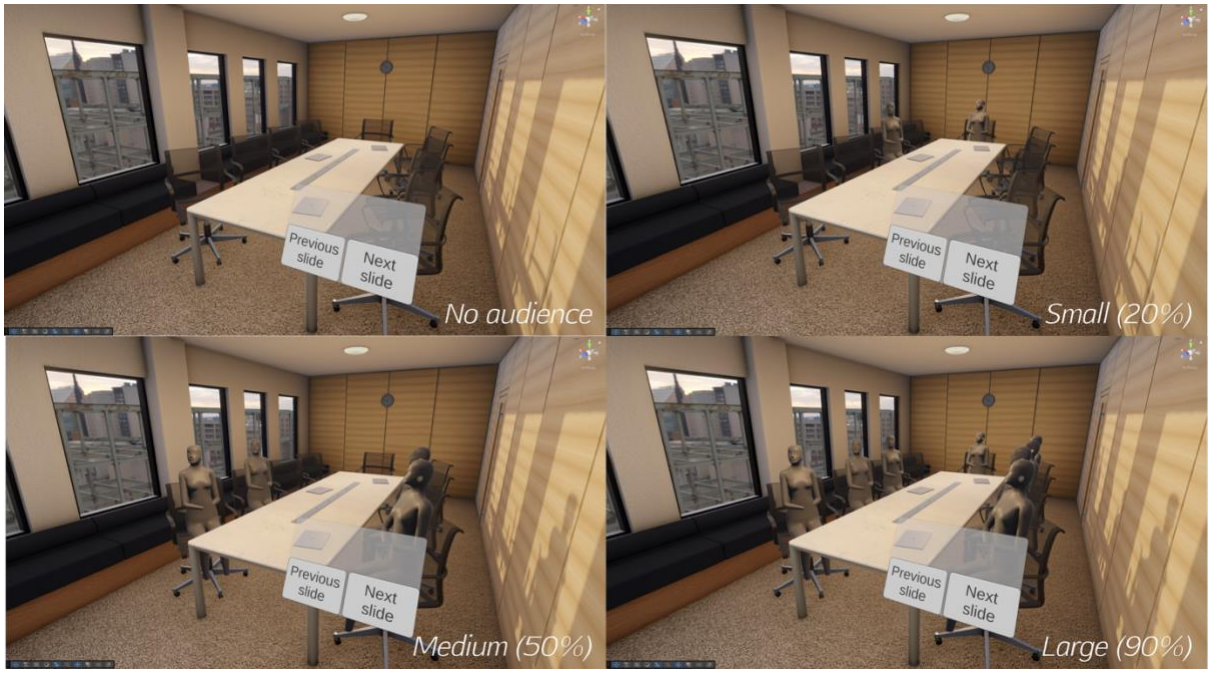

Figure 8: Screenshots of different audience sizes in the conference room.

4.2. Survey Results

The purpose of the survey was to identify common social-anxiety triggers, measure participants' familiarity with VR and digital mental-health tools and obtain feature preferences for a therapeutic VR prototype. A total of 33 completed the online questionnaire, which combined Likert-scale items with open-ended prompts. Participants were aged 18 to 55+. With 63,3% being aged 18-24, and 30,3% being 25-34 years-old, the sample tilted toward younger adults. Only three participants were 35 years or older, and one person chose not to disclose their age (Figure 9). Below, closed-ended items to quantify comfort levels and usage patterns are presented. Then, themes from participants' free-text answers are summarized. Raw data of survey answers can be found in 8.3. Appendix B – Survey Results Raw Data.

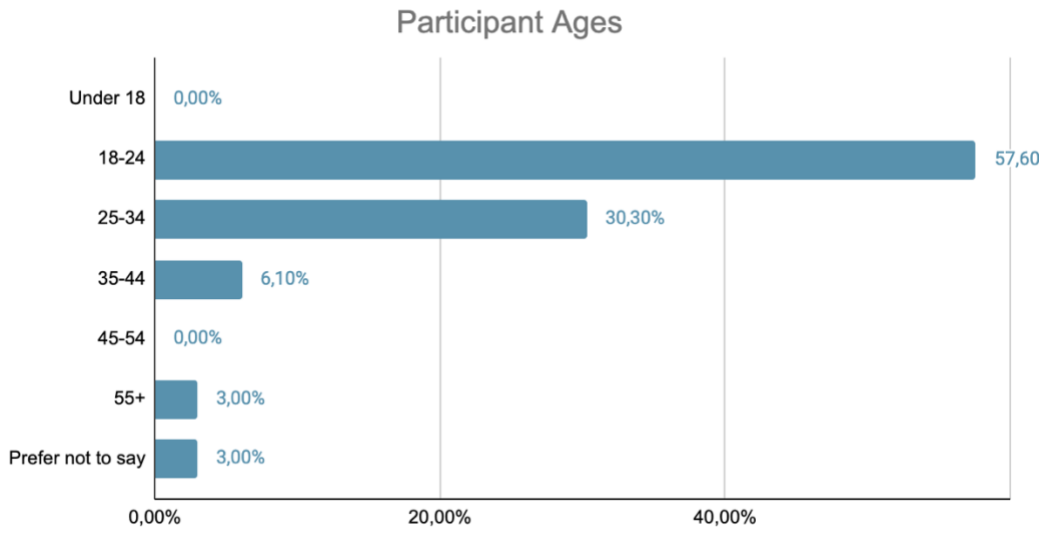

Figure 9: Age groups of survey participants.

4.2.1. Closed-ended Questions.

Overall comfort in social situations.

Participants rated their comfort level across eight typical social situations on a five-point Likert scale (1 = Very uncomfortable, 5 = Very comfortable). The mean comfort ratings were lowest for talking to strangers (M = 2,9, SD = 1,2), making a phone call (M = 3,1, SD = 1,2), and public speaking (M = 3,1, SD = 1,1), indicating these as the most anxiety-provoking contexts (Figure 10). This question addressed variability in baseline social confidence, informing which scenarios to prioritize in the VR tool.

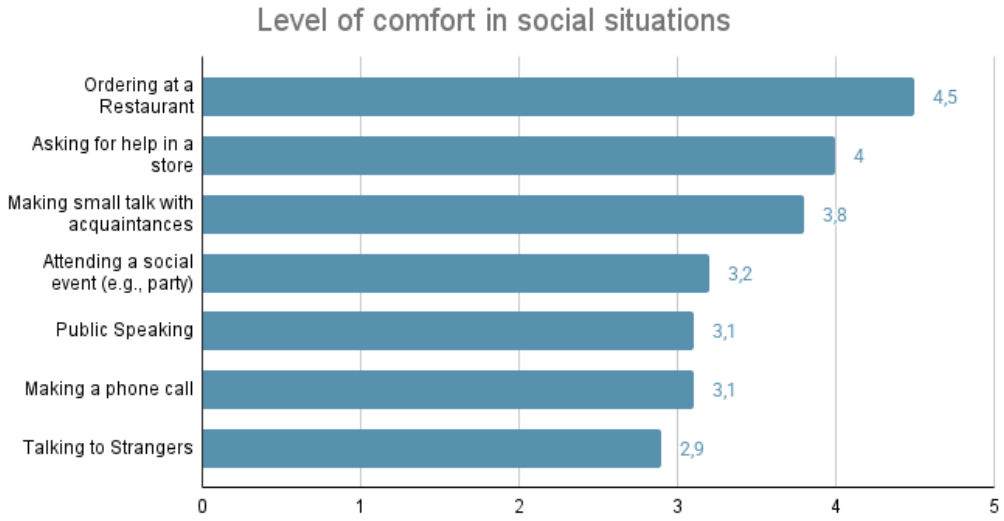

Figure 10: Average comfort ratings for common social situations.

Avoidance Frequency.

When asked how frequently they avoid social situations due to discomfort or anxiety, 75,8% of participants selected “sometimes” or “often,” demonstrating substantial avoidance behaviour in the sample (Figure 11). This measure was intended to assess real-world impact of social-anxiety symptoms and underscore the need for controlled exposure environments.

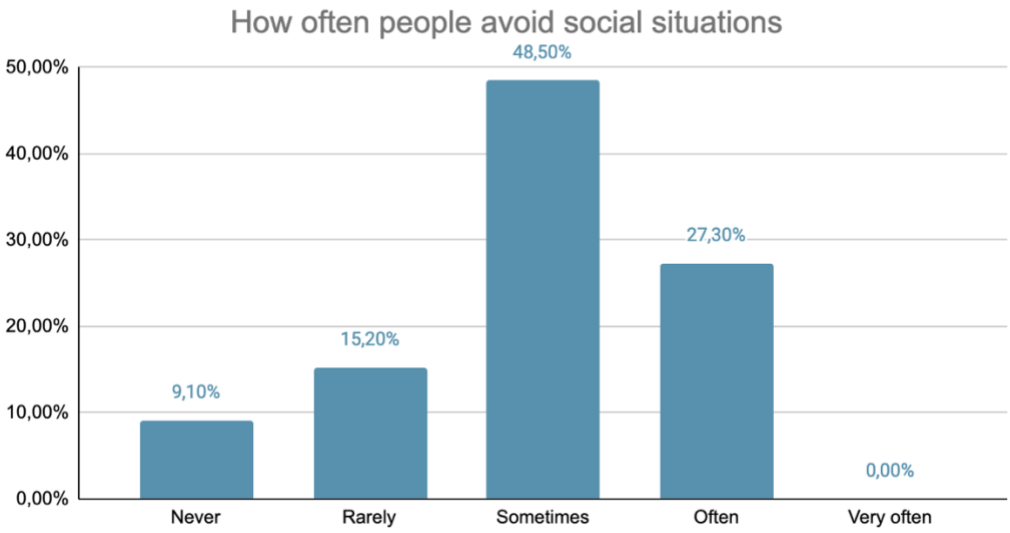

Figure 11: Percentages of participants who avoid social situations due to discomfort or nervousness.

Reasons for Social Avoidance.

Those who reported avoidance could select multiple reasons from a checklist. The most common reasons were “worrying about what to say” (selected by 54,55% of respondents), “fear of making mistakes (54,55%) and “fear of embarrassment or judgement” (48,48%) (Figure 12). Lesser-reported reasons included “preference to be alone” (33,33%) and “feeling physically anxious” (21,21%). A small number selected “other” reasons and mentioned “laziness” or assuming others do not care what they say. This question was included to learn if participants avoidance to social situations was anxiety-related or due to other reasons.

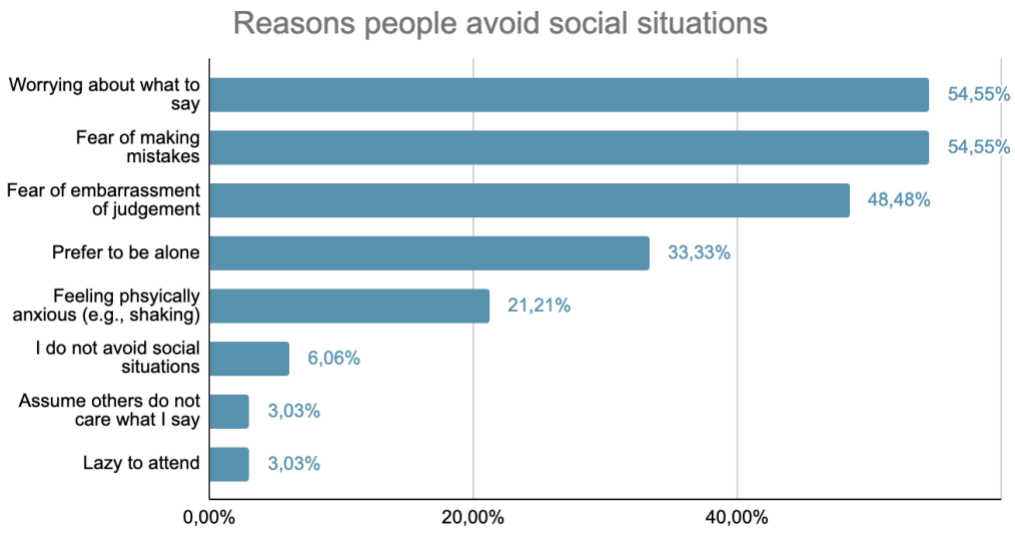

Figure 12: Most common reasons why participants avoid social situations.

Prior VR Experience.

Most respondents (78,7%) reported prior VR use, predominantly for gaming purposes (Figure 13). This high level of familiarity suggests that introducing a therapeutic VR application would leverage existing comfort with immersive environments.

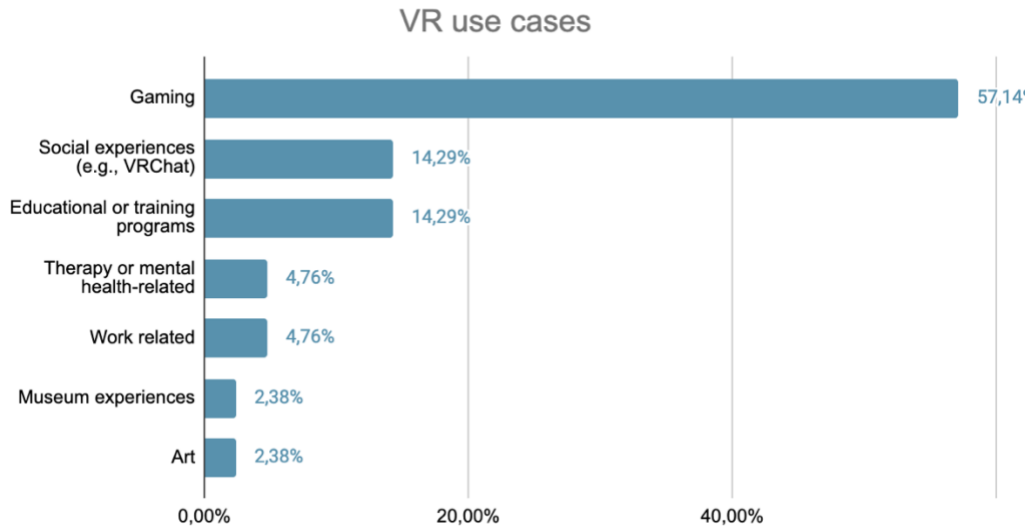

Figure 13: Contexts in which participants have used VR before.

Use of Digital Mental-Health Tools.

Only 27,3% had used any digital platform for mental-health or well-being. Those who did cited apps offering guided exercises, online therapy, and per forums. This item measured the degree to which participants had already integrated technology into their anxiety-management routines.

Willingness to Engage with VR Therapy.

A large majority of respondents (78,8%) indicated that they would be open to using VR with a therapist to practice social situations, Reasons cited in follow-up questions included its usefulness as a starting point before real-world exposure and the privacy and convenience it affords. Some scepticism was noted, mostly regarding realism and whether digital interactions would provoke genuine anxiety.

Preferences for VR Exposure Scenarios.

Participants were asked to select up to three social scenarios they would most like to practice in VR. The most frequently selected were job interviews (72,7%), public speaking (66,7%), and networking events (51,5%). Other contexts mentioned included small talk (21,2%), asking for help (21,2%), and dating (3%), highlighting the extent of potentially useful applications for future iterations of the tool (Figure 14)

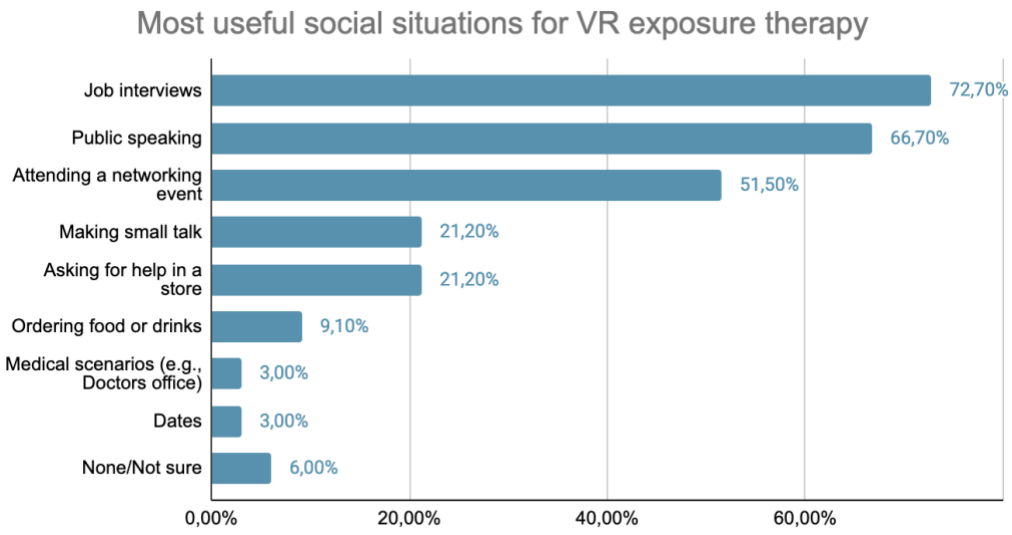

Figure 14: Most selected social situations to be useful in VR exposure therapy.

