

TELEPSYCHIATRY AND VIRTUAL REALITY IN THE TREATMENT OF PATIENTS WITH INTELLECTUAL AND DEVELOPMENTAL DISABILITIES

Krzysztof Krysta¹, Marek Krzystanek¹, Wiesław J. Cubala², Mariusz S. Wiglusz², Katarzyna Jakuszkowiak-Wojten², Maria Gałuszko-Węgielnik², Monika Czarnowska-Cubala², Joanna Szarmach², Adam Włodarczyk² & Małgorzata Janas-Kozik³

¹Department of Rehabilitation Psychiatry, Medical University of Silesia, Katowice, Poland

²Department of Psychiatry, Medical University of Gdańsk, Gdańsk, Poland

³Developmental Age Clinical Ward, Department of Psychiatry and Psychotherapy, Medical University of Silesia, John Paul II Pediatric Center, Sosnowiec, Poland

SUMMARY

Background: Treatment and rehabilitation of people with intellectual and developmental disabilities is a multidisciplinary challenge, which require implementing new attitudes. The use of modern technology solutions like telepsychiatry or virtual reality may be a valuable addition to the traditional methods.

Objective: The objective of this review was to explore the usability of new technological solutions in this special population of patients.

Methods: The search in the PubMed was conducted using the following terms: (intellectual disability (Title/Abstract) OR developmental disability OR learning disorder (Title/Abstract)) AND virtual reality (Title/Abstract) OR telepsychiatry OR telemedicine OR e-mental health AND English (lang) AND (1995/01/01(PDAT): 2017/07/31(PDAT)).

Results: Telepsychiatry may be a useful tool in situations, when the direct access to professional assistance is limited, in solving particular problems like e.g. managing challenging behavior, also to support patients' parents and for diagnostic and educational purposes. Virtual reality can be a safe and effective method of improving different skills, developing physical fitness, and enriching the ways of spending the leisure time.

Conclusions: Using modern technology is a relatively new and promising field in which new ideas may develop to support the already existing services for patients with intellectual and developmental disabilities.

Key words: intellectual disability - developmental disability – telepsychiatry - virtual reality

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INTRODUCTION

The problem of treatment and rehabilitation of people with intellectual and developmental disabilities is a multidisciplinary challenge, in which still more and more new solutions are required (Krysta et al. 2015, Hui Shyuan Ng et al. 2016). Intellectual disability is a disorder with the onset during the developmental period that includes both intellectual and adaptive functioning deficits in conceptual, social and practical domains (Harris 2013). Developmental disorders is a group of disorders, which embrace cognitive, communication, social and motor impairments, which appear in the developmental period (Odom et al. 2009). The new applications of modern technology provide new opportunities in the health care services for this special population (Burke 2017). The access to care for individuals with intellectual and developmental disabilities is often limited due to intellectual and often physical impairments as well as barriers related to the place they live. Telepsychiatry may increase the quality of care due to enhanced access to relevant expertise (Mucic 2008, Krzystanek et al. 2015 Krzystanek et al. 2017, Wojtuszek et al. 2015). Virtual reality (VR) therapy is becoming a more and more popular treatment

method for patients suffering from different psychiatric disorders. One of the methods, which could be used for this group of patients is using systems like MOTEK CAREN, which allows for the improvement of both cognitive and psychomotor skills (Krysta et al. 2016). Another common VR solution are head-mounted VR displays (Piercey et al. 2012). Those different technical solutions can be used in the training of various skills and in a better integration in the real world.

OBJECTIVE

The objective of this review was to explore the usability of telepsychiatry and virtual reality in this special population of patients.

METHODS

In the PubMed search the following terms were used: (intellectual disability (Title/Abstract) OR developmental disability OR learning disorder (Title/Abstract)) AND virtual reality (Title/Abstract) OR telepsychiatry OR telemedicine OR e-mental health AND English (lang) AND (1995/01/01(PDAT): 2017/07/31(PDAT)).

RESULTS

There are not many publications discussing the issue of using telepsychiatry in the treatment and rehabilitation of intellectual and developmental disabilities, the search retrieved only nine papers fulfilling the criteria. On the contrary 18 papers were found referring to the use of virtual reality in this specific group of patients.

