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Abstract

Virtual reality (VR) is an immersive innovative technology that can be used with occupational therapy students for bias training in preparation for fieldwork and clinical practice. The purpose of this study was to explore the use of VR as a complementary educational tool in bias and microaggressions (MA) training for entry-level occupational therapy students. We conducted a secondary analysis of data collected in an 8-week course on diversity, equity, inclusion, and professional skills with a total of 48 first-year entry-level occupational therapy students. We used eight simulated VR cases for all students. Data was collected using a mixed-method survey to capture the students' experiences with VR. The results showed that the majority of students found the VR module helpful in identifying bias and MA ($n=47$; 97.92%), enhancing their confidence to report bias and MA ($n=48$; 100%), offering opportunities to respond to bias and MA ($n=39$; 81.25%), and articulating why certain behaviors can be perceived as MA ($n=45$; 93.75%). Thematic analysis of qualitative data showed that the VR enhanced students' ability to detect bias and MA, and increased the sense of empathy, and ability to be an ally or advocate for targets of bias. The findings indicate that VR is an immersive, engaging technology that can be used for bias and MA training for students and potentially clinicians. It offers a private, inclusive, pressure-reduced learning space for students to learn about bias and MA in preparation for fieldwork education and clinical practice.

Keywords

Virtual reality, bias training, DEI+

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ABSTRACT

Virtual reality (VR) is an immersive innovative technology that can be used with occupational therapy students for bias training in preparation for fieldwork and clinical practice. The purpose of this study was to explore the use of VR as a complementary educational tool in bias and microaggressions (MA) training for entry-level occupational therapy students. We conducted a secondary analysis of data collected in an 8-week course on diversity, equity, inclusion, and professional skills with a total of 48 first-year entry-level occupational therapy students. We used eight simulated VR cases for all students. Data was collected using a mixed-method survey to capture the students' experiences with VR. The results showed that the majority of students found the VR module helpful in identifying bias and MA ($n=47$; 97.92%), enhancing their confidence to report bias and MA ($n=48$; 100%), offering opportunities to respond to bias and MA ($n=39$; 81.25%), and articulating why certain behaviors can be perceived as MA ($n=45$; 93.75%). Thematic analysis of qualitative data showed that the VR enhanced students' ability to detect bias and MA, and increased the sense of empathy, and ability to be an ally or advocate for targets of bias. The findings indicate that VR is an immersive, engaging technology that can be used for bias and MA training for students and potentially clinicians. It offers a private, inclusive, pressure-reduced learning space for students to learn about bias and MA in preparation for fieldwork education and clinical practice.

Introduction

Bias and microaggressions (MA) were first studied in academic environments in 1975, and although they have been explored in various educational and healthcare contexts, there is still not enough research within the field of occupational therapy on bias training in preparation for fieldwork education and clinical practice (Solorzano, 1998; Sue et al., 2007, 2009). Understanding bias and MA and other constructs related to diversity, equity, inclusion, justice, belonging, and accessibility (DEI+) is key for empathic and client-centered occupational therapy practice (Burks & Olson, 2023; Moudatsou et al., 2020; Sterman et al., 2022). Empathy-enhancing interventions such as perspective-taking training, mindfulness, and communication skills training can improve students' ability to recognize and address bias and other issues related to DEI+ and prepare them to become ethical professionals (Tervalon & Murray-García, 1998; Winter et al., 2020).

Traditional teaching methods, such as lecturing and unstructured class discussions, may not be helpful for all students when learning about issues related to bias and DEI+ in occupational therapy curricula (Taff & Blash, 2017). For example, faculty may be underprepared to discuss topics related to bias and DEI+ in the classroom (Sterman et al., 2022), and some students can perceive open classroom discussions as harmful or triggering of their personal or generational emotional, racial, and ethnic traumas (Grosland, 2013). Students from marginalized communities may feel oppressed to participate in open dialogue or feel judged by other classmates for sharing honest opinions about bias and MA (Grosland, 2019). Additionally, traditional teaching on bias may be challenged by several barriers that may limit student class participation including lack of student diversity in the classroom, tokenization of minorities, negative opinions of self-identified race, and poorly trained bias facilitators (Joseph et al., 2021). Furthermore, barriers to learning, including Western-based hidden curriculum, program mission, or stigma (Sukhera et al., 2019) must be carefully considered when teaching issues related to bias and DEI+.

