Simulating Interviews through the Virtual and Two-Dimensional Planes: A Comparison

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Abstract

For many college students, much of the stress and anxiety originates from academic and professional challenges, such as the preparation for job interviews. Our research investigates how different levels of immersion—2D gamified systems versus Virtual Reality—affect improving interpersonal skills and reducing stress among Wellesley College students as they prepare for interviews. Based on existing research on Extended Reality (XR) technology and their effects on mental health, we hypothesize that VR systems, due to its immersive nature, will be more effective in reducing stress and improving postgraduate readiness compared to 2D systems.

Using a within-subject study design, participants completed the Bodyswaps Job Interview Simulator in both formats while their stress and anxiety levels were assessed through self-reported questionnaires. Our initial findings showed no statistically significant differences in stress reduction, helpfulness or immersion. However, VR was generally favored over 2D due to realism and feedback quality. This research highlights the comparative benefits and limitations of both systems for stress reduction and skills training. As such, more research is needed to gain further insight on 2D gamified and VR systems regarding stress reduction and interpersonal skills.

Key-words

Virtual Reality, 2D Gamification, Job Interview Simulation, Stress Reduction, Human-Computer Interaction.

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1. Introduction

College students frequently experience stress and anxiety related to academic and professional challenges, including job interviews. These situations often require strong interpersonal skills, which can be affected by coalescent anxiety. With the growing integration of extended reality (XR) technologies, tools such as Virtual Reality (VR) and 2D gamified systems offer innovative approaches to training and stress management. This study investigates how these two levels of immersion—VR and 2D systems—impact Wellesley students' stress levels and interpersonal skill development during job interview preparation.

Guided by existing research on XR's impact on mental health and soft skill training, we

hypothesized that VR, due to its immersive nature, would be more effective in reducing stress and enhancing interview readiness compared to 2D systems. To test this, we conducted a within-subject study using the Bodyswaps Job Interview Simulator on both the MetaQuest VR platform and iMac for 2D. Participants completed pre- and post-study questionnaires (e.g., State-Trait Anxiety Inventory) to assess stress and anxiety levels, as well as physiological measures (heart rate monitoring) and qualitative feedback to evaluate system usability, perceived realism, and effectiveness.

Our findings suggest that while both systems were helpful and enjoyable, VR was rated higher for perceived realism and feedback quality, despite no significant differences in stress reduction between the two systems. Feedback highlighted the need for further development to enhance the comfort and accessibility of VR systems. This study provides insights into the comparative advantages of VR and 2D gamified systems for job interview preparation, contributing to the broader field of XR applications in education and career development.

2. Related Work

There are a lot of existing applications and research on using extended reality technologies as well as gamified 2D systems for education, stress management, and simulations for anxiety. Existing literature highlights that XR technologies, particularly VR, can have a positive impact on mental health, social anxiety, and skill acquisition. The most common form is the use of in-virtuo exposure through different applications like social immersive training, and embodiment illusions for rehabilitation purposes. Specifically, a lot of research has been done on using VR and 2D applications for social skills training and exposure therapy [21, 7], which allows for a safe space for participants to practice instead of being thrown into real-life scenarios. A good training system needs to invoke a semi-realistic environment and an appropriate level of anxiety, for users to practice and be able to reflect on their experience and develop methods to deal with their anxiety or fears [6].

Through a literature review done in 2021, researchers found that out of the 41 studies reviewed on AR and VR interventions for social skills training for students with autism spectrum disorder, 63% of studies considered the intervention effective, 10% ineffective, and 27% mixed results [10]. They concluded that effectiveness was based on student motivation and attitude towards the technology, as well as personalizations of treatments by parents, educators, and students. There also was a study comparing the efficacy of usual cognitive behavior therapy versus VR exposure therapy, which found that there was no significant distinction in efficacy. The authors in fact argue that the development of VR has not yet been developed enough to be used for clinical treatment [12]. However, various clinicians and practicing psychiatrists have argued for the use of these technologies as a supplement in addition to clinical treatment. The benefits in particular are the customization of simulations, levels of immersion, lowered engagement gap, and easy repeatability [19, 13, 14]. Both 2D applications and VR can help to reduce perceived efforts of patients and increase full engagement, which can help with encouraging users to continue treatment.