Telepsychiatry

A very interesting example of telepsychiatry care service for persons with intellectual disability is Ohio's Telepsychiatry Project, which was initiated in 2012, and over 900 patients can already participate in it (Gentile et al. 2017). De Wit et al. (2015) introduced a web-based program in order to support people with mild intellectual disabilities for daily functioning (de Wit et al. 2015). Another valuable program in this field is the Cedars-Sinai Telepsychiatry Clinic providing care to patients with developmental disabilities, mostly patients with intellectual disability (84%) and pervasive developmental disorder (55%) (Szeftel et al. 2012). The group of patients, which can especially benefit from telemedicine are those, who live in rural areas, where the access to the traditional psychiatric care is limited (Szeftel et al. 2011). Another promising application of telepsychiatry in the treatment of persons with developmental disabilities is training medical students in skills necessary in working with this clinical group (Miriam et al. 2011). The Autism Resource Centre of Brittany successfully introduced telepsychiatry as an additional form of contacting patients along with traditional visits (Saint-Andre et al. 2011). Salomone and Maurizio Arduino developed a special telehealth coaching service for parents of autistic patients a rural area of Italy (Salomone & Maurizio Arduino 2017). Videoconferencing turned out to be helpful in the analysis and managing the challenging behavior in students with autism (Machalick et al. 2009). The telemedicine tools can also be used for diagnostic purposes. The good example of it is the remote administration the Autism Diagnostic Observation Schedule (ADOS), which brings similar results as applying the face-to-face schedule (Schutte et al. 2015).

Virtual Reality

Virtual reality (VR) can be a safe and effective method of improving different skills in individuals with intellectual disabilities and autism spectrum disorders thanks to the fast development of computer technology (Standen and Brown 2005, Cromby et al. 1996, Weiss et al. 2014, Papatthomas & Goldschmidt 2017). One of possible applications of VR is improving psychomotor skills in patients with developmental disabilities. One of the ways of achieving it is learning movements from virtual tasks (de Mello Monteiro et al. 2017). Virtual

reality can be a useful tool in the treatment and rehabilitation of persons with Down syndrome (Delavarian et al. 2012). Gelsomini et al. (2016) used VR storytelling and learning activities in order to improve personal and social autonomy in order to improve integration in the real world of children with intellectual and developmental disorders (Gelsomini et al. 2016). One of the examples of training to integrate in the environment can be virtual street crossing, with such elements like walking within the crosswalk, and continuing to look left and high (Wright and Wolery 2011). In the study by Courbois et al. (2013) individuals with Down syndrome learned to improve their way finding abilities between different locations in the virtual environment (Courbois et al. 2013). Wang et al. (2011) found VR to be beneficial in improving sensorimotor functions in children and adolescents with Down syndrome (Wang et al. 2011, Lin & Wang 2012). Virtual environment may also be a good tool to help people with intellectual disabilities to understand issues related to health care situations, especially these circumstances, where their consent could be necessary (Hall et al. 2011). Another attitude referring to complex life situations, in which persons with intellectual disabilities may find themselves is being a witness in a court. VR turns out to be helpful also in the training of how to cope in this type of life events (Cooke et al. 2002). Tarnanas & Manos (2001) propose a very specific use of VR, which is training the reactions of people with intellectual disabilities in crisis situations like e.g. an earthquake (Tarnanas & Manos 2001). In intellectual and developmental disability VR can also be a method to improve physical fitness through VR-based exercise programs (Lotan et al. 2010). Another useful application of VR can be widening and enriching the ways how they spend their leisure time (Yalon-Chamovitz and Weiss 2008, Weiss et al. 2003).

CONCLUSIONS

The data from literature show that telepsychiatry may be a useful tool in the treatment and rehabilitation of patients with intellectual and developmental disabilities. In most situations it can be a valuable addition to traditional programs. It can be particularly useful in situations, when the direct access to professional assistance is limited, e.g. in rural areas. It may be advantageous in solving particular problem like e.g. managing challenging behavior. Except for the patients, also their parents may benefit from telehealth care providing coaching service for them. Other applications are training medical students in the treatment of special populations and remote diagnostic programs. Virtual reality can be a safe and effective method of improving different skills in individuals with intellectual and developmental disabilities. It can be helpful in obtaining skills necessary in everyday life e.g.

in way finding, crossing streets, in using health care services, being witnesses in a court, as well as in crises situation like during an earthquake. It can also support developing physical fitness and improving sensor motor skills. It can enrich the ways of spending the leisure time. As the above examples show, using modern technology is a relatively new and promising field in which new ideas may develop to support the already existing traditional services for patients with intellectual and developmental disabilities.