Remote Therapy Acceptance.

Responses to whether participants would be more likely to try exposure therapy if it were offered remotely were mixed: 36,4% said yes, 21,2% said no, and 42,4% were unsure. This suggests that wile remote delivery may enhance accessibility for some, others remain cautious or undecided.

4.2.2. Open-Ended Questions.

To analyse open-ended survey items, responses were coded thematically using a qualitative content analysis approach. Phrases were first assigned initial codes and then grouped into broader categories reflecting preferences, concerns, and reflections. Table 2 in 8.3. Appendix C – Survey Analysis shows coded categories for each question.

Desired Features in a VR Therapy Tool.

The most frequent request was realism and immersion (mentioned 13 times), with several respondents stressing the importance of believable environments and character behaviour for provoking authentic responses. Participants also emphasized user agency, such as being able to pause or leave the experience at any time (5 mentions), and scenario variety (5 mentions), such as different environments and audience types. Therapist support and structured guidance during VR sessions were also noted.

Emotional Safety in VR Therapy.

When asked what would help them feel safe in a VR therapy session, respondents most commonly cited a sense of control over the scenario, particularly the ability to exit if overwhelmed (8 mentions). Direct therapist involvement, such as setting expectations or being present during the session, was also important (6 mentions), as was having a comfortable and familiar environment (5 mentions).

General Reflections and Future Applications.

Several participants expressed enthusiasm about the potential of VR for supporting therapeutic work, especially in contexts where real-world exposure is difficult. Some suggested extensions for other phobias, like medical anxiety or dating situations. Notable comments include "*I've often found social situations challenging, especially when there's pressure to perform or when interactions feel unpredictable. I believe VR has huge potential to bridge that gap, it could let people face their fears gradually while still feeling supported. It also allows for repetition, which is really important for building confidence;*" and "*Exposure therapy is something that I struggled with, and I can imagine many others feel the same way. Simulating uncomfortable situations in VR with an actual therapist could be a pretty groundbreaking way to help people overcome their anxiety, especially as a step on the way before trying exposure therapy in real life.*" Others voiced doubts about how realistic or emotionally impactful VR could be in its current form. One respondent wrote, "Knowing it's digital might make me behave differently," raising an important question for future empirical studies of VR exposure generalizability.

4.3. Interview Results

This section presents the findings from three semi-structured interviews with three licensed therapists. The aim was to understand current exposure therapy practices, identify desired features for a VR exposure therapy tool, and explore perceived barriers and conditions for implementation. Detailed tables with coding and direct quotes from the interview can be found in 8.5. Appendix E – Interview Analysis.

4.3.1. Method of Analysis.

The interview data were analysed using thematic content analysis, following a process informed by Elo and Kyngäs (2008), Erlingsson and Brysiewicz (2017) and Luo (2023). This process began with open coding, where key phrases and statements were labelled based on their meaning. Codes were then grouped into broader categories and refined into major themes based on their frequency and relevance to the research questions: (1) current exposure therapy practices, (2) desired features in a VR tool, (3) barriers to adoption, and (4) conditions for effective use. Recurring patterns and the frequency of specific codes helped identify which topics held particular relevance across the interviews.

Thematic analysis resulted in four primary themes: current exposure therapy practices, desired features in a VR tool, barriers to adoption, and conditions for effective use. Each of these themes is presented below.

4.3.2. Theme 1: Current Exposure Therapy Practice.

All three therapists reported using structured, goal-oriented exposure therapy techniques that progress gradually. One therapist (T3) described starting with a Subjective Units of Distress (SUD) scale and then "identifying a hierarchy of feared situations [and] finding things that are low on the scale and work upward." Another therapist (T2) mentioned a similar approach, where patients define goals and log their exposures weekly using a digital platform.

Progress in therapy was tracked primarily through client self-reports and therapist notes. For example, T1 stated, "I document exposures and note how the client responds to them over time," while T3 reflected that "success is when clients can regulate their anxiety during or after a situation." These practices reflect a reliance on qualitative measures of change, which supports the idea of supplementing therapy with VR features such as data logging and progress tracking. These findings were grouped under this theme because they highlight the structure and information flow that any digital exposure tool would need to integrate with.

4.3.3. Theme 2: Desired Features in a VR Exposure Therapy Tool.

A dominant theme across all interviews was the need for realism and customizability in a VR exposure therapy tool. Therapists stressed that virtual environments should closely mimic real-world social situations to provoke genuine emotional responses. T2 stated, "The tool

needs to feel real enough that it triggers the right parts of the brain, like a real situation would." Realism, according to participants, includes lifelike virtual characters, natural social dynamics, and responsive audience behaviours.

Customization was also essential. T3 noted, "It would be great to adjust the age, gender, or engagement level of the audience depending on the client's specific fears." Similarly, T2 said, "Having the option to change the size of the audience or whether they're looking at the client is very important." These preferences demonstrate that therapists want granular control over environmental variables to match the structure of graded exposure therapy.

Therapists also highlighted the importance of clinician control and shared agency. While they acknowledged that client preferences matter, therapists ultimately wanted to guide the process. T1 said, "[Scenario settings] should be a conversation between patient and therapist, but ultimately the therapist should decide."

Several therapists also mentioned interest in integrating biometric data to support assessment. T3 said, "Physiological measures would be amazing, such as heart rate, heart rate variability, skin response, and possibly even EEG." This quote reflects a desire to incorporate objective feedback into sessions, as a way to supplement the self-reports that currently guide treatment.

4.3.4. Theme 3: Barriers to Adoption and Implementation.

Despite their overall enthusiasm, therapists identified several challenges that could limit the adoption of VR in clinical practice. The most frequently discussed barrier was the cost and complexity of the required equipment. T2 expressed concern about this, noting, "Some clients and therapists, especially older ones, might find it too hard to set up or use." T1 echoed this by stating, "I'm not super tech-savvy. If it's complicated, it could be a non-starter for a lot of people."

Concerns about data privacy were also present. Therapists emphasized the need for robust security protocols to protect client confidentiality. T1 explained, "I would need to confirm that no one can get into the digital logs and that the data doesn't leak to other places." Ensuring compliance with privacy regulations was seen as essential for any therapeutic technology, especially one handling sensitive exposure data.

A third barrier discussed was insurance reimbursement. In some regions, notably the U.S., therapists may struggle to get reimbursed for using VR-based tools. T1 mentioned that insurance might not recognize or pay for this kind of treatment yet. Although this is a systemic issue rather than a design flaw, it still influences whether therapists are willing or able to adopt such tools.

These concerns were grouped under this theme because they represent structural and practical obstacles that must be addressed if the tool is to be widely implemented in clinical settings.

4.3.5. Theme 4: Conditions for Effective Use and Implementation.

Therapists were clear that VR exposure should be used as a supplementary tool, rather than a standalone treatment. T1 explained, “it would first be [used] in therapy sessions, doing it together in the office, but [I would] also eventually let them access it on their own in between sessions.” This approach emphasizes the tool’s role in augmenting therapist-led care, rather than replacing it.

Several therapists noted that VR could be particularly helpful for clients who lack natural opportunities for exposure. T2 described a typical case: “Some patients don’t encounter social situations through work or school, so it’s extra challenging to get real-life practice. VR could help with that.” The ability to simulate specific social contexts, such as job interviews or public speaking, was seen as a major benefit.

Therapists also supported the inclusion of a neutral, onboarding environment to ease users into the experience. The virtual therapist office included in the prototype was well received. T1 described it as “a kind of virtual doorway before going into the actual exposure,” and T3 said, “It’s way better than just jumping into a stressful scene right away.” This theme captures the therapists’ broader vision for how and when the tool should be used, including the importance of clinician involvement, flexible session formats, and emotional safety for clients.

4.3.6. Summary of Interview Findings

The interviews revealed both enthusiasm and caution regarding the use of VR in exposure therapy. Therapists expressed a strong desire for realism, customization, and clinician control, while also acknowledging barriers such as cost, training, and privacy concerns. They viewed VR as most effective when used as a therapist-guided supplement to traditional treatment. These findings provided direct guidance for the prototype’s design, particularly the inclusion of adjustable exposure variables, a neutral onboarding space, and the possibility of therapist-led sessions. Further development should address the practical constraints identified, such as equipment complexity and data security.

Findings are summarized in Table 1, which maps therapist insights to specific design responses and outlines possible future development steps. A full list of coded responses and supporting quotes can be found in 8.5. Appendix E – Interview Analysis.

Table 1: Interview analysis summary.

Insight Category	Specific Therapist Need / Concern	Concrete Design Response in Prototype	Future steps
Scenario Relevance	Public speaking, interacting with strangers, job interviews, everyday errands (5 quotes)	Public-Speaking scenario implemented first; modular scene system allows restaurant/store variants	Add more scenarios
Realism & Immersion	"Trigger the right parts of the brain"; realistic environments & characters (4 quotes)	Photorealistic 3D assets, realistic audio/sound effects; NPC age/gender variables planned	Continue texture/lighting polish; diversify NPC library
Therapist Control	Therapist chooses settings; sees what client sees (5 quotes)	Desktop "Therapist Dashboard" controls environment, audience size, pause/exit; screen-share option	Add live "spectator cam" feed + session-record toggle
Gradual Difficulty	Adjustable audience size & therapist involvement (4 quotes)	Audience slider (none → small → medium → full); co-present vs solo modes	Implement NPC behaviour tiers (neutral to challenging)
Between-Session Access	Client homework practice (3 quotes)	Stand-alone client launcher planned; saves therapist-preset scenarios	Build cloud profile sync & progress log export
Biometric / Behavioural Metrics	Heart rate, gaze, avatar posture tracking (5 quotes)	API placeholder & data layer ready; Excel-export of slide-change times	Integrate heart rate sensor, eye-tracking heat map, and motion detectors
Data Privacy & Security	"No leaks, clinician-only data" (2 quotes)	Local-only data storage; opt-in encryption; GDPR-compliant consent dialog	Conduct penetration test; draft HIPAA addendum
Tech & Cost Barriers	Headset price, setup complexity, lack of training (7 quotes)	One-click installer; in-app tutorial; desktop fallback; rental-kit guideline	Create 5-min video tutorial; explore low-cost headset compatibility
Cultural / Remote Trends	Younger clients favour digital; post-COVID tele-therapy is normal (6 quotes)	VR-desktop cross-play enables fully remote sessions; neutral lobby lowers entry anxiety	User-testing with 40–60-year-olds to assess generational UX gaps

4.4. Playtesting Results

This section presents the results from a playtest session conducted with 11 participants who interacted with the VR prototype. The purpose of the playtest was to evaluate the tool's usability, scenario clarity, and perceived effectiveness as a support system for exposure therapy. After completing a short test session, participants answered a post-test questionnaire consisting of 15 items using a 5-point Likert scale (1 = Strongly Disagree; 5 = Strongly Agree). Data was analysed by calculating the mean and standard deviation for each item to understand overall user perceptions. A full breakdown of the calculated values is available in Table 18 in 8.9. Appendix I – Playtest Survey Analysis. Raw data of the results can be seen in 8.8. Appendix H – Playtest Survey Raw Data.

4.4.1. Usability & Navigation.

Items in this category measured how intuitive and navigable the prototype felt to users. The highest-rated item was "Changing the PowerPoint slides was simple and intuitive" with a mean score of 4,73 (SD = 0,45), indicating that users found basic interactions straightforward. The item "I understood what I was supposed to do in the prototype" scored slightly lower (M = 4,27, SD = 0,65), suggesting that while the interface was mostly intuitive, some users required additional guidance or context.

While playtesting, one participant commented: "The UI is very intuitive and the buttons are clear," reflecting positive impressions of interface usability.

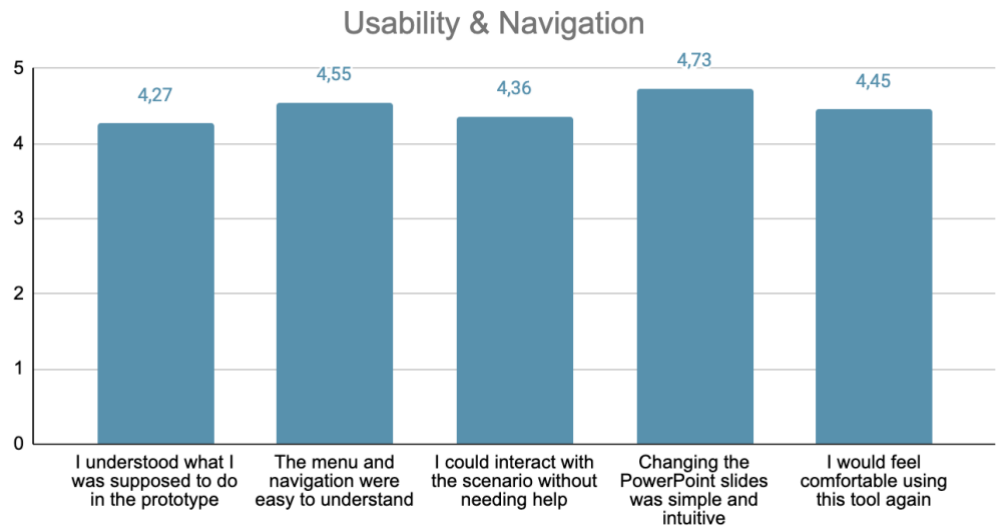

Figure 15: Usability & Navigation mean scores (1 = Strongly Disagree; 5 = Strongly Agree).

4.4.2. Scenario Clarity & Relevance.

These items assessed whether users found the public speaking scenario clear in its intent and relevant for addressing social anxiety. Both "I understood the purpose of the scenario for exposure therapy" and "The scenario felt relevant for people with social anxiety" received high ratings (M = 4,64; SD = 0,58 and 0,48 respectively), indicating strong alignment with therapeutic goals.

The item "The level of exposure in the scene felt appropriate" scored lower at M = 4.09 (SD = 0.76), reflecting a broader range of responses. Some participants noted they lacked familiarity with exposure therapy, which may have affected their ability to assess exposure levels.

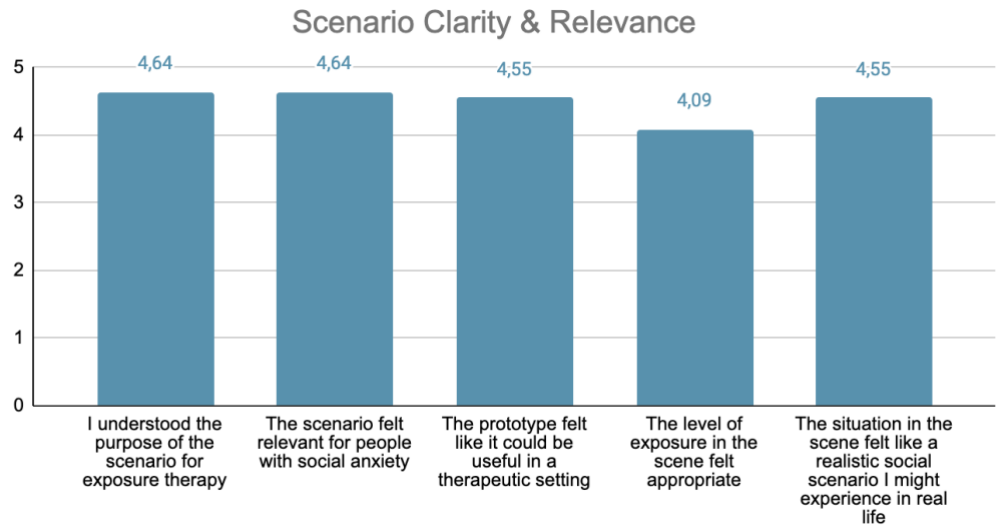

Figure 16: Scenario Clarity & Relevance mean scores (1 = Strongly Disagree; 5 = Strongly Agree).