However, there are certain trade-offs with VR applications, such as sensory issues and physical discomfort, disembodiment, and the uncanny valley phenomenon [11]. Both disembodiment and uncanny valley can generate negative

emotions and feelings of eeriness, with disembodiment affecting self-perceptions and uncanny valley affecting perceptions of avatars and characters [15]. Because there is a disconnect between how characters are animated, especially when they are designed to be hyper-realistic, this may leave users feeling unsettled by the system, which would distract them from the purposes of the simulation or therapy.

3. Goals and Research Questions

There is a growing interest in using VR as a tool for mental health and anxiety support, especially for social skills training and exposure therapy. VR interventions are praised for repeatability and other advantages, but at this stage, still have a high barrier in effectiveness and accessibility. Using this as a key motivator for our research, the primary goal of this study is to explore how the different levels of immersion we investigate - Virtual Reality and 2D systems - affect college students' coalescent anxiety. Since anxiety and stress impact how students function, we also investigate its impact on their soft skill development, specifically in the context of job interview preparation. In summation, our research seeks to comparatively evaluate the effectiveness of these systems in reducing anxiety and stress. To achieve this goal, we created the following research questions as a guide:

3.1 Stress Reduction.

How do VR and 2D systems differ in their ability to reduce participants' stress levels before, during, and after simulated job interviews?

3.2 VR's Impact.

Can VR offer effective interventions in mental health and career development?

3.2 Interpersonal Skill Development.

To what extent do VR and 2D systems improve participants' interpersonal and interview skills, as perceived by the participants and measured through feedback and assessments?

3.3 Participants' Preferred System.

Do participants show a preference for one system over the other based on factors such as comfort, perceived realism, or helpfulness?

4. Methodology

In this section, we detail the methodology of our research, including our research population, the procedure, data collection, and data analysis. The experiment was designed to gain insights into participants' stress levels before and after the experiment as well as attitudes toward soft skill development after using the interview simulator, Bodyswaps. The study was a within-subject study, meaning participants used both systems in the experiment: the MetaQuest VR system and the iMac 2D gamified system. The interview simulator was on both systems with the same settings to ensure this component was controlled. All studies were conducted in person in a human-computer interaction lab.

4.1 Participants

Participants were recruited at an undergraduate liberal arts university using convenience sampling via email, text, and appointment scheduling software. A total of 20 participants (N=20) signed up for the study, with 19 participants currently enrolled at the university and 1 participant an alum from the university.

Participants were female and nonbinary ranging from the ages of 18 - 23. The participants randomly chose to start with the 2D gamified system or the VR system, with both systems evenly distributed among participants (N=10).

4.2 Questionnaire Design

4.2.1 Pre-Study Questionnaire. The pre-study questionnaire consisted of 4 sections: Demographics, Stress and Anxiety Assessment, General Stress, and Anxiety Levels, and Open-Ended Questions. The Stress and Anxiety Assessment and General Stress and Anxiety Levels sections were required to be answered by participants while the other sections were optional questions. The questionnaire was based on the State-Trait Anxiety Inventory, a self-reported questionnaire to measure a person's tendency to feel anxious when in stressful situations [18, 7]. The two required sections were adapted to measure participants' state and trait anxiety regarding job interviews and preparation. We used this questionnaire to better understand participants' baseline levels of stress and anxiety before continuing the study.

4.2.2 Post-Study Questionnaire. Participants filled out two post-study questionnaires: a post-2D questionnaire and a post-VR questionnaire. Both questionnaires consisted of four sections: Perceived Stress, STAI (State-Trait Anxiety Inventory) - Assessing State Anxiety in the Moment, System Specific Application Questions, and Open-Ended Feedback. Only the STAI section was required but all participants (N=20) answered questions in the first three sections. The open-ended feedback sections had 18 responses (N=18) for the 2D system and 17 responses for the VR system (N=17). The Perceived Stress was to measure, on a 1-5 scale, how anxious participants were before, during, and after the session. The System Specific section was to track how immersive and realistic each system was, with the purpose being to track which system participants felt inclined to use. Finally, the open ended questions were meant to gauge participants' opinion on the system, how it can be improved, and which components impact their experience the most.