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Contribution of individual authors:

Krzysztof Krysta and Marek Krzystanek designed the concept of the manuscript and performed the search;

Wiesław J. Cubala and Mariusz S. Wiglusz derived and analysed the data;

Katarzyna Jakuszkowiak-Wojten, Maria Gałuszko-Węgielnik, Monika Czarnowska-Cubala, Joanna Szarmach and Adam Włodarczyk wrote the manuscript in consultation with Małgorzata Janas-Kozik.

References

1. Burke SM: *The Use of Technology by Adolescents With Intellectual and Developmental Disabilities*. *J Pediatr Nurs* 2017, doi:10.1016/j.pedn.2017.06.019.
2. Cooke P, Laczny A, Brown DJ & Francik J: *The virtual courtroom: a view of justice. Project to prepare witnesses or victims with learning disabilities to give evidence*. *Disabil Rehabil* 2002; 24:634-642.
3. Courbois Y, Farran EK, Lemahieu A, Blades M, Mengue-Topio H & Sockeel P: *Wayfinding behaviour in Down syndrome: a study with virtual environments*. *Res Dev Disabil* 2013; 34:1825-1831.
4. Cromby JJ, Standen PJ & Brown DJ: *The potentials of virtual environments in the education and training of people with learning disabilities*. *J Intellect Disabil Res* 1996; 40:489-501.
5. de Mello Monteiro CB, da Silva TD, de Abreu LC, Fregni F, de Araujo LV, Ferreira F et al.: *Short-term motor learning through non-immersive virtual reality task in individuals with down syndrome*. *BMC Neurol* 2017; 14:71.
6. de Wit J, Dozeman E, Ruwaard J, Alblas J & Riper H: *Web-based support for daily functioning of people with mild intellectual disabilities or chronic psychiatric disorders: A feasibility study in routine practice*. *Internet Interventions* 2015; 2:161-168.
7. Delavarian M, Afrooz GA & Gharibzadeh S: *Virtual reality and down syndrome rehabilitation*. *J Neuropsychiatry Clin Neurosci* 2012; 24:E7.
8. Gelsomini M, Garzotto F, Montesano D, Occhiuto D & Wildcard: *A wearable virtual reality storytelling tool for children with intellectual developmental disability*. *Conf Proc IEEE Eng Med Biol Soc* 2016; 2016:5188-5191.
9. Gentile JP, Cowan AE, Harper B, Mast R & Merrill B: *Reaching rural Ohio with intellectual disability psychiatry*. *J Telemed Telecare* 2017; 1357633x17706035.
10. Hall V, Conboy-Hill S & Taylor D: *Using virtual reality to provide health care information to people with intellectual disabilities: acceptability, usability, and potential utility*. *J Med Internet Res* 2011; 13: e91.
11. Harris JC: *New terminology for mental retardation in DSM-5 and ICD-11*. *Curr Opin Psychiatry* 2013; 26:260-262.
12. Hui Shyuan Ng A, Schulze K, Rudrud E & Leaf JB: *Using the Teaching Interactions Procedure to Teach Social Skills to Children With Autism and Intellectual Disability*. *Am J Intellect Dev Disabil* 2016; 121:501-519.
13. Krysta J, Krysta K, Zawada K, Cubala WJ, Wiglusz MS & Jakuszkowiak-Wojten K: *Development of vocational training systems for patients with intellectual disability in Poland*. *Psychiatr Danub* 2015; 27 Suppl 1: S401-407.
14. Krysta K, Wilczynski K, Paliga J, Szczesna A, Wojciechowska M, Martyniak E et al.: *Implementation of the MOTEK CAREN system in behavioural therapy for patients with anxiety disorders*. *Psychiatr Danub* 2016; 28 Suppl 1:116-120.
15. Krzystanek M, Krzeszowski D, Jagoda K & Krysta K: *Long term telemedicine study of compliance in paranoid schizophrenia*. *Psychiatr Danub* 2015; 27(Suppl 1):S266-268.
16. Krzystanek M, Krysta K & Skalacka K: *Treatment Compliance in the Long-Term Paranoid Schizophrenia Telemedicine Study*. *J Technol Behav Sci* 2017, doi:10.1007/s41347-017-0016-4.
17. Lin HC, & Wuang YP: *Strength and agility training in adolescents with Down syndrome: a randomized controlled trial*. *Res Dev Disabil* 2012; 33:2236-2244.
18. Lotan M, Yalon-Chamovitz S & Weiss PL: *Virtual reality as means to improve physical fitness of individuals at a severe level of intellectual and developmental disability*. *Res Dev Disabil* 2010; 31:869-874.
19. Machalick W, O'Reilly M, Chan JM, Lang R, Rispoli M, Davis T, et al.: *Using videoconferencing to conduct functional analysis of challenging behavior and develop classroom behavioral support plans for students with autism*. *Education and Training in Developmental Disabilities* 2010:207-217.
20. Miriam J, Szeftel R, Sulman-Smith H, Mandelbaum S, Vargas M & Ishak W: *Use of telepsychiatry to train medical students in developmental disabilities*. *Acad Psychiatry* 2011; 35:268-269.
21. Mucic D: *International telepsychiatry: a study of patient acceptability*. *J Telemed Telecare* 2008; 14:241-243.
22. Odom SL, Horner RH & Snell ME: *Handbook of developmental disabilities*. Guilford press, 2009.
23. Papatthomas P & Goldschmidt K: *Utilizing virtual reality and immersion video technology as a focused learning tool for children with autism spectrum disorder*. *J Pediatr Nurs* 2017; 35:8-9.
24. Piercey CD, Charlton K & Callewaert C: *Reducing Anxiety Using Self-Help Virtual Reality Cognitive Behavioral Therapy*. *Games Health J* 2012; 1:124-128.
25. Saint-Andre S, Neira Zalentein W, Robin D & Lazartigues A: *Telepsychiatry at the service of autism*. *Encephale* 2011; 37:18-24.