Various interventions have been explored to increase the understanding of bias for students in higher education including mindfulness programs for medical students (Degife et al., 2021; Kanter et al., 2020), mixed interventions for social work students (Byers et al., 2020), small group discussions for undergraduate students (Williams et al., 2020), educational sessions followed by group discussions (Degife et al., 2021), and focus groups for occupational therapy students (Banks, 2022). However, there is insufficient research on interventions specifically targeting awareness of bias and MA in occupational therapy students.

Virtual reality has been utilized in several studies in recent years to determine whether simulations can successfully increase empathy among participants (Roswell et al., 2020). For example, Chen et al. (2021) explored the role of VR in reducing bias toward marginalized communities using a sample of 71 students of self-identified Chinese descent in Singapore. Students participated in a perspective-taking VR session and were asked to embody an avatar of a minoritized ethnic group that was experiencing a workplace microaggression (Chen et al., 2021). Moderated by self-presence in VR, the results showed that participants reported that their attitudes toward the ethnic minority

improved whether they considered their emotional response to the scenario or their thoughts on behaviors of bias. This indicates that students' participation in a VR session can affect their affective and cognitive processes when witnessing or experiencing bias and MA.

Roswell et al. (2020) explored how using 20-min VR simulations could reduce bias when interacting with other students, faculty, and staff in a medical setting. Their results showed that VR helped increase the participants' empathy toward racially marginalized groups. Tassinari et al. (2022) systematically reviewed 64 quantitative studies exploring the use of VR in addressing prejudice in various professional and educational settings. Their findings indicated that VR had a favorable impact on increasing empathy and decreasing implicit and explicit bias toward marginalized groups (Tassinari et al., 2022).

Teaching issues related to DEI+ requires a reflexive and transformative learning approach that allows the students to reflect on bias, social justice, and systemic racism (Serman et al., 2022; Zafran, 2020) rather than traditional pedagogies that focus on cognitive constructivism (Grenier et al., 2020). The use of innovative instructional methods and designs is necessary to prepare students for anti-bias and anti-racism practice as they transition to fieldwork education and later to the clinician role. Although VR has been explored in various higher education settings to reduce bias and MA, there is little research on using VR for occupational therapy students. The purpose of this study was to explore the use of VR as an instructional tool for bias and MA training with occupational therapy students.

Methods

Participants

A group of 48 entry-level Master of Occupational Therapy (MOT) students at Columbia University were enrolled in an eight-week core course called DEI+ and Professional Skills. The course used eight VR scenarios to train students on identifying and addressing MA in various simulated interactions. Approval was obtained from the Columbia University Medical Center Institutional Review Board (IRB).

Virtual Reality

Training

Before starting the eight VR scenarios the students had a two-hour training on using the VR and learning how to operate the equipment and the software. The students were instructed on donning, doffing, and cleaning the headsets and controllers. Additionally, the students were instructed to monitor any physical discomfort when using the device such as nausea, headache, disorientation, and visual blurriness. The students were given the option to stop the VR if they experienced any symptoms and were offered a flatscreen alternative if needed. There was no penalty or grade reduction for opting out of the VR experience.

The VR Case Scenarios

Each week the students used the VR headsets to participate in one case scenario where they embodied an avatar that interacted with other avatars in a professional or clinical setting (see Figure 1). The students witnessed an interaction that contained an incidence of bias or MA such as a conversation with co-workers (see Figure 2). The software instructed the students to push the trigger of the headset's controller every time they witnessed bias or MA (see Figure 3). Bias was defined as language or behaviors targeting an individual or a group based on distinctive features or traits such as gender, race, ethnicity, age, ability, sexual orientation, or other personal factors (Sue, 2013). Microaggressions were defined as subtle and brief interactions that originate from bias toward marginalized individuals (Sue et al., 2007). Throughout the scenario, the students were prompted by the software to select an action to address that instance of bias (e.g., speak up, leave the room) (see Figure 4). Upon completing the VR session students returned to the main classroom and were asked to complete a reflection essay right after finishing the VR interaction. The students reflected on the incident of bias, feelings of inclusion/exclusion, the experience of being the targeted avatar, and the response they chose to address bias. This reflection essay was meant to allow the students to process their feelings and thoughts on bias and MA and was separate from the main survey used to collect data by the end of the course (i.e., post-VR survey). The reflection was meant to help students keep track of their thoughts on bias, MA, and the role the technology played in their learning.