4.3 Bodyswaps

To measure the impact of the two levels of immersion on the participants' stress levels and soft skill development, we employed the Bodyswaps Job Interview simulator. This system is available on both 2D systems (PC, Mac, etc,) and VR (Vive, MetaQuest, etc.) with similar environments. We selected Bodyswaps due to its ability to simulate realistic interview scenarios, including a virtual interview and built-in feedback mechanisms. After completing each question or module, participants could review their responses, allowing them to identify areas of improvement (tone, how fast they were talking, body language, etc.). It is important to note that while most feedback mechanisms were the same across body systems, the VR system had the added capability of tracking participants' body language and eye contact. Bodyswaps has multiple modules but we chose the job interview simulator module for the experiment, as we were not testing the impact of specific training modules of the system. Participants answered 5 "combo" questions - "combo questions" in this instance meaning a combination of Classic, Goal, Character, Competency, and Curveball-oriented job interview questions. This design allowed us to measure and assess participants' stress responses and their ability to engage with various types of interview questions, simulating the unpredictability of real-life interviews.

4.4 Procedure

The study was conducted in a controlled environment in the university's human-computer interaction lab. Each participant, in individual sessions, completed the experiment in two phases - with both the 2D gamified and VR system used by the end of the session. Participants randomly selected which system to start with to control for order effects on the experiment.

4.4.1 Introduction and Pre-Study Process. When participants arrived, they were briefed on the goal and procedure of the study. We obtained verbal informed consent before the study began. Participants completed the pre-study questionnaire to obtain information on their baseline stress and anxiety levels - as detailed in 4.2.1. After completion of the survey, they were given an overview on how to interact with both systems, like setting up the microphone for the iMac 2D platform and using the MetaQuest VR system.

4.4.2 Simulation Sessions. Each participant engaged with the Bodyswaps Job Interview Simulator on both systems consecutively with a questionnaire break between each system. The simulations presented five "combo" questions - as described in 4.3. Since the goal of the simulator was to simulate a real-life interview scenario, it is important to note that the questions were randomized to ensure the same questions wouldn't appear for each system. The participants used a microphone, mouse, and keyboard for the 2D system. For the VR session, participants wore the MetaQuest headset, ensuring tracking of their body language and eye contact in the simulation.

4.4.3 Post-Simulation Feedback and Debrief. One or both researchers were present during the sessions to aid participants if they had technical questions or system issues, and to ensure consistency in the experiment. The sessions were not recorded to ensure anonymity and confidentiality of participants. After each session, participants completed the post-study questionnaire tailored to the system they just finished (4.2.2). The questionnaire assessed their overall experience, perceived stress, and system usability. Once the session was complete, participants were debriefed again on the goal and procedure of the study. We invited participants to share any feedback on their experience in the questionnaire or to the researchers. Participants were notified that resources for stress and job preparedness would be sent to them if they so wish to have them.

5. Data Analysis

The collected data was analyzed using both statistical/qualitative and quantitative methods.

5.1 Quantitative Method.

In our quantitative analysis, we sought to examine the difference in stress, realistic immersion, and the effectiveness of using a virtual system for interview soft skill development. We used paired sample t-tests, descriptive statistics, and confidence intervals to assess these factors based on both post-study questionnaires. Note that the paired sample t-tests are a statistical method used to compare the means between two related groups; in our case, 2D and VR. In general, the results of the paired sample t-tests contain two values: the t-value and the p-value. The t-value is a measure of how different the two groups are from each other in terms of their means relative to the spread of the data. The larger the absolute t-value, the larger the difference between groups. The p-value reflects the probability that this study's observed difference would have occurred

if there were no real effect. A p-value less than the cut-off for significance-0.05-used in this study-suggests that this difference is statistically significant, and is unlikely to have occurred by chance. Therefore, in the light of the above, we derived the following key findings:

