

## A virtual reality based psychosis simulation for education of medical students: An ongoing project

**Majid Zare Bidaki**, University of Medical Sciences, Social Determinants of Health Research Center, Faculty of Paramedical Sciences, Birj and Birjand, Iran <https://orcid.org/0000-0003-4338-9899>

**Bentolhoda Mousavi\***, University of Social Welfare and Rehabilitation Sciences, Department of Psychiatry, Psychosis Research Center, Tehran, Iran <https://orcid.org/0000-0002-4346-7669>

**Alireza Ehteshampour**, Virtual University of Medical Sciences, Department of VR & AR, Tehran, Iran

### Suggested Citation:

Bidaki, M. Z., Mousavi, B. & Ehteshampour, A. (2020). A virtual reality based psychosis simulation for education of medical students: an ongoing project. *New Trends and Issues Proceedings on Humanities and Social Sciences*. 7(3), 18–22. Available from: [www.prosoc.eu](http://www.prosoc.eu)

Received from December 5, 2020; revised from January 21, 2020; accepted from 10 March, 2020.

Selection and peer review under responsibility of Prof. Dr. Huseyin Uzunboylu, Higher Education Planning, Supervision, Accreditation and Coordination Board, Cyprus.

©2020 Birlesik Dunya Yenilik Arastirma ve Yayıncılık Merkezi. All rights reserved.

### Abstract

Psychosis, which is defined as the loss of contact with external reality, is a subjective and complex experience that has two major presentations: delusions and hallucinations. Delusions are defined in a spectrum from overvalued ideas that can be considered as the upper extreme of normal limits, to the presence of crystallised, systematic ideas, without any external proof that clearly interferes with the experiencer's life. The same is true for hallucinations, as it can be experienced by any person in some point of their life or it can be multimodal which dominates the thinking process and leads to verbal or behavioural response. Despite the prevalence of both experiences, and even though medical students participate in theory-based education as well as apprenticeship in psychiatric wards, they find the experience non-tangible and difficult to digest. Improvement in technology has led to development of computer programmes, such as virtual reality (VR), by which the sense of immersion is induced in a simulated environment through combining sensory inputs with computer-generated graphics and effects and mostly is used through a head-mounted display. Constructivist movements have placed emphasis on active learning and visual-spatial abilities in education and VR has paved the way for its practical application. In this research project, along with producing an authentic virtual psychotic experience according to patients' real-life experiences, we aim to assess its efficacy in improving knowledge, attitude and empathy towards people with psychotic experience, in comparison with the current method of education.

**Keywords:** Virtual reality, psychotic experience, simulation, medical education, e-learning.

\* ADDRESS FOR CORRESPONDENCE: **Bentolhoda Mousavi**, Department of Psychiatry, Psychosis Research Center, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran.

E-mail address: [be.mousavi@uswr.ac.ir](mailto:be.mousavi@uswr.ac.ir), [be.mousavi@uswr.ac.ir](mailto:be.mousavi@uswr.ac.ir) / Tel.: +982133401604

## 1. Background

Psychosis has been defined as the loss of contact with external reality and is a subjective and complex experience that has two major presentations: delusions and hallucinations (Association, 2013). Either hallucinations— sensory perceptions occurring within the absence of an external provocation – or delusions – thoughts that are not compatible with factual evidence – seem real to the person who is experiencing them (Association, 2013; Tandon et al., 2013). There is, however, no clear boundary between now and then formation of paranoid thoughts and a full-blown delusional experience (van Bennekom, de Koning & Denys, 2017). People who are diagnosed with variety of mental disorders ranging from schizophrenia spectrum disorder to bipolar and substance-induced psychotic disorder as well as individuals with neurological conditions and even people without any diagnostic condition can experience one form of paranoid thoughts or hallucinations in some point of their lives (Association, 2013). In spite of this prevalence, in our experience, medical students find the concept highly complicated and difficult to understand.