Figure 1

Students take part of an interaction while assuming a different identity (e.g., being a Black woman).



Figure 2

Each VR scenario offered the students the opportunity to experience or witness bias or microaggression (as an avatar) in a professional setting.

**Figure 3**

The VR software prompted the students to press the controller every time they detected bias while pointing to the person making the biased remark. The software then shared the exact statement the student detected as biased.



Figure 4

Each VR case study allowed the student to pick a course of action in a situation. The action selected by the participant determined the next events in the scenario.



Equipment and Software

The VR software included different simulated case scenarios throughout the eight-week course. Students used the VR Oculus 2™ headsets with the Equal Reality® software to work through various case scenarios to recognize bias and MA in a clinical setting. The cases included interactions between healthcare professionals of different races and ethnicities, interactions between patients and providers, and other interactions between individuals of different sexual orientations, races, and ethnicities in community-based settings (e.g. office).

Outcomes: Post-VR Survey

A survey was distributed to students after completing all VR sessions to describe their experience with the technology during the course. Data described in this paper are based on data collected from this survey.

Survey Development

The survey was prepared prior to the beginning of the course. Upon an extensive review of the literature on bias and MA, a concept map was created to guide the development of the survey used to collect data on students' experience using VR. The constructs identified were bias, empathy, and VR use. Questions identified within each construct asked the students to rate their ability to recognize and articulate incidents of bias and MA, select an action against bias, and reflect on the avatar experience. A total of 24 guiding questions were then identified under bias and MA ($n=7$), empathy ($n=15$), and VR use ($n=2$). Other questions on the survey ($n=23$) included items on

demographics, previous experience with VR, personal experience with bias and MA, and other questions on students' intersectionalities (e.g., race). The survey also had one open-ended question that asked the students to reflect on the use of VR in this course and how it enhanced their ability to deal with bias and MA in real life.

Testing the Survey

The survey was tested before being distributed to students to check for clarity, errors, redundancy, time spent, and any other concerns (e.g., triggers). A group of 14 students from another cohort in the program (i.e., not enrolled in class or taking part in the VR experience) agreed to respond to the test survey. Feedback from the 14 test students was incorporated into a revised version of the survey. Revisions included adding response options to some demographic questions (e.g., adding "prefer not to disclose", "prefer to self-describe", "biological sex assigned at birth", "remarried"). The students shared that the survey was clear, contained inclusive language, had an easy flow of questions, and contained no trauma or emotional triggers.

The final survey contained 47 items and was completed by the students at the end of the course (i.e., after completing all the VR scenarios). These questions asked participants to reflect on their experiences with the VR simulation. The survey had a cover letter explaining the purpose of the survey (i.e., to assess the use of VR in bias and MA training as an objective of the course) as well as indicating that data may be analyzed for research purposes. Students were given the option to opt out of the survey at any point or leave any questions blank if needed. The survey did not collect identifying information (e.g., names, or student ID numbers) and all responses were anonymous.

Data Analysis

Data collected via Qualtrics © (2023) were used to explore the effect of VR on students' learning. Descriptive statistics were collected on students' demographics and personal information (e.g., previous experience with VR). Descriptive statistics were also used to collect students' perceptions of their ability to recognize bias and MA using VR.

A thematic analysis was completed to analyze the qualitative data from the open-ended question. The trained research team (i.e., authors) analyzed the qualitative responses to these questions. Team members reviewed the data separately and completed a first-round coding. Common themes were identified based on the codes until no new themes were identified (i.e., saturation). Member-checking was completed to ensure trustworthiness (Korstjens & Moser, 2018). The themes were reviewed by a group of occupational therapy students in the final semester of the program ($n=5$) to provide feedback on the consistency of the themes with their experiences with VR. These students did not take part in the course or the VR experiences. All students confirmed that the themes captured in our thematic analysis reflected their experience with VR.