4.4.3. Effectiveness & Future Improvements.

Participants generally viewed the prototype as a promising tool for therapeutic support. The statement “The prototype gave me an idea of what a real exposure therapy session might look like” received a mean score of 4,27 (SD = 0,63), while “I could imagine this being helpful for people who avoid in-person therapy” scored higher (M = 4,55; SD = 0,60). Interest in continued development was also strong, with “I think this tool could benefit from more customization options” rated at M = 4,55 (SD = 0,64).

One participant remarked, “NPCs need more detail to fit in with the rest of the graphics,” suggesting that while the core concept was well received, visual polish could improve immersion.

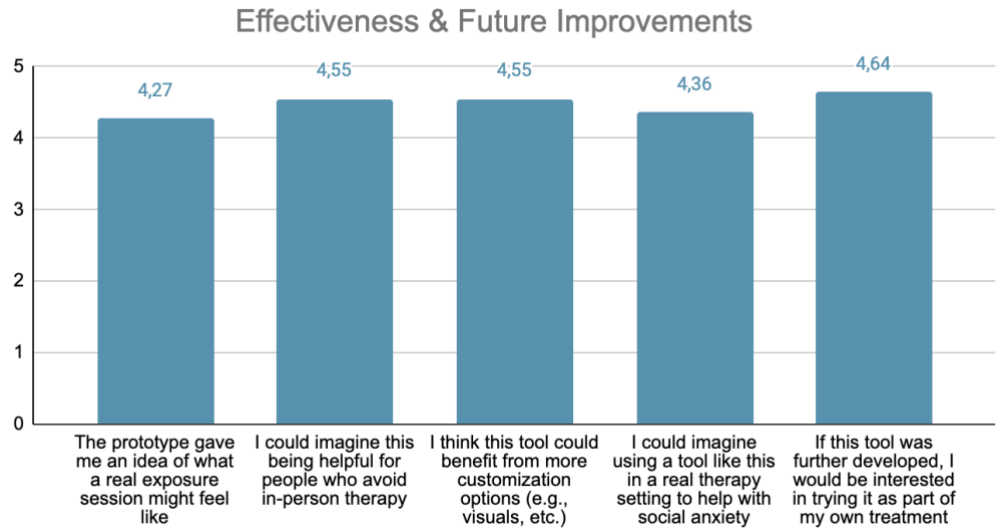

Figure 17: Effectiveness & Future Improvements mean scores (1 = Strongly Disagree; 5 = Strongly Agree).

4.4.4. Summary.

The quantitative data and participant feedback suggest that the prototype is functional, intuitive, and well-received in terms of its potential for supporting exposure therapy. Ratings across categories were consistently high, with only minor variation. Areas for future improvement include enhancing avatar realism, refining exposure levels, and testing with professional therapists to validate clinical relevance.

5. Discussion

This study explored how a therapist-guided virtual reality tool could be designed to support exposure therapy for social anxiety, while also offering a generalizable model for immersive clinical tools. Through a combination of therapist interviews, user surveys, and playtesting, several key insights emerged. Therapists highlighted the importance of realism, emotional safety, and control over exposure settings (4.3. Interview Results). In response, the prototype incorporated customizable environments, a transitional onboarding space, and therapist-side controls, which received high usability ratings in user testing.

Survey results helped identify the most socially stressful scenarios for users, namely public speaking, phone calls, and interacting with strangers, which directly shaped the selection of the first prototype scenario (4.2. Survey Results). Interviews reinforced the clinical relevance of these use cases and provided valuable suggestions that guided both the tool's structure and its therapist-facing features. Playtesting further demonstrated that the prototype was intuitive, well-received, and effective in simulating a therapeutic experience. However, variation in how challenging the exposure was perceived suggests a need for further refinement in future iterations (4.4. Playtesting Results).

This chapter discusses the findings in more detail, interpreting them through the lens of the theoretical frameworks, research questions, and wider implications for digital health and design.

5.1. Interpretation of Results

5.1.1. Alignment with Theoretical Frameworks

The design of the prototype aligns closely with the two guiding theoretical frameworks: exposure therapy principles and player-centred design with emotional safety.

In accordance with exposure therapy theory, features like adjustable audience sizes, real-time therapist presence, and a neutral onboarding space allow for graded exposure – a core therapeutic method shown to promote habituation and reduce avoidance (Craske et al., 2014; Powers & Emmelkamp, 2007). This structure enables the therapist to gradually introduce stressors in a controlled way, helping clients to confront anxiety-provoking situations at their own pace.

Equally, the design integrates principles of player-centred interaction and emotional safety. The use of a calm, familiar therapist office as the starting point reflects design practices aimed at easing users into more emotionally intense experiences (Herrero et al., 2014). This onboarding environment functioned as a "virtual doorway," as one therapist phrased it (4.3. Interview Results), giving users a chance to acclimate before entering a socially challenging

scenario. This suggests that emotionally sensitive VR design must include more than just scenario content—it must also carefully consider user onboarding, pacing, and perceived safety.

5.1.2. Therapist Perspectives and Clinical Alignment

Therapists confirmed the potential of the prototype to be integrated into real clinical workflows. They emphasized the importance of maintaining therapist presence, customizing scenarios, and monitoring client behaviour – needs that current solo-use platforms like *Psious* or *Amelia Virtual Care* often fail to meet (Freeman et al., 2017; Meyerbröker, 2021).

This feedback not only informed specific features but also shaped the conceptual design: rather than replacing therapy, the VR tool serves as a supplement that empowers therapists and enhances client engagement. This suggests that co-designing tools with therapists may be essential for meaningful clinical integration. In particular, the inclusion of multiplayer functionality and therapist-side controls stands out as a key innovation. It implies that future mental health technologies should go beyond patient-facing design and more deeply integrate therapist workflows and preferences.

5.2. Implications

5.2.1. Implications for Mental Health Practice

This study suggests that therapist-guided VR applications can meaningfully enhance traditional and remote therapy models. The ability to customize exposure tasks, observe client behaviour in real time, and gradually build challenge levels replicates the core mechanisms of exposure therapy. Moreover, therapists indicated that such tools could provide controlled scenarios when in vivo options are unavailable – such as for clients with limited social contact or mobility constraints (4.3. Interview Results).

The tool also aligns with blended care models, where digital tools support but do not replace therapy. Therapists envisioned the VR system being used in live sessions, followed by client-led practice between meetings – a model that reflect growing interest in hybrid mental healthcare (Lau et al., 2024).

5.2.2. Implications for Game Design and HCI

For the field of game and interaction design, this research illustrates how principles of user-centred design, immersion and emotional pacing can support therapeutic outcomes. The success of the prototype's interface, scenario flow, and safe-starting environment reflects how therapeutic VR design can benefit from insights in digital play environments.

Designers working in mental health technology must balance immersion with emotional regulation. This study demonstrated that affordances like exit controls, non-threatening environments, and gradual challenge levels can be adapted from entertainment games to support clinical applications.

5.2.3. Broader Applicability Beyond Social Anxiety

Although this thesis focused on social anxiety, the design architecture has broader relevance. The modular scenario system could support exposure exercises for other conditions, such as phobias (e.g., fear of flying), trauma related disorders (e.g., revisiting difficult situations), or even speech rehabilitation contexts. The therapist-controlled format has potential value in talk therapy or psychoeducation, where co-presence and environmental context may support empathy or skill practice. Additionally, the tool could be used as a training platform for future therapist, allowing them to practice (exposure) therapy exercises.

By framing the system as a generalizable platform for therapist-led interventions, this research contributes to wider discussions on digital health equity, remote care delivery, and the ethical implementation of immersive technologies in clinical settings.

5.3. Limitations

5.3.1. Sample Size and Generalizability

A major limitation of the study is its small sample size. Only three therapists were interviewed, and playtesting was conducted with 11 participants, most of whom were in the 18-24 age range. This may limit the generalizability of the findings to broader clinical or demographic populations.

However, this limitation is partially mitigated by the diversity of methods used. While interview numbers were low, the inclusion of a well-designed survey (n = 33) and a playtest study added important triangulation. The convergence of themes across all three methods – especially around emotional safety, realism, and therapist involvement – strengthens the credibility of the results despite the sample size. Furthermore, interviewees varied in therapeutic approach, years of experience, and national context, offering meaningful diversity even within a small group.

5.3.2. Scope of Implementation

The prototype included only one scenario (public speaking) and excluded several planned features (e.g., audience behaviour, demographic customization, and biometric tracking). This constrained the prototype's ability to demonstrate its full range of therapeutic applications.

Nevertheless, the public speaking scenario was highly validated by both therapists and users as clinically relevant. Additionally, the underlying architecture of the prototype was explicitly designed to support modular expansion. While the feature set was limited, the system's design choices suggest strong potential for generalization in future versions.

5.3.3. Use of Desktop VR Simulation

Due to logistical constraints, all playtesting occurred via desktop simulation rather than fully immersive headsets. This limited the ability to assess presence, depth of immersion, and embodied interaction. While this affects ecological validity, it also allowed a more accessible form of testing that prioritized core mechanics and interaction flows.

Despite the lack of headset use, participants still rated immersion and clarity highly. This suggests that strong design fundamentals, such as user interface and scenario clarity, can still offer valuable insight, even without full VR deployment. Future testing in immersive environments should explore how headset-based interaction affects user anxiety, realism, and therapeutic engagement.

5.3.4. Interview Data Collection Constraints

Finally, technical issues prevented audio recordings of the therapist interviews. Instead, real-time notes were used for qualitative analysis. This may have limited the depth and precision of the findings, as some nuance could be lost in paraphrased responses.

However, the use of structured coding frameworks and multiple rounds of review helped ensure analytic rigor. The emergence of strong, repeated themes across therapists also suggests that meaningful patterns were captured despite this limitation. For future research, full transcription should be prioritized to enrich detail and allow for more nuanced thematic interpretation.

6. Conclusion

6.1. Summary of key findings

This thesis set out to investigate how a VR exposure therapy tool could be designed to meet the needs of therapists and patients in treating SAD, particularly within blended or remote therapy contexts. The research was guided by three core questions: How to design a VR tool that aligns with therapeutic needs (RQ1), which scenarios are most relevant for VR-based exposure (RQ2), and how users perceive the tool in terms of usability and clinical potential (RQ3).

The final prototype enables real-time interaction between therapist and client in a shared virtual space, offering customizable environments that simulate public speaking tasks. Both quantitative and qualitative data suggest strong user interest and therapist support for such tools. The survey revealed that the most anxiety-provoking social situations, such as public speaking and job interviews, are also the ones users would most like to practice in VR. Interviews with clinicians emphasized the importance of emotional safety, realism, and therapist control. Playtesting further confirmed that the tool is usable and relevant, with high ratings for clarity and engagement.

Taken together, the findings demonstrate that therapist-guided VR applications can serve as viable clinical tools when carefully designed around emotional safety, gradual exposure, and collaborative flexibility. Although the current version focuses on social anxiety, its architecture and interaction model are flexible enough to support other psychological disorders and therapy formats.

6.2. Reflection on the process

Throughout the course of this project, I encountered a variety of technical, methodological, and personal challenges that provided valuable learning experiences. From a technical standpoint, developing a functional multiplayer VR application required managing complex synchronization systems and ensuring compatibility between VR and desktop platforms. Implementing therapist-controlled parameters within the virtual environment involved not just interface design, but thoughtful structuring of user flow to mirror therapy dynamics.

From a research perspective, the biggest challenge lay in ensuring that user-cantered design was meaningfully grounded in clinical practice. Conducting therapist interviews helped bridge the gap between academic theory and real-world therapeutic contexts. These conversations were particularly illuminating, as they revealed subtle needs, such as session pacing, onboarding rituals, and patient autonomy, that might not be captured in the literature alone.

Personally, this project holds deep significance for me. I have been wanting to work on this idea for a long time, and it felt incredibly rewarding to finally bring it to life. As someone with firsthand experience of social anxiety, the opportunity to design a tool that could one day make therapy more accessible and effective was both meaningful and motivating. It gave me a strong sense of purpose to know that I was not just building a technical prototype but creating something that has the potential to make a real impact in people's lives.

This dual role – as both a designer and someone who understands the problem space from personal experience – was a source of both insight and responsibility. While it helped me empathize with users' emotional needs, it also required me to stay critically aware of my own biases. Through rigorous feedback, literature review, and user testing, I was able to balance personal motivation with evidence-based development.

In the end, this project has been one of the most fulfilling creative and academic efforts I have undertaken. It strengthened my skills in research, design, and development, and affirmed my desire to pursue work that is not only technically challenging, but also socially meaningful.

6.3. Final Thoughts on Broader Implications

The outcomes of this thesis suggest that Virtual Reality has the potential to fundamentally enhance how therapeutic exposure is delivered, especially in contexts where traditional in-person therapy is limited by logistical, emotional, or geographic constraints. While social anxiety served as the initial focus, the underlying design model –real-time therapist-guided scenarios with adjustable levels of challenge – could be extended to support a range of disorders and treatment formats.

Beyond exposure therapy, this model may offer value in psychoeducation, trauma processing, communication skills training, or even talk therapy when paired with shared virtual environments. The ability to co-regulate experiences, customize stimuli, and repeat difficult interactions in safe, immersive spaces opens new possibilities for therapeutic engagement. As remote and hybrid therapy become increasingly normalized, especially post-pandemic, VR tools can play a key role in maintaining therapeutic presence, even when therapist and client are not physically co-located.

This project contributes not only a working prototype but a roadmap for future iterations that balance immersion with clinical realism, technical feasibility with emotional safety, and innovation with therapeutic ethics.

6.3. Recommendations

Looking ahead, several areas of future research and refinement have emerged from this project. First, the prototype should be expanded to include additional scenario types, such as job interviews, social gatherings, or customer service interactions. These were frequently requested in both survey responses and therapist interviews and would broaden the tool's relevance.

Second, features that enhance therapist monitoring, such as live camera views, session recording, and objective data tracking, should be prioritized. While the current prototype allows therapists to control and observe scenes, it lacks advanced metrics such as gaze tracking or physiological data, which were of interest to clinicians.

Third, clinical validation is essential. Future studies should assess therapeutic outcomes by using the tool in real sessions with clients undergoing treatment for social anxiety or related conditions. This will help determine how VR exposure compares to traditional methods in terms of efficacy, engagement, and dropout rates.

Fourth, accessibility remains a concern. Lowering the hardware and financial barriers through support for affordable VR headsets, 2D fallback modes, or clinic-based kits would help ensure broader adoption across different healthcare contexts.

Finally, therapist training and user onboarding need to be developed further. For this tool to be successfully integrated into mental health care, therapists must feel confident using it, and patients must understand what to expect. Instructional materials, walkthroughs, and guided demos will be necessary components in any full deployment.

By addressing these future directions, this tool has the potential to become a flexible and impactful resource in the evolving landscape of digital mental health care. The foundation laid in this project offers a solid base on which more complex, inclusive, and scalable VR therapy solutions can be built.

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8. Appendices

8.1. Appendix A –Survey Flyer

Want to Help Improve VR Therapy for Social Anxiety and Get the Chance to Playtest (Optional)?

Scan the QR-Code to fill out the short Survey!

- Only takes 5-10 minutes
- All answers are anonymous and confidential
- Open to anyone, no prior VR experience required.

This survey is part of a Master's thesis project at Uppsala University. Thank you for your participation!