The development of educational methods has improved the learning condition in accordance with constructivist movements that have placed emphasis on visual-spatial abilities in education with the primary goal of the conceptual development and fostering problem-solving. Constructivism assumes that people are active learners and can construct knowledge for themselves (Jonassen, 1999). Applying new technologies, such as virtual reality (VR), has taken the constructivist methods to the next level, that is, by providing a multidimensional and interactive environment, they have taken a step forward in overcoming educational barriers in variety of complicated and non-tangible subjects (Darras et al., 2018; Zare Bidaki, 2017).

VR is a computer-based technology in which the feeling of immersion is induced in a simulated environment through combining sensory inputs with computer-generated graphics and effects (Zare Bidaki, 2017, 2018). As far as the education is concerned, virtual environment almost possess the key features of a constructivist learning environment; they can potentially stimulate participants' intrinsic motivation to support active learning. These include participants exploring the environment (active and intentional) to experience the symptoms (ill-structured, complicated problems of goal) in different realistic and everyday situations (in context) by themselves (they feel they own the problem). This can provide not only a convenient and user-friendly pedagogic environment, but also a cost-effective one with the benefit of repetition of the experience in a judge-free way as much as it needs to be learned.

Previous attempts have been made to simulate the psychotic experience in a virtual environment with fair success and minimal adverse effects. Formosa, Morrison, Hill and Stone (2018) have shown that one session of experiencing simulated psychosis in a VR setting can increase users' knowledge, attitudes and empathy related to psychosis. In another study, Yellow lees et al. have shown positive results in increasing the knowledge of psychosis in an internet-based VR programme which was an indicator of feasibility and user friendliness of the approach (Yellow lees & Cook, 2006). Scant attention, however, has been placed on the comparison of this method to the current approach of educating medical students; that is, the supervised visiting patients with psychotic experience in a psychiatry ward which can per se increase empathy through having contact with the patients (McLeod, Deane & Hogbin, 2002; Vescio, Sechrist & Paolucci, 2003). Here, in a head to head comparison study, we are going to examine whether one session of experiencing VR can provide more benefits than one session of visiting patients in terms of knowledge and attitude towards psychotic symptoms, empathy towards people with psychotic disorders as well as reducing stigma.

### 1.1. Objectives

The primary goal is to compare the efficacy of applying one session of VR experience as an educational tool to enhance users' knowledge, attitudes and empathy towards psychosis in medical students in comparison with one session of visiting patients as routine practice (RP). To reach that goal,

we had to develop a culturally consistent experience of psychotic symptoms as well as explore the attitudes and objective experience of medical students in applying this method. Potential adverse effects must be systematically monitored. All this lead to the increase in accessibility of the technology for building the foundation of further studies

## **2. Method**

This is an ongoing project with the integration of VR as a supplementary learning tool to the traditional learning style, that is, lectures and practical training in the psychiatric ward. The first phase of the study currently running in the Birj and University of Medical Sciences includes developing an authentic simulation of psychotic experience in a VR setting. The scenario has been written according to the real experience of patients (provided by a semi-structured interview by two separate psychiatrists) and the consensus of psychiatrist experts who are supervising the procedure. Co-working with a team of ICT men and graphists, the e-content of VR is designed and produced as 3D videos which finally provide a 360-degree show as long as the VR headset is mounted on the user's face. Features in the VR setting, including the nature of a 3D, 360-degree show together with the texture of the scenario immerse the user inside the virtual world. This situation can help user to put him/herself in the shoes of people with psychotic experience (Formosa et al., 2018). The VR setting is estimated to be ready by the end of 2018.

In the second phase, two sessions of education with focus on psychotic symptoms will be held. After giving written informed consent, all participants take part in one session of lecture about theoretical concept targeting psychotic symptoms. In the next stage, the researcher-made questionnaires of knowledge, attitude, empathy and stigma were filled by participants. To improve the homogeneity of groups, according to the scores, the participants are allocated to either experience one session of VR simulated psychosis (VRSP) or visiting patients under supervision as R Pin the ward. Finally, the results are compared in the groups. The course content focuses on hallucinations and delusions and, correspondingly, the focus of the questionnaires is on the changes in knowledge, attitude, about this symptoms as well as empathy and stigma.