Results

A total of 48 students completed the post-VR survey. The majority of students self-identified as female ($n=46$; 95.83%), heterosexual or straight ($n=43$; 89.58%), White ($n=32$; 66.67%), non-Hispanic ($n=42$; 87.50%), age 20-22 ($n=43$; 89.58%), and upper middle class ($n=23$; 47.91%). The majority identified as single ($n=45$; 93.75%), non-international students ($n=46$; 95.83%), and as first generation (i.e., first of a generation to become a US citizen $n=7$; 14.58%), second generation (i.e., child of immigrant parents $n=9$; 18.75%), or third generation (U.S born parent with one or more foreign-born grandparent $n=24$; 50.0%). Some students spoke more than one language ($n=15$; 31.25%) and described culture as an important aspect of their lives ($n=41$; 85.42%). Most students reported using VR previously for recreational purposes ($n=31$; 64.58%) and only a few students ($n=3$; 6.25%) reported physical symptoms after completing the training session with symptoms of feeling lightheaded, light nausea, and mild headache. The students reported lighter to no symptoms in subsequent sessions. Most of the students reported using a limited or moderate amount of media on bias and MA (e.g., books, $n=40$; 83.33%) and the majority had experienced bias or MA toward someone else ($n=47$; 97.92%).

The majority of students reported the VR module helped them identify bias and instances of MA ($n=47$; 97.92%), enhanced their confidence to report a biased or micro-aggressive behavior ($n=48$; 100%), offered them enough time and space to reflect on potential responses to bias and MA ($n=39$; 81.25%), and helped them articulate why certain behaviors could be perceived as MA ($n=45$; 93.75%).

Students also reported they were able to empathize with the characters ($n=43$; 89.58%) and that their emotional reactions fit the simulated scenario they experienced in the VR ($n=44$; 70.83%). The students found the scenarios to be relatable to real-life instances of bias and MA ($n=34$; 70.83%), found the VR storylines in the scenarios to be immersive ($n=38$; 79.16%), and reported experiencing similar bias and MA towards them in real life ($n=24$; 50%).

The thematic analysis of the qualitative data revealed the following themes on students' perception of the VR experience:

1. **Bias detection in real life:** the data showed the students felt the VR experience would help them identify bias and MA in real life. As one student shared: "*Being able to recognize bias and microaggressions through VR will help me in real life because I can identify behavior and when it is necessary to intervene.*"
2. **Allyship and responding to bias and MA in real life:** students felt the VR experience prepared them to respond to or intervene in instances of bias or MA in real-life situations. One student reported: "*The immersive VR experience has helped me prepare to be an ally and advocate for my peers, coworkers, and clients. I was able to think about how I would respond in situations and carried these thoughts into real-life scenarios.*" Some students who self-identified as White reported the VR allowed them to experience bias for the first time while others felt the experience reflected similar real-life situations. One student shared

“As a white woman it was helpful to gain perspective from a person of color perspective through the VR experience.”

3. **Immersive empathy:** students felt the VR enhanced their empathy by experiencing how the avatar was targeted or attacked by biased remarks. Students reported they were able to be “in someone else’s shoes” during the VR experiences. One participant shared: *“If you are not someone who this would likely ever happen to in real life, it’s a great way to put yourself into someone’s shoes.”*
4. **Confidence to address bias and MA:** The students described how the VR experience enhanced their confidence and motivation to address bias and MA in real-life situations. One participant stated: *“I think this gave me the tools to identify microaggressions and to be able to have the confidence to say something if I saw it happen in real life.”*
5. **Private learning space:** The students also felt that VR was a good tool to practice identifying and responding to bias and MA in a private learning space. One participant shared: *“Practicing what your responses would be in a safer environment where your responses have no consequence on any people around is helpful to apply what you’ve learned to real-life situations.”*

Discussion

With the shift to cultural humility (Agner, 2020) and anti-racist education (Johnson et al., 2022), it is important to help future practitioners identify and respond to bias and MA in their clinical practice. Reducing professional bias, communicating empathically, and self-reflection are necessary to transition to that clinician role and deliver bias-free interventions (Serman et al., 2022). Research shows that occupational therapy students do exhibit biased attitudes and behaviors toward several marginalized communities (Friedman & VanPuymbrouck, 2021; Patten, 2022). Traditional instructional approaches to teaching sensitive topics related to DEI+ (e.g., lecturing, assigned readings) may not be useful in preparing the students for bias-free professional interactions in fieldwork education and future clinical practice. Our educational approaches to teaching occupational therapy students must begin to align with the anticipated role of technology and artificial intelligence in healthcare practice and education (Thibault, 2020).