Figure 18: Survey flyer with description and QR code

8.2. Appendix B –Survey Results Raw Data

1. How comfortable do you feel in the following social situations?

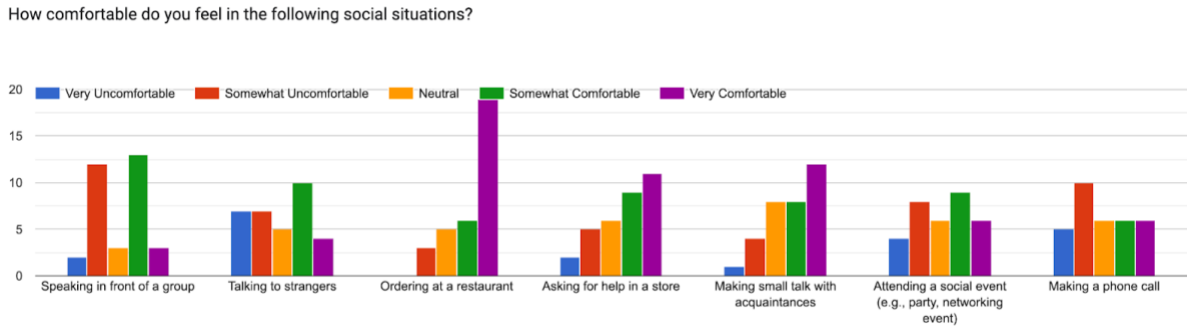

Figure 19: How comfortable participants feel in different social scenarios.

2. Do you ever avoid social situations due to nervousness?

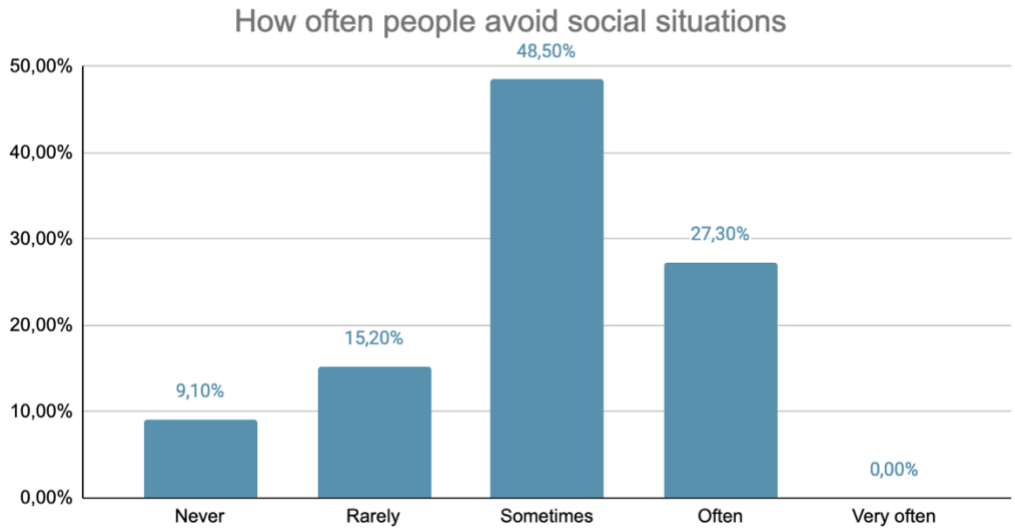

Figure 20: Percentages of participants who avoid social situations due to discomfort or nervousness.

3. If you do avoid social situations, what are the most common reasons?

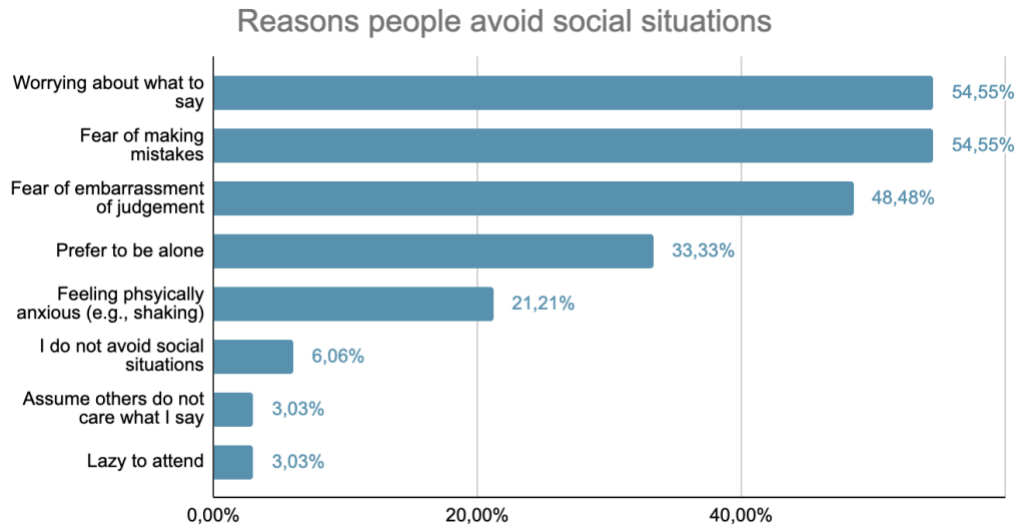

Figure 21: Most common reasons why participants avoid social situations.

4. Have you ever tried VR before?

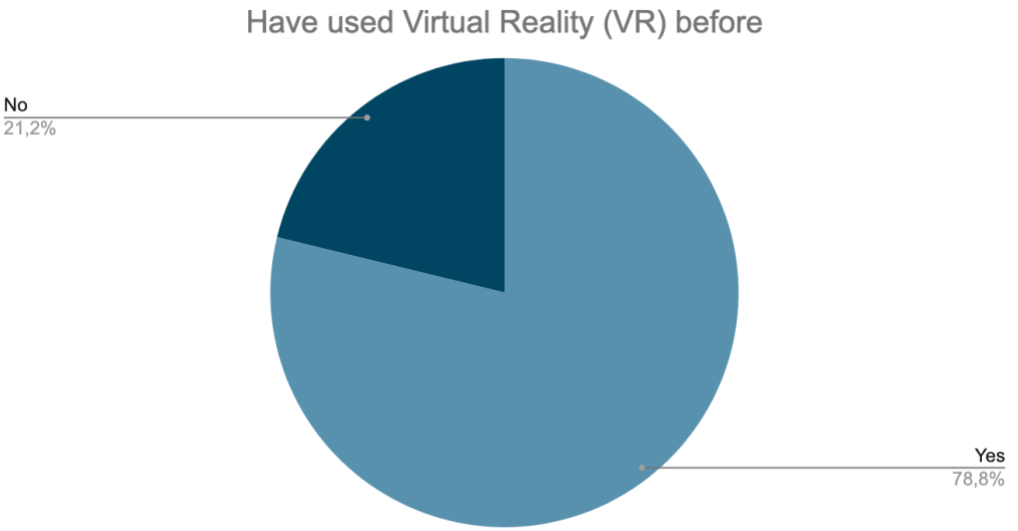

Figure 22: Percentage of participants who have used Virtual Reality (VR) before.

5. **If yes, in what context have you used VR?**

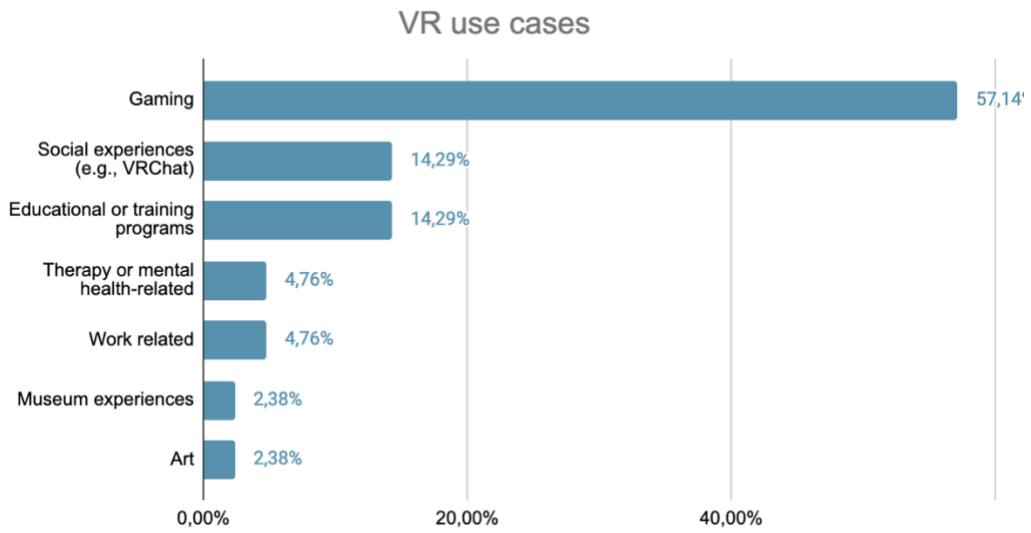

Figure 23: Contexts in which participants have used VR before.

6. **Do you regularly use digital tools for mental health or well-being?** (e.g., meditation apps, therapy platforms, guided breathing tools)

Figure 24: Percentages of participants who have or are currently using digital tools for mental health or well-being.

7. **If applicable, what tool(s) did you use and what did you like about them, or what benefits do you get from using them?**

A few therapy platforms, as well as self-help forums. They helped to a decent amount, but mostly taught me how to help me myself and how to internalize my issues
Again mistagged survey, do not use such stuff on myself, used to on my patients. Also after retirement I became a luddite essentially, only use this Linux desktop every Monday (hence why replying now) and only for the ar15.com forum and protonmail, I refuse to own a smartphone or use any kind of social media. 99% of my time is spent outdoors, at the shooting range I built on my property, away from any screens and electronics.
As stated, just for gaming, not for health or well-being. Benefit: entertainment and fun
I briefly used the app Mindler for online therapy sessions with a therapist as well as exercises on my own to deal with anxiety and (potential) depression.
Mindfulness apps that help me to relax and sleep
Name "Tide", I had a peace of mind with them
Online platform for therapy and self help resources funded by my workplace, called Modern Health.
release stress
Sleep Tracker
Vent, I liked that it allowed me to share my thoughts but the community was insane and it ended up being worse for my mental health.

8. **If you would use a VR tool to practice social situations in a therapy setting, what features would be important to you?** (Reminder: Your therapist would join you in the virtual world and act as a character in the tool, e.g. a salesperson or someone conducting job interviews)

A feature to stop at any point if it becomes too much for me. A feature to be able to really talk and express myself inside the VR tool.
For example considering a job interview (which I have less exposure to) it would be better to have like a Hr character with a voice, and questions that would improve the personality over time, stages of interviews (beginner, intermediate and advanced)
Realism, both graphical and environmental.
The realism of the situation and the believability factor for me to be convinced that it is a situation that could occur in real life
Would probably be better if it wasn't my therapist, since it would be less realistic since I already feel very comfortable around them (hopefully)
Wide range of situations - since i think for me it would be most useful for stressful situations like a doctor's office.
A comfortable environment
The accuracy of the setting would be really important. It should feel as close as possible to real life in order to actually successfully do practice, I think.
I find it hard to say because ive never had therapy

No idea
Read my previous explanations.
Ability to repeat scenarios Realistic but not overwhelming visuals and sounds Option to pause or step away at any time
subtle facial/body expression as feedbacks to my behaviors if possible
that there‘s room for error, being able to redo and retry situations and scenes
A realistic depiction of the social situation. One should be confronted with uncomftable situations to learn from them. Certain scenarios with differnet reactions from the npcs should be available to practise different reactions and allow a tailored therapy depending on the type of discomfort/anxiety.
Quality, wouldnt take seriously a low poly of my therapist, good communication, perhaps a pretty view since the sky is the limit
Speaking in front of a big group of people, also some job interviews.
Clear instructions and maybe develop personal growth from a game-based scenario
Realism of the setting
I think it'd be cool to be able to change the setting, like from an office to an underwater room or something lol. Also the mental health professional would need to actually be a professional for me to ever use it
Exposure therapy to situations that make me uncomfortable and give me anxiety with guided steps of how to break out of it
comfortability
help
Not sure
That I can interact with anything, maybe grab things to feel less stressed.
price
I think a very realistic environment would be very important to me, in order to be immersed and actually feel like I am in that social situation. Having immersive sound would also help
To have someone you‘re comfortable with, in it
I'm not sure. Maybe immersion? So it feels like a real situation.
I think involvement and guidance
The function of pausing and exiting anytime, and authentic scene settings that simulating the real life secenarios.
For me, things such as job interviews and other situations where I have to talk about myself or sell the idea of myself to someone are incredibly nerve wracking and therefore I think simulating those would be a helpful tool in VR.

9. What would help you feel safe and comfortable in a VR therapy session?

No idea
Maybe make the therapist more humanistic.

An understanding and fitting therapist, besides that anything goes
A professional discussion and feedback with/from the therapist.
If it’s only me and my therapist
Since I have a very limited experience with VR I'm not entirely sure? I think it's very based on how the therapist is as a person and how accommodating they are of my anxiety issues. As far as the VR element goes I don't have a very good answer.
It feels quite safe already.
Another person you know
Knowing that I can quit anytime I want, and positive feedbacks after the session (like encouraging words)
Yes
Not sure
no observers in actual environment; disconnection for short breaks anytime
No idea what such a session would look like, so I can't say
No judging
It needs to feel real
privacy
Feeling safe
Having a good exit strategy that allows me to naturally exit a situation. E.g. on-demand emergency phone call or something like that
Knowing I can exit the session at any time A clear plan from the therapist about what we'll do
Complete Privacy
That I'm in control at all time
Consent without the collection of personal data
I feel like a good dialogue with the therapist should be very important, like in reali life
Some kind of familiarity or the feeling of control, so I suppose customization maybe.
Comfortable scenery and sound
sitting down as in not having to stand. it not being recorded, leaving room to make mistakes
Knowing that the information does not get out, that it's a safe space for failure.
Familiarity with the software and headset before using it in a stressful situation -it would be nice to know what to expect before using it in a therapeutic setting. Even just if you did a tech-demo type situation first.
alone and privacy
guide
Relaxing environment

10. If you were to engage in exposure therapy to help with social discomfort or anxiety, which format would you prefer?

Figure 25: Format preference of exposure therapy for social discomfort or anxiety.

11. Why would you prefer this format?

Feels more direct, personal, intact with potential technological flaws and barriers
It’s easier to express emotions.
Due to the availability of it, as well as being able to be exposed to the uncontrollable situations more easily in a controlled environment
Either In-person or with VR. VR wouuld be a differnet and interesting approach and this rather playful tool would increase my wilingness to approach exposure therapy.
Feels more personal
In person feels the most like the real thing and therefore it might be the most effective form of exposure for me. However, depending on my anxiety levels that would be a large hurdle to cross. Therefore, having tools such as VR or online in combination with in person could be super beneficial, as it might feel a bit safer some people (including me).
I prefer no format, so cannot really answer this.
Idk
I think face to face would create binding between me and the therapist, and create trusting atmosphere, thus making the session more efficient and helpful.
Presence of a trusted person gives comfort.
A in-person therapist could make it obvious it's exposure therapy.
I prefer more personal interactions, such as eye-contact and other spontaneous feedbacks.
Seems like it would be the most realistic and require the least amount of tech
Just prefer in-person service
I dont know
cofotbality

Because it's most effective in my opinion
Personally, I feel a gigantic gap between virtual interactions and real life interactions, so I don't think that a virtual exposure therapy would work as well. Having a VR headset on would make a clear distinction in my mind between a "real" anxiety inducing situation and a "training exercise".
More natural
None
Not sure
Generally I would prefer in-person, but due to lack of knowledge on VR I could not select between them.
I feel like it would be like being in the "real thing" but being able to opt out at any moment
I kind of forced myself to tackle a lot of my anxiety through unguided exposure therapy (i.e.: fake it till you make it) so I don't have a strong opinion on this.
Want to overcome in my own time and not feel forced
i'm a huge fan of reading people, their body language and expressions and i can do that best IRL
I want to be able to be fully there in the moment with the therapist. I want them to be fully there as well and I don't mind being uncomfortable for it if I feel I can trust them.
My gut instinct is that being in person would be the most helpful but I am not that familiar with VR. I think if it was an option that was offered to me (i.e. rather than me specifically seeking it out) I would be more likely to seriously consider it.
Prefer alone
Via person emotions get transported better
I used to use VRChat to get myself to talk to people and it just made me more of a shut-in.