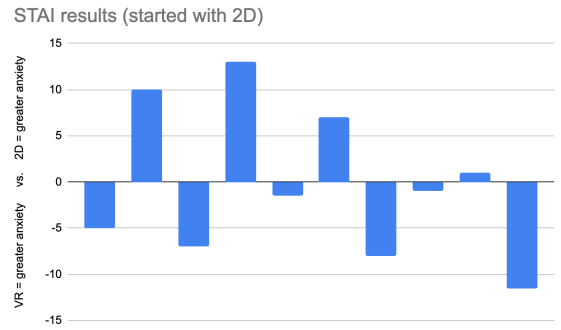

Figure 1: STAI results from 2D-first participants

Among the groups based on STAI scores of all participants, the aggregated STAI results showed no significant differences considering that the starting format balanced VR and 2D systems (t = 0.330, p = 0.745); however, in cases related to 2D, participants who started working with VR showed higher states of anxiety. Partial findings evidenced an adaptation barrier to using an immersive format for some participants. Additionally, though participants reported that their level of stress went down as simulations progressed, paired t-tests revealed no statistically significant differences between the 2D and VR formats concerning a reduction in stress. For example, one section of the

5.1.1 Stress and Anxiety

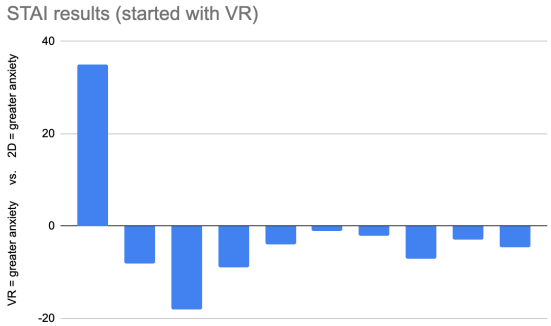

Figure 2: STAI results from VR-first participants

questionnaire asked participants whether they felt their level of stress decrease as the simulation progressed. Our hypothesis that stress levels decreased differently across formats was rejected, with t = -0.420, p = 0.679.

Paired Samples Test

		Paired Differences					t	df	Significance	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			One-Sided p	Two-Sided p
Pair 1	decreaseStress2D - decreaseStressVR	.150	1.599	.357	-.598	.898	.420	19	.340	.679

Table 1: The paired sample t-test result (t = -0.420, p = 0.679) corresponds to the question, *"I felt my stress levels decrease as the simulation continued."*

5.1.2 Realism and Immersion

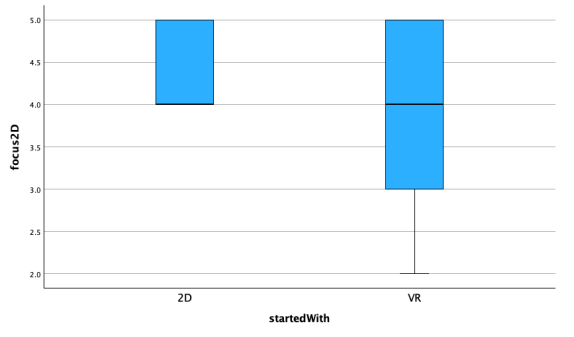

Figure 3: Focus levels for 2D system based on participants' start system

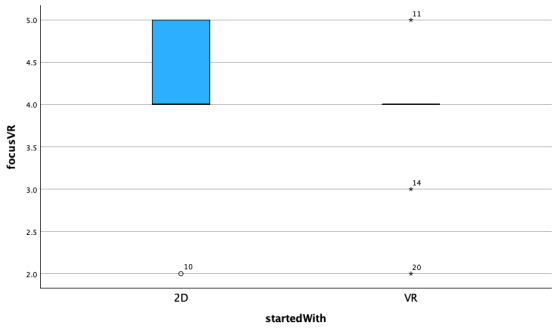

Figure 4: Focus levels for VR system based on participants' start system

Paired Samples Test

	Paired Differences							Significance	
				95% Confidence Interval of the Difference					
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	One-Sided p	Two-Sided p
Pair 1 realism2D - realismVR	-.250	1.118	.250	-.773	.273	-1.000	19	.165	.330

Table 2: The paired sample t-test result (t = -1.0, p = 0.330) corresponds to the question, *"It felt like a real interview."*

Paired Samples Test

	Paired Differences							Significance	
				95% Confidence Interval of the Difference					
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	One-Sided p	Two-Sided p
Pair 1 realism2D - realismVR	-1.450	1.504	.336	-2.154	-.746	-4.313	19	<.001	<.001

Table 3: The paired sample t-test result (t = -4.13, p < 0.001) corresponds to the question, *"It felt like the interviewer was actually in the room with me."*

On average, participants found that the VR system created a feeling closer to that of a real interview. However, the paired t-tests showed no significant differences for these; t = -1.0, p = 0.330. However, VR was rated significantly higher in the perception of the "feeling as though the interviewer was actually in the room," t = -4.13, p < 0.001. Turning to another aspect, most of the participants indicated that they maintained similar levels of focus between the two formats. However, those who started with VR showed more fluctuation in their level of focus between the systems, which can be due to the nature of VR, being that it is so immersive it takes more cognitive adjustment.