The purpose of this study was to explore the potential value of using VR as an educational tool in identifying and addressing bias and MA. We conducted a secondary analysis of data collected in a course on DEI+ for entry-level MOT students. Our findings indicate that using this immersive technology was a positive and engaging learning experience. The quantitative and qualitative findings indicate that the VR helped students identify, articulate, and respond to bias and MA. The students reported that VR helped them: a) articulate how it felt being a target of bias (i.e., enhancing their sense of empathy), b) reflect on how they would address, stand up, or respond to bias if they were in similar situations in real life (i.e., enhancing a sense of allyship and accompliceship), and c) boosted their confidence to address bias and MA in real life

(i.e., enhancing assertiveness). Although research on the use of VR is limited in this area, our findings were consistent with the research exploring the use of VR as an innovative tool in higher education (Chen et al., 2021; Roswell et al., 2020; Tassinari et al., 2022).

An important finding in this study is that VR provided a private space for students to process, reflect, and respond to incidents of bias without feeling the pressure of responding directly to the instructor or other classmates. Some students may be reluctant to share their thoughts on topics such as discrimination, bias, racism, privilege, and other DEI+-related issues in front of other classmates. This may be even more challenging for students from minoritized or underrepresented groups. The use of VR will promote a more inclusive learning environment allowing all students to learn in a safer and non-confrontational space given their different intersectionalities (Appert et al., 2017; Taff, 2023).

Additionally, students found VR beneficial in having time to reflect on how MA can present themselves as subtle interactions in daily conversations. Being offered ample time and a comfortable pace to analyze and respond to the scenarios in the VR may have reduced the stress of sharing thoughts directly with the instructor or other classmates, especially at the early stages of building class rapport.

Reflective of the profession's demographic makeup, the majority of the students in this project identified as White females. The thematic analysis showed that the VR may help prepare them to identify incidents of bias that they may not typically experience firsthand in real life. Therefore, the VR can be used for various purposes of bias exposure (i.e., training to identify bias and be mindful of bias when witnessed) or bystander training (i.e., trained to respond to bias and MA), bias-free communication (i.e., being mindful of one's language when communicating with clients, families, and colleagues). However, additional research is needed to collect correlational data on how students' diverse backgrounds (e.g., race, gender, ability, age) and personal factors (e.g., experience with VR, education on social justice and DEI+ issues) shape how effective VR can be in bias and MA training.

Limitations

The use of VR has a few limitations. First, training students to use the VR headset and navigate the software can be time and effort-consuming. Instructors planning to use this technology may need to reserve enough time for training and troubleshooting. Second, although most students reported no physical symptoms, educators may need to explore alternatives to VR (e.g., flatscreen scenarios) in bias and MA training for students who may be sensitive to the technology. Third, although students were clearly instructed to complete the survey while considering their VR experiences (i.e., and not the course reading material), we cannot exclusively attribute the positive learning experience to VR. Further research designs such as randomized controlled trials are needed to examine the main effect of VR in bias and MA training. Fourth, the VR equipment and software can be costly, and adequate funding must be allocated to use the technology. Educational and teaching grants can be a good source to support these projects.

Finally, although most students found the VR relatable to real-life bias and MA interactions, some described that real-life bias does not offer time to pause and reflect when responding to bias and MA. Future research is needed to employ assertiveness training in combination with VR experiences.

Implications for Occupational Therapy Education

Virtual reality is an immersive technology that provides an interactive learning experience. The results suggest that VR can be an instructional technology tool that facilitates students' ability to identify bias and MAs in a private learning space.

- Virtual reality can be utilized for training occupational therapy practitioners to recognize and identify bias and MA in clinical settings.
- Virtual reality can be used to enhance students' sense of empathy, allyship, and assertiveness.
- Virtual reality can be used in continuing education modules, as an in-service session, or professional development activity on bias training or cultural humility.
- Virtual reality can be used as a tool to complement communication skills training where students can practice responding to difficult conversations on the bias.

Conclusion

Virtual reality is a helpful instructional tool for occupational therapy students to identify bias and MA. Given the vision of our profession to diversify the workforce and offer inclusive, culturally appropriate, and bias-free education and practice, investing in innovative tools such as VR can enhance the ability of current and future practitioners to deliver bias-free client-centered care to diverse populations.

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