12. Would you be more willing to participate in exposure therapy if it were offered remotely (e.g., online with a therapist in VR) rather than in person?

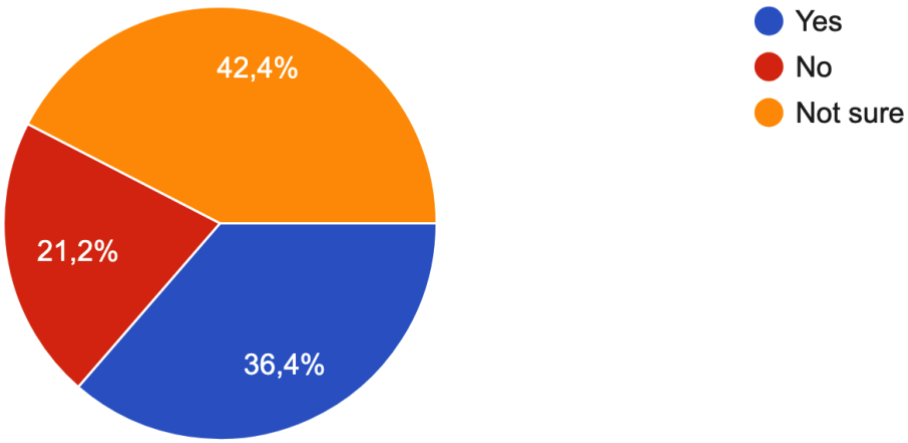

Figure 26: Would participants feel more willing to participate in exposure therapy if it were offered remotely.

13. Please explain your answer to the previous question:

Same as the doctor visits through phone online , I prefer the direct contact to make sure the specialist has the whole picture of my current state
I don’t know how efficient will be.
Partially yes, as it might make it easier to be exposed to my anxiety and combat it, but maybe a mix of both would be good? As there could be VR sessions to help with exposure, and follow up in person sessions to walk about it
Already explained everything, again badly mistagged survey.
The entry hurdle for a online session might be lower, but I beliefe a personal session would be more efficent.
Anything that is helpful ill try it
While my anxiety says no, therapy is good and I believe that exposure therapy really does help and something I could definitely need with some social situations.
I don't think that exposure therapy would have any benefit to me, as I don't think I have that much of social anxiety to actually help me, so if I had answered yes or no it would be made up.
Weil man leichten zugriff drauf hat
This can provide a new platform and more opportunities for patients and therapists to communicate
Depending on the context the answer would differ.
See above
I have participated in in-person therapy; I am also interested in vr remote therapy tho, but not sure if remote communication is more demanding to me. Personally, online communication requires more trust in the other side and devotion compared to face to face communication.
You just miss so much compared to a real life conversation, have to deal with tech, I prefer being in a dedicated "therapy space" as opposed to my home or wherever
No idea
I dont have therapy and I dont need it so i find it hard to imagine
safety
I prefer live interaction with therapists in particular
As I have stated before, I don't think digital exposure therapy would have the desired effect. Also, programs, such as VRChat allow for exposure therapy to social interactions in a VR (or flat-screen) format for free anyway, so a VR therapist would be a waste of money in my eyes.
I would rather go to common therapist sessions
I think id be indifferent on it since im used to media in different channels
If you do it remotely, you can feel safe by being in your own home
Like I mentioned above, I couldn’t help decide between them
I would maybe be even more comfortable doing it online, since I have never done it in real life
It would be more convenient to do exposure therapy at a distance than in person, and I also think it would be a good "baby step" instead of going from zero to one hundred.
If the times would be more accommodating, idk.

maybe, it depends with who it is. i'd prefer if it were in person but if it's a specific person that can only help me online then online also works
I want the 100% authentic real experience of whatever the therapist is cooking up for me. But! VR sounds like an awesome tool for people with worse anxiety around others.
I'm not particularly socially anxious in 1:1 settings, especially since i've done therapy lots of times throughout my life both in-person and online.
Remotely is more flexible
yes
I'm not sure I would find VR exposure therapy more beneficial, but I would probably be more willing to do it because I wouldn't actually be exposed as much.

14. Which social situations would you find most useful to practice in VR? (Select up to three)

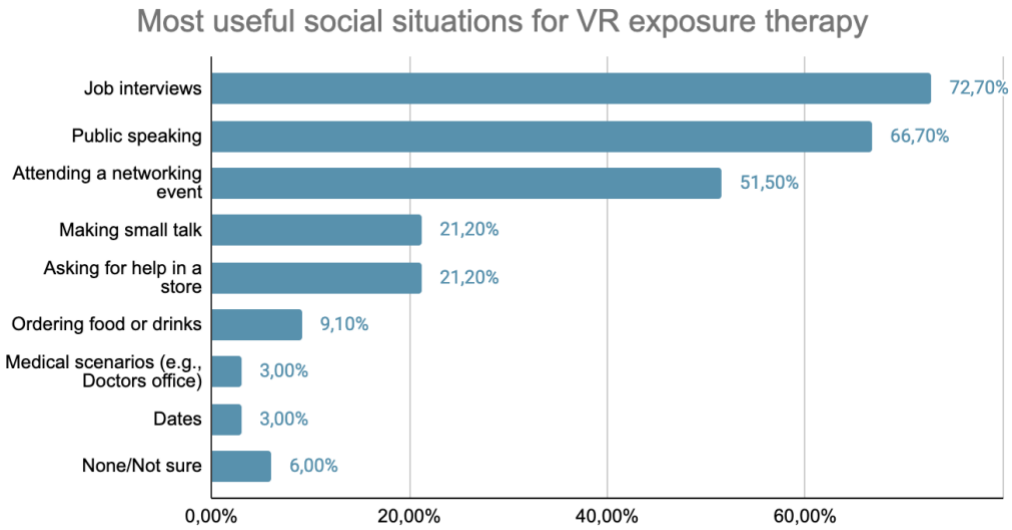

Figure 27: Most selected social situations to be useful in VR exposure therapy.

15. Would you consider using VR as a way to practice social situations in a therapy setting?

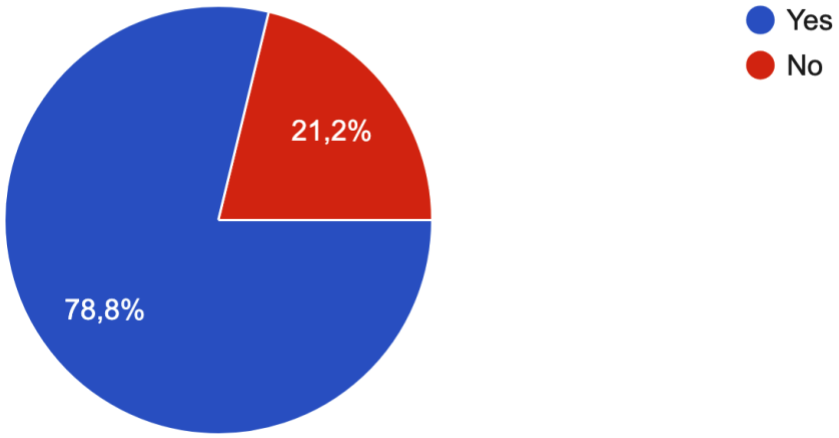

Figure 28: Willingness of participants to use VR as a way to practice social situations in a therapy setting.

16. Please explain your answer to the previous question:

I might try it as an experimental method, but would probably not consider it a long term prsctice
I think is a good way of practicing public speaking. Also some validation from the bots will be nice
I am always open to anything that could help me, so I'd be interested in trying it out to see if it works, as I feel like it would.
If the VR headset is provided and there would be no substantial additional costs for the therapy session.
Makes me get used to it
I think it's a super neat idea! It's a good in-between solution to regular online therapy (where you can't do that much as far as exposure therapy to these situations goes) and doing it in real life. I think it can really help people who have worse anxiety too, as it's a good first step to dealing with the issues that might feel more comfortable.
Same as previous explanation
To try new things
It would be convenient and private
Training through simulations is safer than real life.
Knowing its digital might make me behave differently
VR as a method for social situations could be practical since there are many online communication demands in reality like job interviews and connection with people in a long distance. In this case, VR could provide more realistic simulations.
I would at least give it a try
Could be applied across different fields at everywhere and anytime
I dont need therapy

nor natural
It might help with overcoming social anxiety
If the therapy session was in person, but using VR headsets to place us into a different environment from the office. In that case, I am still directly with a person, but we can place ourselves into the scenarios that the exposure therapy aims to help with. I guess it's more of an Augmented Reality rather than Virtual Reality, but yeah...
I could build confidence before trying things in real life
I think any practice is good as long as you clearly know that it wont turn out to be 100% perfect irl but still something to learn out of it
If the VR experience is good enough, it can be felt as the real situation
Yeah, I'm not much into VR for practising social situations, but it would be really helpful in having beforehand exposure to social situations like talking to strangers and interviews
I feel like it would be a format that would help me
I can definitely see the "roleplaying" of these situations as useful practice.
I don't really use VR or have any experience except for a museum viewing thing so I don't know how it would help
i think it'd be a cool concept to try.
Hey, real exposure therapy is expensive, budget version will do :)).
Sure - I definitely think it would've helped me when I was more socially anxious when I was younger. These days it might be less beneficial but I can see me doing it if my therapist thought it would be helpful.
You can use it anytime
No
I've done it before and I might consider it again if it were a more professional setting.

17. What is your age?

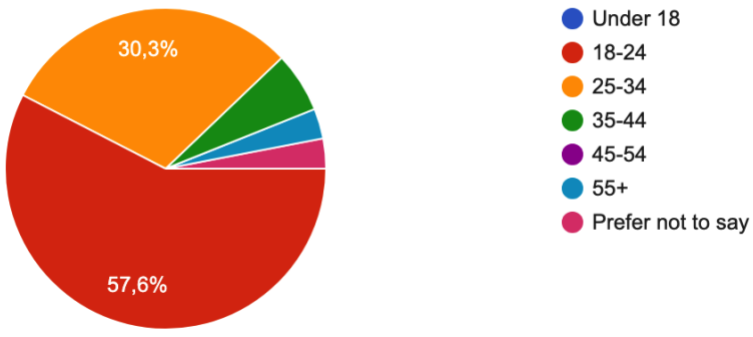

Figure 29: Age groups of participants

18. Have you ever attended therapy or counselling?

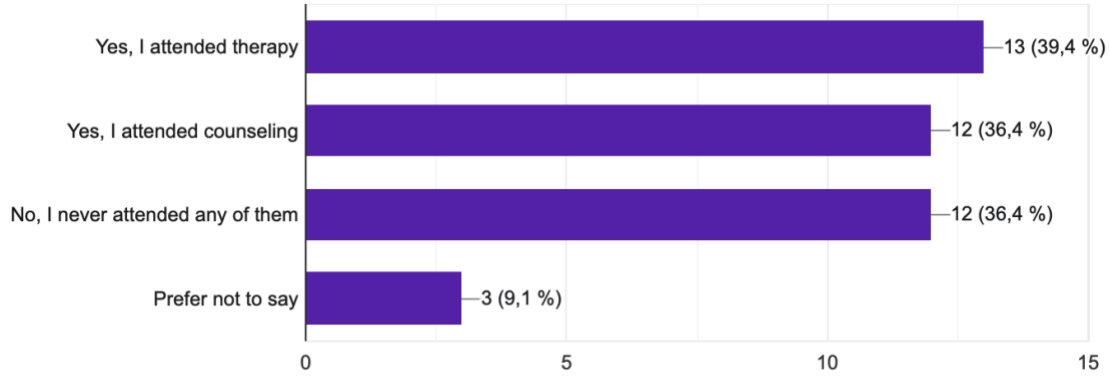

Figure 30: Therapy and counselling experiences of participants.

19. Is there anything else you would like to share about your experience with social situations or your thoughts on VR as a tool for exposure therapy?

Nope
I think it's a very useful and interesting concept that could help a lot of people
Read my explanation.
Nope
No
I think it's a great idea to be honest. Exposure therapy is something that I have struggled with and I can imagine many others feel the same way. Simulating uncomfortable situations in VR with an actual therapist could be a pretty groundbreaking way to help people overcome their anxiety, especially as a step on the way before trying exposure therapy in real life.
I have concerns as in how much that tool can actually help. If someone has troubles in social situations, how can a VR simulation can act as actual exposure? Don't you always have the feeling that it is...fake?
Nö
I think this is a project with great potentials, since VR as a tool for simulating would definitely be great for simulating scenes and let players to immerse themselves in.
NA
No
i am looking forward to the playtest :))
No
The requirement for VR as hardware in such a sensitive field is extremely high. So I would be more concerned about the degree of sophistication of such technology at the current stage.
No
no
It might help some people

I have always been struggling with social anxiety and it took me quite a few years to get to a point where I'm comfortable with social situations. This was mainly achieved through exposure to these situations, but I don't see how a therapist could have made it easier for me specifically.
I've often found social situations challenging, especially when there's pressure to perform or when interactions feel unpredictable. I believe VR has huge potential to bridge that gap, it could let people face their fears gradually while still feeling supported. It also allows for repetition, which is really important for building confidence.
I think it can be neat and def something many people with anxiety could use for helping ease the barrier
No
-
Very cool idea!
I think it's important to maintain a balance where the exposure takes prevalence over the user's comfort zone because otherwise it's not really exposure therapy at all.
No
no
... no, fuck you
I think VR could be really useful not only for social anxiety but also for exposure therapy in a phobia setting. I struggle with needle phobia and I think practicing a setting like a blood test could be really beneficial for me.
Job interview/call always make me nervous
no
N/A

8.3. Appendix C – Survey Analysis

If you would use a VR tool to practice social situations in a therapy setting, what features would be important to you?

Table 2: Important features for a VR tool to practice social situations in a therapy setting.

Theme	Description	Example Quotes	Frequency
Realism & Immersion	Desire for high visual, audio, and behavioural realism in both environments and character responses	"The realism of the situation and the believability factor…", "Immersive sound would also help"	13
Pause / Exit Options	Need for emotional safety by including features to pause or exit at any time	"Option to pause or step away at any time", "Feature to stop at any point if it becomes too much"	5
Comfort & Emotional Safety	Wanting a sense of control, familiarity, or soothing environments	"Comfortability", "To have someone you're comfortable with", "A comfortable environment"	5
Scenario Variety / Customization	Interest in different social situations, flexible settings, or unusual environments	"Wide range of situations", "Change the setting, like from an office to an underwater room…"	5
Repetition / Retry Functionality	Importance of practicing multiple times or making errors safely	"Ability to repeat scenarios", "Being able to redo and retry situations"	3
Guided Support / Therapist Role	Value of involvement or guidance from therapist, either within or alongside the VR	"I think involvement and guidance", "Guided steps of how to break out of it"	3
NPC Interactivity / Reactions	Wanting realistic NPCs with varied reactions or adaptive feedback	"Certain scenarios with different reactions from the NPCs", "Facial/body expression as feedback"	3
Game-Based Progression / Growth	Interest in gamified features that support development over time	"Develop personal growth from a game-based scenario", "Stages of interviews (beginner to advanced)"	2
Cost / Accessibility Concerns	Mention of pricing or equipment access	"Price"	1
Not Sure / No Experience with Therapy	Respondents who didn't know how to answer due to inexperience	"I find it hard to say because I've never had therapy"	1

What would help you feel safe and comfortable in a VR therapy session?

Table 3: What would help users feel safe and comfortable in a VR therapy session.