5.1.3 Effectiveness. Participants were asked if the application provided meaningful insights for future interviews. VR was rated significantly higher for providing meaningful and actionable feedback than 2D (t = -2.557, p = 0.019). This might be explained because VR is able to track body language and eye contact, thus providing richer feedback. Some participants said they preferred the system they started with, but most preferred VR, assuming a simulation like Bodyswaps is included, as the preferred interview preparation method. This is in line with ratings VR received for realism and quality of feedback, despite higher adaptation barriers for some.

5.2 Qualitative Method.

Participants were asked open-ended questions within the three questionnaires we provided. Similar to our statistical analysis above, our qualitative, thematic findings focus on the efficiency of 2D and VR training formats in reducing stress, enhancing realism, and improving overall skill development. Overall, results underlined nuanced strengths for each format.

5.2.1 Stress Reduction. The most helpful formats for both systems were reported to have assisted the participants in keeping their level of stress in balance during simulations. While the levels of stress reported after the use of both

systems decreased over time, the initial feedback showed that a higher adaptation barrier occurred when using VR, probably due to its immersive character. One person stated they felt more comfort and familiarity with the 2D system, but this resulted in less intention in their answers and body language. Based on this response and others similar, the 2D format was often perceived as more predictable and comfortable in first-time use.

5.2.2 Realistic Immersion. Participants constantly ranked VR as more immersive, adding that it can emulate an actual interview environment. The other features included in the creation of eye contact were the realistic gestures, which also added to its strengths in creating a sense of presence. In comparison, the 2D format was simple and maintained its focus hence dependable to those who preferred less immersing experience. While many participants praised VR for its realism, others noted feeling slightly unsettled by aspects of the simulation, which may reflect the 'uncanny valley' effect. One 2D-first participant remarked, “the biggest drawback was that it still felt like you were talking to a computer so it lacked the immediate stress of an actual interview, but it was still helpful and more immersive than the 2D.” A VR-first participant stated: “I felt like the gestures feature didn't match the reality of the gestures I was using - the tech might not be able to accurately measure things such as that [...]” These statements show the impact of the awareness gap between users and systems that create an uncanny valley effect. As such, this highlights the importance of fine-tuning VR environments to balance immersion with comfort.

5.2.3 Quality of Feedback: VR received rave reviews for giving very comprehensive feedback on body language and eye contact to get deeper insights into interview preparation. One participant said that “by incorporating hand gestures and eye contact, it definitely increased the feeling of being immersed in VR. ” Even 2D feedback proved to be quite useful, but interactive elements in VR make it all the more actionable and personal for participants in this study. While 2D feedback was effective, it was often seen as less comprehensive: “I think I got too comfortable because it did not read my body gestures and overall eye contact, so it gave me less input on how I was actually interacting with the person. While 2D made me feel more comfortable, I don't think it gave me the most productive feedback.”

In sum, VR was preferred for an interview, though some took some time to get used to it, owing to the immersive factor and the higher feedback. On the other hand, the 2D system was more comfortable, especially for participants who did not have experience with this kind of virtual training tool.

Figure 5: Word cloud of common words and themes from participant feedback

6. Discussion & Limitations

6.1 Key Insights. The results of the study showed interesting insights into the strengths and weaknesses of VR and 2D systems regarding stress and soft skill preparation. We found that both systems were effective in reducing participants’ stress over time and were seen as helpful and enjoyable. Our statistical analysis, however, revealed no significant

differences in stress reduction between both formats.

On the other hand, VR was rated higher in terms of perceived realism and the feedback mechanisms on the virtual platform, possibly from its ability to simulate more authentic scenarios for skill building. Participants appreciated the feedback based on the body language and eye contact trackers, an essential component of training one's soft skills. However, our findings highlight the challenges with virtual reality. Some participants had a harder time adapting to the system, with some reporting physical discomfort with the system and, interestingly, some discomfort because it felt similar to a real interview.