26. Salomone E & Maurizio Arduino G: Parental attitudes to a telehealth parent coaching intervention for autism spectrum disorder. *J Telemed Telecare* 2017; 23:416-420.
27. Schutte JL, McCue MP, Parmanto B, McGonigle J, Handen B, Lewis A, et al.: Usability and reliability of a remotely administered adult autism assessment, the autism diagnostic observation schedule (ADOS) module 4. *Telemed J E Health* 2015; 21: 176-184.
28. Standen PJ & Brown DJ: Virtual reality in the rehabilitation of people with intellectual disabilities: review. *Cyberpsychol Behav* 2005; 8: 272-282; discussion 283-278. *Cyberpsychol Behav* 2005; 8: 272-282; discussion 283-278.
29. Szeftel R, Federico C, Hakak R, Szeftel Z & Jacobson M: Improved access to mental health evaluation for patients with developmental disabilities using telepsychiatry. *J Telemed Telecare* 2012; 18:317-321.
30. Szeftel R, Mandelbaum S, Sulman-Smith H, Naqvi S, Lawrence L, Szeftel Z, et al.: Telepsychiatry for children with developmental disabilities: applications for patient care and medical education. *Child Adolesc Psychiatr Clin N Am* 2011;20: 95-111.
31. Tarnanas I & Manos GC: Using virtual reality to teach special populations how to cope in crisis: the case of a virtual earthquake. *Stud Health Technol Inform* 2001; 81: 495-501.
32. Weiss PL, Bialik P & Kizony R: Virtual reality provides leisure time opportunities for young adults with physical and intellectual disabilities. *J Child Neurol* 2014; 29:1119-1124.
33. Weiss PL, Tirosh E & Fehlings D: Role of virtual reality for cerebral palsy management. *J Child Neurol* 2014; 29:1119-1124.
34. Wojtuszek M, Kachnic J, Krysta K & Wutke J: Telepsychiatry in Polish patients' and doctors' opinion. *Psychiatr Danub* 2015; 27 Suppl 1:S379-382.
35. Wright T & Wolery M: The effects of instructional interventions related to street crossing and individuals with disabilities. *Res Dev Disabil* 2011; 32:1455-1463.
36. Wuang YP, Chiang CS, Su CY & Wang CC: Effectiveness of virtual reality using Wii gaming technology in children with Down syndrome. *Res Dev Disabil* 2011; 312-321.
37. Yalon-Chamovitz S & Weiss PL: Virtual reality as a leisure activity for young adults with physical and intellectual disabilities. *Res Dev Disabil* 2008; 29:273-287.

Correspondence:

Krzysztof Krysta, MD
Department of Rehabilitation Psychiatry, Medical University of Silesia
Ziółowa 45/47, 40-635 Katowice, Poland
E-mail: krysta@mp.pl