Theme	Description	Example Quotes	Frequency
Control & Ability to Exit	Emphasis on user control and the ability to stop the session when needed	"That I'm in control at all times", "Knowing I can exit the session at any time", "Good exit strategy, e.g., on-demand phone call"	8
Privacy & Data Security	Concern for privacy, confidentiality, and data safety	"Alone and privacy", "Consent without the collection of personal data", "Not being recorded," "That the information does not get out"	6
Therapist Support & Communication	Importance of therapist's demeanour, human connection, and ongoing dialogue	"Good dialogue with the therapist", "A clear plan from the therapist", "A fitting therapist", "Guide", "Professional discussion"	6
Comfortable Environment	Value of relaxing or soothing environment, both visual and auditory	"Comfortable scenery and sound", "Relaxing environment", "Sitting down", "It needs to feel real"	5
Familiarity & Preparation	Desire to be familiar with the VR equipment or have a non-stressful onboarding	"Familiarity with the software and headset", "Know what to expect", "A tech-demo type situation first"	3
Customization / Personalization	Interest in tailoring aspects of the experience for comfort	"Customization maybe", "Make the therapist more humanistic", "Another person you know"	3
Positive Feedback / Reinforcement	Suggestions to include encouraging, non-judgmental feedback	"Positive feedback after the session", "No judging", "A safe space for failure"	3
Uncertainty / Inexperience	Participants unsure due to lack of VR or therapy experience	"No idea what such a session would look like", "I'm not entirely sure"	2

Would you consider using VR as a way to practice social situations in a therapy setting?

Please explain your answer to the previous question:

People who said "No":

Table 4: Why participants would (not) consider using VR to practice social situations in a therapy setting

Theme	Description	Example Quotes
Lack of Need	Respondents felt they personally didn't require therapy	"I don't need therapy"
Lack of Familiarity	Discomfort or inexperience with VR technology	"I don't really use VR… so I don't know how it would help"
Preference for Realism	Preference for natural, real-world interaction over digital simulation	"Knowing it's digital might make me behave differently", "More natural"

People who said "Yes":

Theme	Description	Example Quotes	Frequency
Practice & Skill Building	VR seen as a way to rehearse social situations or build confidence	"Try new things", "Makes me get used to it", "Practice public speaking", "Roleplaying useful practice"	10
Convenience & Accessibility	Highlights VR as a low-barrier, easily repeatable, private tool	"You can use it anytime", "Convenient and private", "Budget version will do"	6
Curiosity / Openness to New	General interest or openness to trying new methods	"I think it's a super neat idea", "Would at least give it a try", "Always open to anything that could help me"	5
Limitations Acknowledged	Acknowledges it may not be a full substitute, but still helpful	"Not 100% perfect but still useful", "Might not consider it long-term, but I'd try it"	3
Validation & Feedback	Importance of receiving in-VR feedback, like from NPCs	"Some validation from the bots will be nice"	1
Previous Experience with VR	Had tried similar exposure before and are open to doing it again	"I've done it before… might consider it again if it were more professional"	1

Would you be more willing to participate in exposure therapy if it were offered remotely (e.g., online with a therapist in VR) rather than in person?

Please explain your answer to the previous question:

People who said "No":

Table 5: Why participants would (not) be more willing to participate in exposure therapy if it were offered remotely.

Theme	Description	Example Quotes
Preference for In-Person	Belief that in-person therapy is more effective or authentic	"I want the 100% authentic real experience", "Prefer direct contact", "Prefer being in a therapy space"
Scepticism Toward Digital	Distrust in digital/remote tools to provide meaningful exposure	"VRChat already exists for free", "Don't think digital therapy would have the desired effect"
Tech Concerns / Limitations	Mention of technical issues or reduced interaction quality	"Have to deal with tech", "You just miss so much compared to a real-life conversation"
Already Comfortable	Not socially anxious in therapy settings, no added benefit from VR alternative	"Not particularly socially anxious in 1:1 settings", "Done therapy in person and online"

People who said "Not sure":

Theme	Description	Example Quotes
No Therapy Need / Not Relevant	Respondents unsure because they don't currently need therapy or have low social anxiety	"Don't think I have much social anxiety", "I don't have therapy and I don't need it"
Depends on Therapist / Context	Openness depends on specific therapist, quality, or context	"Depends with who it is", "If it's a specific person that can only help me online…"
Mixed Preference / Flexibility	A blended approach might be best – not strictly online or in-person	"Maybe a mix of both would be good", "Online might be easier but in-person more efficient"
Uncertainty About Effectiveness	Unsure whether VR would be effective but curious or neutral about trying it	"Not sure I'd find it more beneficial", "Don't know how efficient it will be"
Communication Barrier	Concerns about trust or emotional connection in remote communication	"Online communication requires more trust", "Remote requires more devotion compared to face-to-face"

People who said "Yes":

Theme	Description	Example Quotes	Frequency
Convenience & Flexibility	Ability to access therapy more easily, from anywhere	"Remotely is more flexible", "Do it from home", "Easy access"	5
Emotional Safety & Comfort	Feels safer or less anxious in their own space	"Feel safe by being in your own home", "Would be even more comfortable doing it online"	4
Openness to Innovation	Interest in trying new therapy formats	"This can provide a new platform", "Anything helpful I'll try"	2
Beginner Step / Gradual Exposure	VR seen as a good first step before real-world exposure	"A good 'baby step'", "Could definitely need this for some social situations"	2

Is there anything else you would like to share about your experience with social situations or your thoughts on VR as a tool for exposure therapy?

Table 6: Final thoughts on VR exposure therapy and experiences with social situations.

Theme	Description	Example Quotes
VR Potential & Optimism	General support or belief in VR as a useful or promising tool	"Very cool idea!", "Could help a lot of people", "Great potential", "It's a useful and interesting concept"
Realism & Effectiveness Doubts	Concerns about how immersive or "real" VR can feel in terms of true exposure	"How can a VR simulation act as actual exposure?", "Don't you always have the feeling that it is… fake?"
Hardware & Accessibility Concerns	Scepticism about how accessible and advanced VR technology is for therapy	"Requirement for VR is extremely high", "Concerned about sophistication at current stage"
Support for Gradual & Repeatable Exposure	Value placed on repetition and gradual challenge within VR environments	"Could let people face their fears gradually", "Allows for repetition which is important"
Suggestions for Broader Use Cases	Ideas for using VR beyond social anxiety, such as for phobias or medical fears	"Could be useful for needle phobia", "Practice a blood test would be beneficial"
Balance Between Comfort & Challenge	View that therapy should push boundaries and not only offer comfort	"Exposure should take precedence over comfort zone or it's not really exposure therapy"
Personal Experience with Social Anxiety	Reflections on personal challenges in social settings	"Social situations have always been challenging", "Job interviews/calls make me nervous"
Therapist Role Uncertainty	Doubts about how much therapists can support or improve the exposure process	"I don't see how a therapist could have made it easier for me specifically"
Excitement for Playtest	Direct anticipation for testing the prototype	"Looking forward to the playtest :))"

8.4. Appendix D – Interview Raw Data

Interview 1

Would you be okay with the interview being recorded to make a transcript afterwards?

I will start with a few statistical questions about your background, then I have 15 questions that are divided into 5 sections.

Background info

1. **What kind of therapy do you practice?**

Psychodynamic therapy

2. **How long have you been practicing?**

Full time almost 11 years

3. **Which country do you mainly work in?**

United States

4. **On average, how many patients do you see per week?**

about 20-22

5. **How many of your therapy sessions do you conduct online compared to in person?**

all online, for the past 5 years

Digital tools in therapy

1. **Have you ever considered using digital tools (e.g. apps, online platforms, virtual environments) in your therapy sessions? Why or why not?**

Yes, just switched to using zoom for video platform because it has clear video and good noise cancellation (work from home so lot of noise)

used to use doxy.me -> switched away from it because of video quality and noise

have used person q global for personality assessment, but very rare

a. **Which tools have you used and in what context?**

b. **What worked well, and what didn't?**

2. Have you ever used or considered using VR specifically in therapy? What are your thoughts on it?

have considered it but haven't used it; because not having access on it, lack of training, logistical difficulties (providing it to patients)

would be interested without those issues

Exposure Therapy Practices

don't really use it

1. **How would you conduct exposure therapy for clients with social anxiety disorder?**

2. What are the biggest challenges when using exposure therapy for SAD, for both the therapist and the patient?

a. What about in terms of accessibility and logistics?

3. In your experience, what makes exposure therapy an effective treatment option for social anxiety disorder?

a. Do these factors differ across patients?

Social Anxiety Triggers & Therapy Structure

4. What kinds of social situations most commonly trigger anxiety in your clients?

grocery store, markets, parties and social situations

a. Have these changed over time (such as post-covid)?

stayed pretty similar; probably a small change during the worst but returned to normal

5. How do you determine the right level of exposure for a patient?

6. How do you currently track a patient's progress during exposure therapy?

progress notes and documentation

like the way I do it now, don't think there's other measures I would realistically use

a. Are there any methods or metrics you wish you had?

really like the idea of heart rate and physiological measures can be really useful

Features and Future of VR Therapy

7. If a VR exposure therapy tool was developed, what features would you want to include to make it effective for your practice?

having different situations (restaurant, store, party, etc.) being able to customize the situation (be able to change characters in the environment to be older or younger than the patient

settings should be a conversation between therapist and client but ultimately therapist should decide

if they have the ability to practice between session it would be useful for them to customize themselves

a. What features would help with customisation (colour schemes, timers, etc.)

8. What ethical concerns should be considered when using VR exposure therapy?

patient privacy (not selling data); making sure that information stays offline and within just the clinician

being representative - > having diverse characters in the game and not overrepresenting one group

9. If this tool was fully developed and accessible to therapists, how would you imagine using it in your practice?

it would first be in therapy sessions, doing it together in the office; but also eventually let them access it on their own in between sessions; make the software commercially accessible

could also imagine having 3-4 headsets and renting them to patients

eventually would love to be able to advertise the patients that I can do this and do it from a distance -> would be easier to get people with SAD to start therapy

having a virtual therapy office where we start the session where we can start

have your own office in VR would be cool

a. What role would it play - a supplemental tool during sessions, a tool for patients to practice alone at home, or an assessment aid?

10. What might prevent a clinic or an individual therapist from adopting such a VR tool?

despite what I mentioned earlier, the upfront cost; unfamiliarity; new way of therapy, concerns about therapy and making sure the data doesn't go everywhere

I have to advertise myself as a private clinician and it might be difficult to advertise it because clients might be sceptical

insurance reimbursement might be an issue

Culture and accessibility

11. In your opinion, are there any cultural factors from your country or region that affect how online therapy is received?

maybe for some people a taboo but covid changed it -> therapists tend to still prefer in person and being able to read body language -> VR could be useful

12. Has the popularity of online therapy changed in your country over recent years?

definitely -> went way up

Final questions

13. Would you be interested in a short demonstration of the current prototype and sharing your thoughts on it after the interview?

love it, it's really great

14. Do you know any other therapists or professionals that might be interested to participate in an interview like this?

yes -I will reach out

15. Do you have any final thoughts or comments about the idea of using digital tools or VR to support exposure therapy for social anxiety?

really liked the virtual waiting room in doxy -> procedural thing -> starting step by step

starting in a neutral environment before going to the social scenario

like a virtual doorway

Interview 2

Would you be okay with the interview being recorded to make a transcript afterwards?

I will start with a few statistical questions about your background, then I have 15 questions that are divided into 5 sections.

Background info

1. **What kind of therapy do you practice?**

At the moment internet based CBT; entirely digital; therapy for most common anxiety disorders (SAD, panic disorder, general anxiety, health anxiety, depression); patient work on their platform, they register their exposure exercises on the platform and they communicate with them on the platform to give feedback etc

2. **How long have you been practicing?**

licensed psychologist since September 2024

worked in training for a year before that (internet and normal CBT)

3. **Which country do you mainly work in?**

patients only in Sweden (need Swedish ID)

4. **On average, how many patients do you see per week?**

around 15 active treatments per week, but since contact only through messages (minimum one per week but depends on patients)

5. **How many of your therapy sessions do you conduct online compared to in person?**

Digital tools in therapy

1. **Have you ever considered using digital tools (e.g. apps, online platforms, virtual environments) in your therapy sessions? Why or why not?**

only their own digital platform (for taking notes, messaging, etc.)

a. **Which tools have you used and in what context?**

b. **What worked well, and what didn't?**

2. Have you ever used or considered using VR specifically in therapy? What are your thoughts on it?

haven't used it; think it's very interesting

haven't considered it because atm it's not a part of my workplace

heard about research regarding it and it sounded interesting

Exposure Therapy Practices

1. **How would you conduct exposure therapy for clients with social anxiety disorder?**

based on our treatment structure; before they start, they do exercises to formulate treatment goals and difficult situations that they want to be able to be in or do sth differently

after that, they are asked to formulate exposures related to their goals; then ask them what they can think of; if they struggle I will give some examples or suggestions on different levels, related to their goals -> try to involve the patient as much as possible

if the exposure needs to be broken down into different parts or patient thinks its too difficult, I will help them with it

2. What are the biggest challenges when using exposure therapy for SAD, for both the therapist and the patient?

for SAD: sometimes patients have a lot of negative thoughts regarding what others think about them and they have a hard time to move their focus from their thoughts to the situation; if they are not present during the exposure but stuck in their head too much (behaviour or what others think) exposure won't have the same amount of effects; patients don't get the new experience that I want them to have because they have just physically been there but not mentally

a. What about in terms of accessibility and logistics?

yes, can be challenges and extra challenging for a patient that doesn’t have social situations they encounter naturally through work or school (on sick leave or no work/school; sometimes due to SAD); then it's hard to find good exposure situations because they don't have any situations that occur naturally, so we have to create them

can be harder to relate the situations to the patient's goal, because forced situations are far away from it or its difficult to find the right level, because made up situations are too difficult

3. In your experience, what makes exposure therapy an effective treatment option for social anxiety disorder?

mostly that the person gets new experiences from being in a social situation and try out different behaviours and think about the situation in a different way (had different safety behaviours or things that they always did before; now they find new behaviours) -> outcome of the situation improves by acting different (more eye contact; being more talkative) -> more positive experience -> that is more important than their level of anxiety being lower (but that can be a plus)

trying other behaviours and trying to see how their own behaviour affects the social contexts and the people around them

a. Do these factors differ across patients?

Social Anxiety Triggers & Therapy Structure

4. What kinds of social situations most commonly trigger anxiety in your clients?

a lot of public speaking/speaking for a large number of groups (almost everyone with social anxiety; some only have this) -> when they need to perform or present something; for some people that's just the top of the hill

talking to people that you don't know or are only slightly familiar with

a. Have these changed over time (such as post-covid)?

was a student during covid so didn’t work before the pandemic; can only speculate

think I have noticed that esp younger patients talk about social anxiety in a digital format (anxious in a zoom lecture or meeting and being on camera; anxious in voice chat with friends while playing games) -> also before covid but now more

5. How do you determine the right level of exposure for a patient?

beginning of treatment, person gets to give examples of situations that they had the last days and triggered their anxiety; look at those to get an idea of what level of exposure could be sufficient; also what their goal is and what they want to achieve;

based on this find a situation that the patient feel comfortable doing but is still challenging ; usually happens in a dialogue with the patient (either they come up with an idea themselves, or I give examples if they need help); important to increase exposure over time

6. How do you currently track a patient's progress during exposure therapy?

for me, patient register what kind of exposure they are planning for the coming week (if I think it sounds like reasonable exposure)

patient fills out a form about the exposure afterwards (how did it go, did you fulfil your goals, etc.) -> I give feedback on what is good and if there is anything I wonder about and ask more specifically what they did/how it went

a. Are there any methods or metrics you wish you had?

haven't really thought about it

not sure if I would like biometrics for heart rate because I don't know how valid it would be and how helpful it is; as long as the person is doing new things and moving forward with their goal the level of anxiety isn't as important; it would be interesting with some type of other measures -> when you have physical face to face treatment you can see how they behave (safety measures, etc.) -> would be interesting to have measures like that -> some type of measure that could give me info about the person's behaviours

Features and Future of VR Therapy

7. If a VR exposure therapy tool was developed, what features would you want to include to make it effective for your practice?

some level of customisation so that the patient feels that the scenario is relevant (the most common ones should be there -> public speaking, interacting with strangers, etc.)

features that make the situation seem as realistic as possible so that it feels realistic for the patient and triggers the right parts of their brain like a real situation

as a therapist, would be interesting if I could see what the patient sees or see the patient as an avatar and their behaviour and see what they say to give feedback (ask specific question or talk louder)

a. What features would help with customisation (colour schemes, timers, etc.)