These findings suggest that though virtual reality can offer more immersive experiences and advanced features, such as eye contact and body language tracking, its immersive nature can require a learning curve for those unfamiliar with virtual reality. The 2D system was designed to be more comfortable and predictable than newer technologies (extended reality) making it more accessible for first-time users. In light of this, we suggest that while VR holds greater potential for realism, it may not be suitable for every user without refining its capabilities in reducing stress and preparing users for real-world scenarios.

6.2 Implications for Practice. After completing the simulation and questionnaires, participants found the two systems - VR and 2D- helpful and enjoyable. Statistical analysis, however, mostly showed that there was no significant difference in terms of stress and helpfulness. Despite this, the VR system is better at perceived realism and feedback quality and, overall, seems to be more favored than the 2D gamified system.

Our analyses and participant feedback showed room for practical considerations regarding VR design and implementation. Although VR's features and realism show promise, the insignificant difference in stress reduction between both virtual systems suggests that both formats could be effective depending on the usage context and user preference. The responses from the participants have again pointed toward a need to improve the comfort of VR systems. To optimize VR systems, we suggest developers address technical limitations, such as inaccuracies in gesture tracking, and ensure the hardware is physically comfortable for extended use.

6.3 Study Limitations. Though the study gave valuable insights into stress reduction and skill development via VR and 3D systems, there are several limitations we must note. First, the study involved a small sample of 20 participants, all of whom were women or nonbinary individuals from one liberal arts college. Due to this, the study is not generalizable of findings from other populations, specifically individuals with different educational backgrounds or men and assigned male at birth individuals. The study had a short lifespan of only 2.5 weeks, thus restricting the opportunity for long-term observations and greater data collection. There were also challenges with the VR system, with some participants reporting physical discomfort from the headset and unfamiliarity with the system, which may have influenced the stress levels and questionnaire responses. There may have been survey fatigue as participants were to complete three detailed questionnaires. This cognitive limitation from overload may affect their engagement and responses. Finally, to ensure the study ran smoothly, at least one researcher was present in the room during the study. Participants' stress levels, or behavior knowing they were being observed, may have been influenced by this factor.

6.4 Future Directions. Based on the limitations and insights of our study, there are several paths for future research we believe can be taken. For starters, future research should include a wider range of demographics, such as different genders, students from different universities, and a wider age range to improve the generalizability of the study's findings. Longer-term studies would allow for further exploration of how participants adapt to VR over time and the potential impact of extended use on stress reduction and skill development. Expanding the scope of the systems to other stress-inducing scenarios, such as public presentations or networking with professionals, could provide more information on the potential of virtual reality and two-dimensional systems for reducing stress in educational or professional settings. Finally, improvements in VR hardware regarding accurate tracking and comfortable headsets could enhance the user experience and facilitate user adaptation to the system, thus possibly improving the users' stress levels.

7. Conclusion

This study investigated how Virtual Reality and 2D gamified systems reduce stress and develop soft skills during preparation for job interviews. Both systems were perceived as useful and enjoyable, while from a statistical point of view, no significant differences emerged between these two systems in decreasing the participants' level of stress. The participants enjoyed the VR condition because of the realism of immersion and elaborated feedback mechanisms such as body language and eye contact, which are important in the development of interpersonal skills.

However, the difficulties with adaptation, physical discomfort connected with the use of VR hardware, and uncanny valley effects showed points where the VR system needed further refinement. In contrast, the predictability and accessibility of the 2D system made it a reliable choice for users who prefer a less immersive experience, especially first-time users.

These findings suggest that, despite the great promise of VR for enhancing soft skills due to its realism and feedback that is actionable, it might not always outperform 2D systems, at least in reducing stress. While the strength of one system does differ in one aspect or another from the other, its efficiency is dependent upon the user's context and familiarity with the technology along with the aims of the training.

Further proof for this confirmation could stem from further usability and comfort studies on VR systems, 2D/VR-hybrid format training, and their testing with larger participant groups. Further optimization of XR technologies in the above-mentioned aspects can certainly extend their potential for supporting stress reduction and skills development in various educational and professional contexts.

Conclusively, the research contributes to the recent upsurge in various research regarding the extended reality tool and, in relation, identifies such platforms for training in view of proper and inclusive user design, comfort, and efficacy.

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