### **2.1. Sample size**

The empathy score was considered as a primary outcome of this study. Because the standard questionnaire in Persian was not available, the questionnaire was developed in the first phase of the current study. For sample size calculation, we used Cohen's standardised effect sizes. Assuming an alpha of 0.05, a power of 0.80 and Cohen's d of 0.5 (a medium effect), the sample size was calculated with 64 subjects in each group. Considering 10% attrition rate, the total sample size was calculated as 72 subjects in each group.

### **2.2. Participants**

All 3rd and 4th year medical students who meet the inclusion criteria enrolled in the study and after the lecture, according to the students' scores in the knowledge test, they were randomly assigned into two different interventions –VRSP and RP.

### **2.3. Statistical analysis**

All analyses will be carried out using Statistical Package for Social Sciences (version 21.0). For categorical variables frequency (percentage) and for the quantitative variables mean (SD) or the median (inter quartile range) were reported. To compare the means of quantitative outcomes between the two groups, independent *t*-test or its non-parametric equivalent, Mann–Whitney test, is used. Chi-squares test or Fisher's exact test is used to compare categorical variables between the two

groups. To compare the results before and after the intervention in each group, paired *t*-test or its non-parametric equivalent Wilcoxon test is used. ANCOVA analysis is used to compare the two groups with adjustment for variables that are statistically different in the baseline. In all analyses, *p*-value <0.05 was considered statistically significant.

### 3. Discussion

This study provides a deeper understanding of the potential benefits of integrating VR in routine medical education and informs us about the benefits as well as potential adverse effects of applying VR as a novel learning tool in this context can offer. It was hypothesised that receiving training in the psychological management of psychotic symptoms would lead to improvements in participants' attitudes and empathy towards working with people who have delusions and hallucinations. Even though previous applications of VR in education were useful in increasing the knowledge and empathy of participants (Formosa et al., 2018; Yellow lees & Cook, 2006), this goal might still be achieved by RP of visiting patients in wards. Without any control group for equating, it remains unclear whether VR provides further benefits for medical students and the implementation of such interventions remains erratic.

Perspective-taking in a virtual setting can be a positive step in improving empathy (Formosa et al., 2018), which is considered essential in developing and confirming a therapeutic relationship (Reynolds, Scott & Jessiman, 1999). In the case of non-tangible experiences, such as delusions and hallucinations, developing empathy can be quite challenging (Chadwick, Birchwood & Trower, 1996). Through drawing a realistic schema of a psychotic episode, psychiatric training programmes can address the negative attitudes, held by students, about people with psychotic disorders. Perspective taking has been shown to be a reliable method in reducing negative social stereotyping even in a short virtual interaction (Yee & Bailenson, 2006). This can also improve attitude towards stigmatised groups (Vescio et al., 2003) and the attitudes held by health professionals, especially those working in mental health, can profoundly influence the well-being of patients with psychosis (Patel, 2004). VR can also provide students with an exceptional opportunity to put themselves in the shoes of others, thus developing empathy through understanding their experience and perspective (Formosa et al., 2018).

It should not be presumed that because students might intellectually receive the knowledge of the features of mental illness after a lecture or course they are also capable of spontaneously moderating their emotional reactions to client's behaviour and not all the students have the opportunity of visiting enough patients during their 1-month apprenticeship. The predicted benefits of VR is feasible training, as well as increasing empathy and providing a homogenous learning tool for all students.

The potential drawbacks, however, can be some adverse effects, such as VR induced sickness, including nausea, dizziness and headaches (Sharples, Cobb, Moody & Wilson, 2008) which reflects that widespread implementation of VR in the education might be premature. For the majority of participants, however, these effects are mild and subside quickly (Nichols & Patel, 2002). Improvement of technology has also reduced these symptoms by providing valuable recommendations in order to minimise the experienced adverse effects (Nichols & Patel, 2002; Sharples et al., 2008).

### 4. Future steps and investigations

Our next step is to design an authentic constructivist learning model that aims to integrate into our current curriculum. Long-term assessments to evaluate the efficacy of the method in producing long-term changes are essential. Increasing clinicians' knowledge about and willingness to work with new technologies is a necessary precursor to the implementation of these techniques that may facilitate long-term change.