8. What ethical concerns should be considered when using VR exposure therapy?

9. If this tool was fully developed and accessible to therapists, how would you imagine using it in your practice?

I’m not that familiar with current VR technology and what is possible; maybe it's difficult when you don't see the patient physically so I wouldn't be able to be in the room with the patient

would be great if we can work together remotely on the exercise in VR and I could remotely get info on how it went and support the patient

a. What role would it play - a supplemental tool during sessions, a tool for patients to practice alone at home, or an assessment aid?

if I would do face to face therapy, it would be the most effective to treat it as a normal exposure exercise -> first do the exercise together with the patient then let the patient do it alone (same with VR so patient can practice at home in VR)

but for digital therapy; we don't have sessions so we wouldn't be able to do it together with the patient so it would be homework for the patient on their own and that would be fine as well

10. What might prevent a clinic or an individual therapist from adopting such a VR tool?

people that are in charge don't have a lot of knowledge about it (didn't read any research so don’t know its effective or has been tested) -> too little knowledge about VR in general and VR in therapy specifically

costs: buying the equipment

logistics: it's easier to stick to what works at the moment

Culture and accessibility

11. In your opinion, are there any cultural factors from your country or region that affect how online therapy is received?

I think it has become more popular, esp. since the pandemic (probably not just in Sweden but worldwide) -> people prefer online therapy

new treatments are being developed and tested so specialized treatment offers improve (also digitalisation and younger people are more open to digital therapy because they are used to digital tools) -> also used to social connections and contacts online; not unfamiliar to them

for older generation it might still be unfamiliar or weird

12. Has the popularity of online therapy changed in your country over recent years?

Final questions

13. Would you be interested in a short demonstration of the current prototype and sharing your thoughts on it after the interview?

really cool how you could customize it in so many different way

really like that can have so many options and there are many common SAD situations (matches what I said before); very good that you could customize it in exposure levels (audience size, how involved the therapist is) -> it's what you would do in a face to face exposure

graphics looked really good and realistic with powerpoint and realistic environment (small conference room with powerpoint slide a lot of people can relate to

could have even more customisation options for specific people like gender of the audience/other person

14. Do you have any final thoughts or comments about the idea of using digital tools or VR to support exposure therapy for social anxiety?

Interview 3

Would you be okay with the interview being recorded to make a transcript afterwards?

I will start with a few statistical questions about your background, then I have 15 questions that are divided into 5 sections.

Background info

1. **What kind of therapy do you practice?**

Clinical psychologist, psychotherapy and specifically working with neurodivergent clients (Autism, ADHD, etc.) or working on issues in relationships (couples, family therapy

2. **How long have you been practicing?**

since 2012; licensed since 2019

3. **Which country do you mainly work in?**

United states, California, greater LA area

4. **On average, how many patients do you see per week?**

usually around 15-18

5. **How many of your therapy sessions do you conduct online compared to in person?**

50% online 50% in person

Digital tools in therapy

1. **Have you ever considered using digital tools (e.g. apps, online platforms, virtual environments) in your therapy sessions? Why or why not?**

using telehealth platform (like teams but more security)

use electronic health record software for record keeping

2. **Have you ever used or considered using VR specifically in therapy? What are your thoughts on it?**

not myself but have heard of people using it and I have colleagues (veterans for ptsd treatment); think it would be interesting because it would give me an advantage in marketing

familiar with research saying its useful; I never tried it but I believe the research; some of my contacts would really like it

I'm intrigued

Exposure Therapy Practices

I do exposure therapy but not for phobia; I do relational exposure (practicing relationships)

1. **How would you conduct exposure therapy for clients with social anxiety disorder?**

2. **What are the biggest challenges when using exposure therapy for SAD, for both the therapist and the patient?**

not for SAD but for his case: creating a sense of realism and making it feel like in the real world

something will work in therapy but at home it feels different so they get different results

a. **What about in terms of accessibility and logistics?**

for me, I don't think that has played a problem

for classic exposure therapy more common (spider phobia -> finding a spider)

3. **In your experience, what makes exposure therapy an effective treatment option for social anxiety disorder?**

one of the root causes of SAD is the expectation that when I put myself out there I will face rejection, etc. -> often by evidence of the persons story and lack of experiences

when treating SAD -> we look at getting repetition of getting ourselves out there -> show that situations are risky but humiliation is rare (example 1 in 20 cases) -> that's why you need practice

a. **Do these factors differ across patients?**

yes, because different patients have different experiences and different exposure to rejection or humiliation

60% of people think if a social situation goes wrong I can protect myself and my humility -> the other 40% are at risk of SAD

Social Anxiety Triggers & Therapy Structure

4. **What kinds of social situations most commonly trigger anxiety in your clients?**

being in social situations with unfamiliar people (ppl I don’t know I can trust to like me); social gathering where there are a lot of strangers; dates (feels like there is an evaluations); business meetings; interviews

a. Have these changed over time (such as post-covid)?

depends on who you are talking to

for the generation that was becoming adults during covid (gen z, gen a) -> struggle with more SAD -> critical moments of hanging out with people that didn't happen during lockdown

5. How do you determine the right level of exposure for a patient?

typically, one of the first patient is working on a SUOD scale -> identify fears and triggers that exist on different point on that scale (1-10) -> find things that are low and work their way up

6. How do you currently track a patient’s progress during exposure therapy?

my tracking progress is on how well a patient is able to regulate their anxiety (if I can go through a situation without feeling anxious afterwards, successful)

a. Are there any methods or metrics you wish you had (e.g. heart rate, etc.)?

physiological measures would be amazing (heart rate, heart rate variability, skin response, and possibly brain waves EEG (delta vs alpha waves))

Features and Future of VR Therapy

7. If a VR exposure therapy tool was developed, what features would you want to include to make it effective for your practice?

accessibility esp. when doing therapy online (getting the equipment to the client, setting it up, etc.)

love the idea of biometric tracking -> wouldn't have to rely on subjective self-reports

realism (make it realistic)

flexibility and adaptability (different situations that fit to the patient)

a. What features would help with customisation (colour schemes, timers, etc.)

ability to personalize it would be cool

if I was a big organisation, more details would be fun, but I work alone so don't have much time

8. What ethical concerns should be considered when using VR exposure therapy?

biggest one is confidentiality (making sure that we can maintain all of the normal protocols; data doesn't leak to other places) -> need to be able to confirm that no one can get into the digital logs

duty to protect clients from anything harmful -> not expose them to further risk of physical or emotional danger

if AI is part of it that would be a grey zone

9. If this tool was fully developed and accessible to therapists, how would you imagine using it in your practice?

a few things

one idea is being able to be as close as possible to the in person format (reading clients body language) -> way better than camera online therapy

couples do teletherapy during workday they are in different placed -> getting them in the same place together

a. What role would it play - a supplemental tool during sessions, a tool for patients to practice alone at home, or an assessment aid?

more interested in using it during the session so I can help them in real time

if they can use it at homework would be cool once they are comfortable

10. What might prevent a clinic or an individual therapist from adopting such a VR tool?

def the extent to which someone is good with tech -> being comfortable with the idea of VR and setting it up, hardware, etc. -> for therapist and also client

accessibility, price

Culture and accessibility

11. In your opinion, are there any cultural factors from your country or region that affect how online therapy is received?

many younger clients feel more comfortable with online therapy than older clients

paranoia about online therapy is also a factor

otherwise not much of a difference in background

12. Has the popularity of online therapy changed in your country over recent years?

drastically

before 2020 I never did online therapy (it wasn't the norm); since then I’m now half online

it's nice because it expands accessibility so I can treat people from all over CA and it expands my market

Final questions

13. Would you be interested in a short demonstration of the current prototype and sharing your thoughts on it after the interview?

environments and the elements of the exposure feel very realistic

for presentation upload custom powerpoint so clients can practice real presentations that they have coming up

I’m really impressed

14. Do you have any final thoughts or comments about the idea of using digital tools or VR to support exposure therapy for social anxiety?

I think it sounds awesome

cutting edge stuff

it’s probably where it's headed

it's inevitable to use new tech

its nice that you interview therapists

8.5. Appendix E –Interview Analysis

8.5.1. Thematic analysis

Exposure therapy practices.

Table 7: Coding table of exposure therapy practices.

Code	Quotes	Mentions
Tailored to individual goals	"We try to involve the patient as much as possible." – T2, "We look at those [recent experiences] to get an idea of what level of exposure could be sufficient." – T2, "Based on a SUOD scale… find things that are low and work their way up." – T3	3
Behaviour change as goal	"Trying other behaviours and seeing how their own behaviour affects the social contexts." – T2, "Outcome improves by acting different." – T2, "We look at getting repetition… to show that humiliation is rare." – T3	3
Incremental difficulty	"Important to increase exposure over time." – T2, "Find things that are low and work their way up." – T3	2
Supportive therapist-patient dialogue	"If they struggle, I will give examples or suggestions… dialogue with the patient." – T2, "Usually happens in a dialogue." – T2	2
Lack of real-world exposure opportunities	"Hard to find good exposure situations… don't encounter them naturally." – T2	1
Challenges with presence / internal distraction	"Patients have a hard time moving their focus from their thoughts to the situation." – T2, "They've just physically been there but not mentally." – T2	2

Desired VR features.

Table 8: Coding table of desired VR features.

Code	Quotes	Mentions
Scenario variety	"Restaurant, store, party, etc." – T1, "Public speaking, interacting with strangers, etc." – T2, "Different situations that fit the patient." – T3	3
Realism & immersion	"Should trigger the right parts of their brain like a real situation." – T2, "Make it realistic." – T3, "Graphics looked really good and realistic with PowerPoint." – T2 (prototype feedback), "Environment elements of the exposure feel very realistic." – T3 (prototype feedback)	4
Therapist-led control	"Settings should be a conversation between patient and client but ultimately therapist should decide." – T1, "I could see what the patient sees… give feedback." – T2	2
Behavioral realism	"Be able to change characters… older or younger than the patient." – T1, "See the patient as an avatar and their behaviour." – T2	2
Flexible exposure (difficulty)	"Audience size, how involved the therapist is—exactly what you'd do in face-to-face exposure." – T2, "Start small and build up, like you'd do in real life." – T3	2
Between-session access / homework	"Eventually let them access it on their own in between sessions." – T1, "Patient can practise at home in VR." – T3	2
NPC diversity & visuals	"Diverse characters in the game, not over-representing one group." – T1	1
Interface / simplicity	"Needs to be easy for clients who aren't tech-savvy." – T3	1

Anticipated barriers.

Table 9: Coding table of anticipated barriers of VR implantation to therapy.

Code	Quotes	Mentions
Technical / cost	"Up-front cost." – T1, "Buying the equipment." – T2, "Getting the equipment to the client, setting it up." – T3, "Hardware, etc." – T3, "Logistics: it's easier to stick to what works at the moment." – T2	5
Training & familiarity	"Lack of training, logistical difficulties (providing it to patients)." – T1, "People in charge don't have knowledge about VR in therapy." – T2, "Extent to which someone is good with tech… for therapist and client." – T3	3
Data privacy & security	"Patient privacy (not selling data)." – T1, "Need to confirm that no one can get into electronic logs." – T3	2
Therapeutic alliance / realism concerns	"Therapists still prefer in person and being able to read body language." – T1, "Creating a sense of realism… something works in therapy but at home it feels different." – T3	2
Insurance / reimbursement scepticism	"Insurance reimbursement might be an issue." – T1	1

Social Anxiety Triggers.

Table 10: Coding table of social anxiety triggering situations.

Code	Quotes	Mentions
Public speaking & performance	"Public speaking/speaking for large groups (almost everyone with social anxiety)." – T2, "Business meetings; interviews." – T3	2
Talking to unfamiliar people	"Talking to people you don't know or are only slightly familiar with." – T2, "Being in social situations with unfamiliar people." – T3	2
Crowds & social gatherings	"Grocery store, markets, parties and social situations." – T1, "Social gathering where there are a lot of strangers." – T3	2
Romantic/Intimate situations	"Dates (feels like there is an evaluation)." – T3	1
Post-COVID digital interactions	"Zoom lecture or meeting and being on camera." – T2, "Voice chat with friends in games." – T2, "Gen Z… didn't get key social exposure during lockdown." – T3	3

Tracking and measurement methods.

Table 11: Coding table of tracking and measurement methods of patient progress.

Code	Quotes	Mentions
Self-report logs & forms	"Patient registers what kind of exposure they are planning for the coming week." – T2, "Fills out a form about the exposure afterwards." – T2, "Progress notes and documentation." – T1	3
Progress via behaviour change	"How well a patient is able to regulate their anxiety." – T3, "As long as the person is doing new things and moving forward with their goal." – T2	2
Desire for behavioural data	"Would be interesting to have measures [like safety behaviours]." – T2, "See how they behave physically." – T2	2
Interest in biometrics	"Physiological measures would be amazing." – T3, "Heart rate and physiological measures can be really useful." – T1	2
Scepticism of physiological data	"Not sure how valid [biometrics] would be." – T2	1

Role and Use Case of a VR Tool.

Table 12: Coding table of possible roles and use cases of a VR tool.

Code	Quotes	Mentions
Use during sessions	"First do the exercise together… then let the patient do it alone." – T2, "More interested in using it during the session so I can help them in real time." – T3	2
Use for homework / between sessions	"Eventually let them access it on their own in between sessions." – T1, "Patient can practise at home in VR." – T3, "Would be homework for the patient on their own." – T2	3
Remote therapist involvement	"Would be great if we can work together remotely on the exercise in VR." – T2	1
Could expand reach / marketing	"Would give me an advantage in marketing." – T3, "Would love to be able to advertise… do it from a distance." – T1	2

Ethical Considerations.

Table 13: Coding table of ethical considerations related to VR implementation to therapy.

Code	Quotes	Mentions
Data privacy and confidentiality	"Patient privacy (not selling data)." – T1, "Need to confirm that no one can get into electronic logs." – T3	2
Emotional safety / not overwhelming users	"Duty to protect clients from anything harmful… not expose them to further risk." – T3	1
Representation and diversity	"Having diverse characters in the game and not overrepresenting one group." – T1	1
Concern over AI integration	"If AI is part of it, that would be a grey zone." – T3	1

Summary of Key Findings and Future Steps to take.

Table 14: Summary of key interview findings and future steps to take.

Insight Category	Specific Therapist Need / Concern	Concrete Design Response in Prototype	Future steps
Scenario Relevance	Public speaking, interacting with strangers, job interviews, everyday errands (5 quotes)	Public-Speaking scenario implemented first; modular scene system allows restaurant/store variants	Add more scenarios
Realism & Immersion	"Trigger the right parts of the brain"; realistic environments & characters (4 quotes)	Photorealistic 3D assets, realistic audio/sound effects; NPC age/gender variables planned	Continue texture/lighting polish; diversify NPC library
Therapist Control	Therapist chooses settings; sees what client sees (5 quotes)	Desktop "Therapist Dashboard" controls environment, audience size, pause/exit; screen-share option	Add live "spectator cam" feed + session-record toggle
Gradual Difficulty	Adjustable audience size & therapist involvement (4 quotes)	Audience slider (none → small → medium → full); co-present vs solo modes	Implement NPC behaviour tiers (neutral to challenging)
Between-Session Access	Client homework practice (3 quotes)	Stand-alone client launcher planned; saves therapist-preset scenarios	Build cloud profile sync & progress log export
Biometric / Behavioural Metrics	Heart rate, gaze, avatar posture tracking (5 quotes)	API placeholder & data layer ready; Excel-export of slide-change times	Integrate HR sensor (e.g., Polar H10) + eye-gaze heat-map in later release

Data Privacy & Security	“No leaks, clinician-only data” (2 quotes)	Local-only data storage; opt-in encryption; GDPR-compliant consent dialog	Conduct penetration test; draft HIPAA addendum
Tech & Cost Barriers	Headset price, setup complexity, lack of training (7 quotes)	One-click installer; in-app tutorial; desktop fallback; rental-kit guideline	Create 5-min video tutorial; explore low-cost headset compatibility
Cultural / Remote Trends	Younger clients favour digital; post-COVID tele-therapy is normal (6 quotes)	VR-desktop cross-play enables fully remote sessions; neutral lobby lowers entry anxiety	User-testing with 40–60-year-olds to assess generational UX gaps

8.6. Appendix F – Flowchart

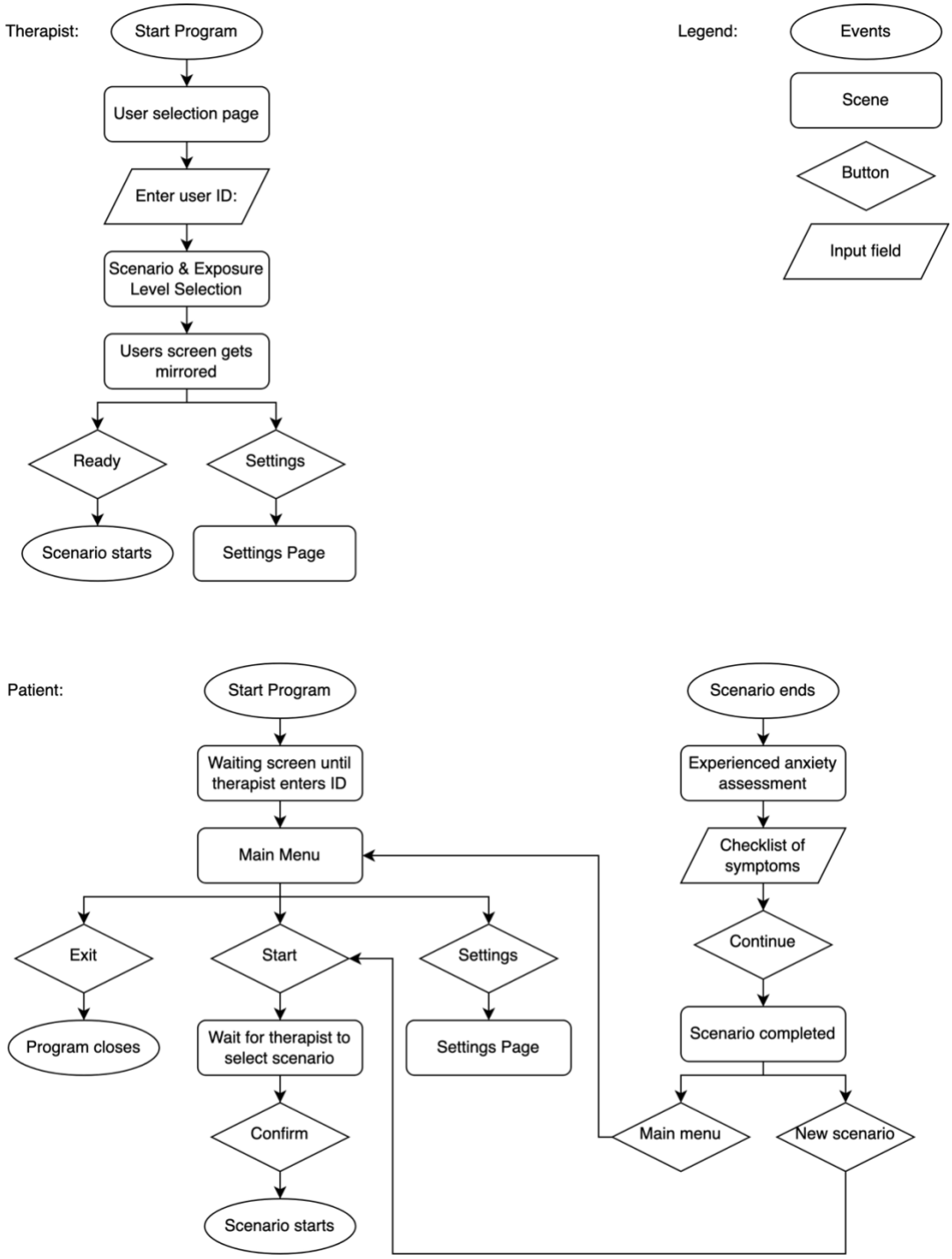

Figure 31: Flowchart of the prototype.

8.7. Appendix G – Playtest Survey Questions

Name (Optional)

Usability & Navigation

1. I understood what I was supposed to do in the prototype
2. The menu and navigation were easy to understand
3. I could interact with the scenario without needing help
4. Changing the PowerPoint slides was simple and intuitive
5. I would feel comfortable using this tool again

Scenario Clarity & Relevance

1. I understood the purpose of the scenario for exposure therapy
2. The scenario felt relevant for people with social anxiety
3. The prototype felt like it could be useful in a therapeutic setting
4. The level of exposure in the scene felt appropriate - not too overwhelming, but still challenging
5. The situation in the scene felt like a realistic social scenario I might experience in real life

Effectiveness & Future Improvements

1. The prototype gave me an idea of what a real exposure session might feel like
2. I could imagine this being helpful for people who avoid in-person therapy
3. I think this tool could benefit from more customization options (e.g., visuals, etc.)
4. I could imagine using a tool like this in a real therapy setting to help with social anxiety
5. If this tool was further developed, I would be interested in trying it as part of my own treatment

8.8. Appendix H – Playtest Survey Raw Data

Usability & Navigation

Table 15: Survey results on Usability & Navigation.

I understood what I was supposed to do in the prototype	The menu and navigation were easy to understand	I could interact with the scenario without needing help	Changing the PowerPoint slides was simple and intuitive	I would feel comfortable using this tool again
Agree	Strongly Agree	Agree	Agree	Agree
Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree
Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree
Strongly Agree	Agree	Agree	Strongly Agree	Agree
Agree	Strongly Agree	Agree	Strongly Agree	Strongly Agree
Strongly Agree	Agree	Strongly Agree	Strongly Agree	Strongly Agree
Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree
Agree	Strongly Agree	Neutral	Strongly Agree	Agree
Agree	Disagree	Agree	Agree	Agree
Agree	Strongly Agree	Agree	Strongly Agree	Strongly Agree
Agree	Strongly Agree	Agree	Strongly Agree	Agree

Scenario Clarity & Relevance

Table 16: Survey results on Scenario Clarity & Relevance.

I understood the purpose of the scenario for exposure therapy	The scenario felt relevant for people with social anxiety	The prototype felt like it could be useful in a therapeutic setting	The level of exposure in the scene felt appropriate - not too overwhelming, but still challenging	The situation in the scene felt like a realistic social scenario I might experience in real life
Neutral	Agree	Strongly Agree	Agree	Strongly Agree
Strongly Agree	Strongly Agree	Neutral	Disagree	Agree
Strongly Agree	Strongly Agree	Agree	Agree	Agree
Strongly Agree	Agree	Agree	Neutral	Neutral
Strongly Agree	Agree	Strongly Agree	Agree	Strongly Agree
Agree	Agree	Strongly Agree	Neutral	Agree
Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree
Strongly Agree	Strongly Agree	Agree	Agree	Strongly Agree
Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree
Strongly Agree	Strongly Agree	Strongly Agree	Agree	Agree
Agree	Strongly Agree	Strongly Agree	Agree	Strongly Agree

Effectiveness & Future Improvements

Table 17: Survey results on Effectiveness & Future Improvements.

The prototype gave me an idea of what a real exposure session might feel like	I could imagine this being helpful for people who avoid in-person therapy	I think this tool could benefit from more customization options (e.g., visuals, etc.)	I could imagine using a tool like this in a real therapy setting to help with social anxiety	If this tool was further developed, I would be interested in trying it as part of my own treatment
Agree	Agree	Strongly Agree	Strongly Agree	Agree
Agree	Strongly Agree	Strongly Agree	Neutral	Agree
Agree	Agree	Neutral	Agree	Neutral
Agree	Neutral	Agree	Agree	Strongly Agree
Strongly Agree	Strongly Agree	Strongly Agree	Agree	Agree
Strongly Agree	Strongly Agree	Agree	Strongly Agree	Strongly Agree
Agree	Agree	Strongly Agree	Agree	Strongly Agree
Neutral	Strongly Agree	Agree	Agree	Strongly Agree
Agree	Strongly Agree	Strongly Agree	Agree	Strongly Agree
Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree
Neutral	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree

8.9. Appendix I – Playtest Survey Analysis

Table 18: Median values and standard deviations of post-test survey questions.

Question	Mean	SD
Usability & Navigation		
I understood what I was supposed to do in the prototype	4.27	0.65
The menu and navigation were easy to understand	4.55	0.80
I could interact with the scenario without needing help	4.36	0.69
Changing the PowerPoint slides was simple and intuitive	4.73	0.45
I would feel comfortable using this tool again	4.45	0.52
Scenario Clarity & Relevance		
I understood the purpose of the scenario for exposure therapy	4.64	0.58
The scenario felt relevant for people with social anxiety	4.64	0.48
The prototype felt like it could be useful in a therapeutic setting	4.55	0.60
The level of exposure in the scene felt appropriate (not too overwhelming, but still challenging)	4.09	0.76
The situation felt like a realistic social scenario I might experience in real life	4.55	0.50
Effectiveness & Future Improvements		
The prototype gave me an idea of what a real exposure session might feel like	4.27	0.63
I could imagine this being helpful for people who avoid in-person therapy	4.55	0.60
I think this tool could benefit from more customization options	4.55	0.64
I could imagine using a tool like this in a real therapy setting to help with social anxiety	4.36	0.50
If this tool was further developed, I would be interested in trying it as part of my own treatment	4.64	0.58

8.10. Appendix J – Reference Images for 3D Environments

8.10.1. Therapist Office

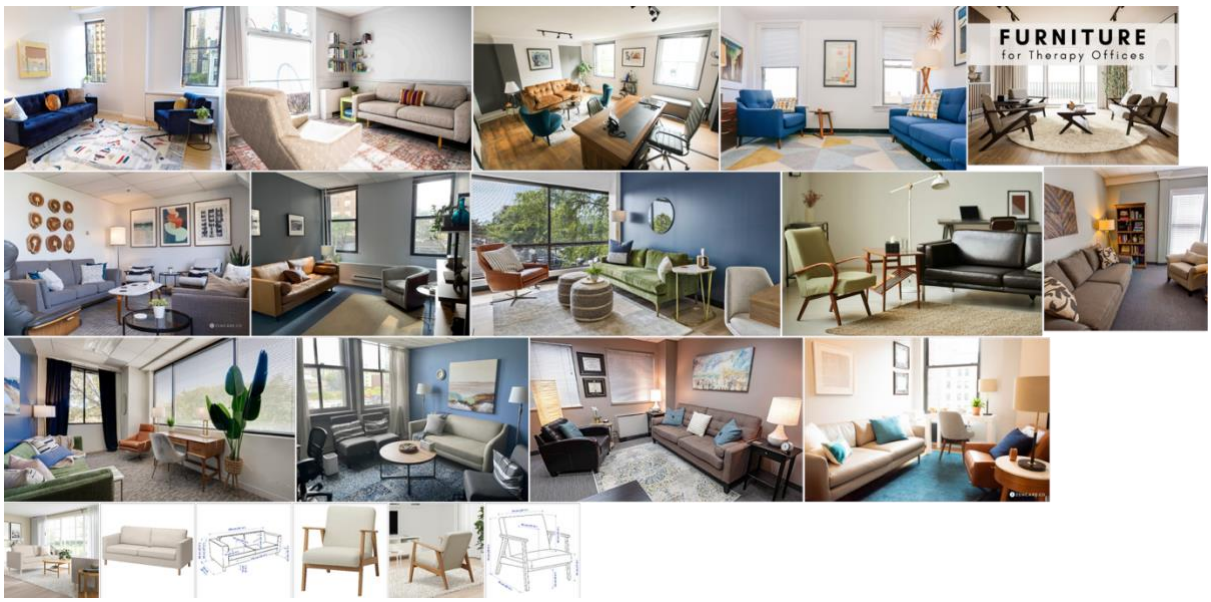

Figure 32: References images for the 3D modelled therapist office.

8.10.2. Conference Room

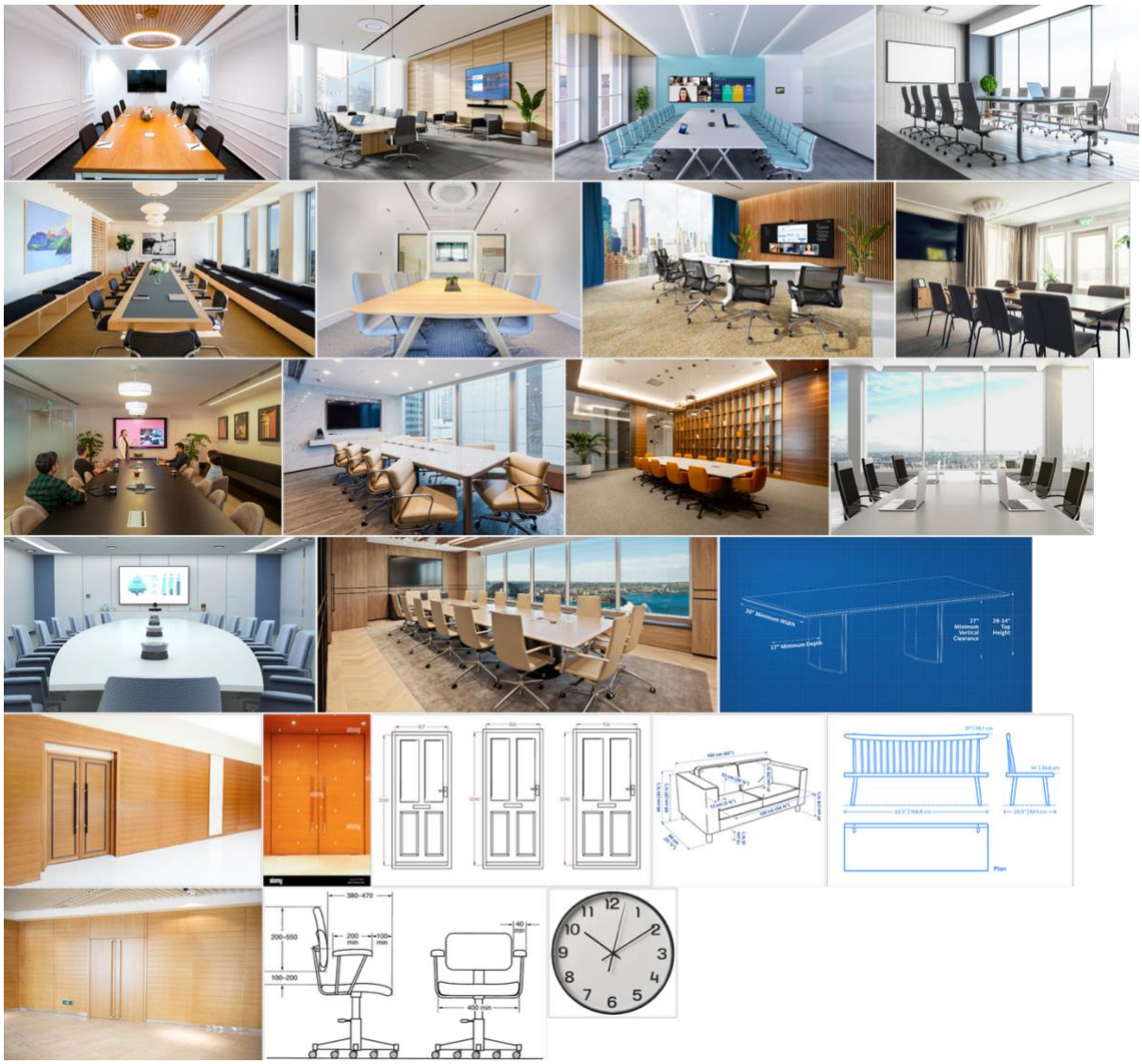

Figure 33: References images for the 3D modelled conference room