Bidaki, M. Z., Mousavi, B. & Ehteshampour, A. (2020). A virtual reality based psychosis simulation for education of medical students: an ongoing project. *New Trends and Issues Proceedings on Humanities and Social Sciences*. 7(3), 18–22. Available from: [www.prosoc.eu](http://www.prosoc.eu)

## 5. Declaration of interest

The authors have no declarations of interest to report.

## References

- Association, A. P. (2013). *Diagnostic and statistical manual of mental disorders (DSM-5®)*. Philadelphia, PA: American Psychiatric Pub.
- Chadwick, P. D., Birchwood, M. J. & Trower, P. (1996). *Cognitive therapy for delusions, voices and paranoia*. Hoboken, NJ: John Wiley & Sons.
- Darras, K. E., de Bruin, A. B. H., Nicolaou, S., Dahlstrom, N., Persson, A., van Merrienboer, J. & Forster, B. B. (2018). Is there a superior simulator for human anatomy education? How virtual dissection can overcome the anatomic and pedagogic limitations of cadaveric dissection. *Medical Teacher*, 40(7), 752–753.
- Formosa, N. J., Morrison, B. W., Hill, G. & Stone, D. (2018). Testing the efficacy of a virtual reality-based simulation in enhancing users' knowledge, attitudes, and empathy relating to psychosis. *Australian Journal of Psychology*, 70(1), 57–65.
- Jonassen, D. H. (1999). Designing constructivist learning environments. *Instructional Design Theories and Models: a New Paradigm of Instructional Theory*, 2, 215–239.
- McLeod, H. J., Deane, F. P. & Hogbin, B. (2002). Changing staff attitudes and empathy for working with people with psychosis. *Behavioural and Cognitive Psychotherapy*, 30(4), 459–470.
- Nichols, S. & Patel, H. (2002). Health and safety implications of virtual reality: a review of empirical evidence. *Applied Ergonomics*, 33(3), 251–271.
- Patel, M. X. (2004). Attitudes to psychosis: health professionals. *Epidemiology and Psychiatric Sciences*, 13(4), 213–218.
- Reynolds, W. J., Scott, B. & Jessiman, W. C. (1999). Empathy has not been measured in clients' terms or effectively taught: a review of the literature. *Journal of Advanced Nursing*, 30(5), 1177–1185.
- Sharples, S., Cobb, S., Moody, A. & Wilson, J. R. (2008). Virtual reality induced symptoms and effects (VRISE): comparison of head mounted display (HMD), desktop and projection display systems. *Displays*, 29(2), 58–69.
- Tandon, R., Gaebel, W., Barch, D. M., Bustillo, J., Gur, R. E., Heckers, S., Carpenter W. 2013. Definition and description of schizophrenia in the DSM-5. *Schizophrenia Research*, 150(1), 3–10.
- van Bennekom, M. J., de Koning, P. P. & Denys, D. (2017). Virtual reality objectifies the diagnosis of psychiatric disorders: a literature review [Review]. *Frontiers in Psychiatry*, 8, 163.
- Vescio, T. K., Sechrist, G. B. & Paolucci, M. P. (2003). Perspective taking and prejudice reduction: the mediational role of empathy arousal and situational attributions. *European Journal of Social Psychology*, 33(4), 455–472.
- Yee, N. & Bailenson, J. N. (2006). Walk a mile in digital shoes: the impact of embodied perspective-taking on the reduction of negative stereotyping in immersive virtual environments. Proceedings of Presence 2006: The 9th Annual International Workshop on Presence. Cleveland, OH.
- Yellowlees, P. M. & Cook, J. N. (2006). Education about hallucinations using an internet virtual reality system: a qualitative survey. *Academic Psychiatry*, 30(6), 534–539.
- Zare Bidaki, M. (2017). Virtual reality: a new window to medical education. *Research and Development in Medical Education*, 6(2), 62–63.
- Zare Bidaki, M. (2018). Application of virtual reality simulators and virtual labs in medical education. *Interdisciplinary Journal of Virtual Learning in Medical Sciences*, In Press.