Empirical Studies on the Outcome of Virtual Reality Therapy

Boeldt, D., McMahon, E., McFaul, M., & Greenleaf, W. (2019). Using Virtual Reality Exposure Therapy to Enhance Treatment of Anxiety Disorders: Identifying Areas of Clinical Adoption and Potential Obstacles. Frontiers in Psychiatry, 10, 773.

https://doi.org/10.3389/fpsyt.2019.00773

Findings: Incorporating VR in therapy can increase the ease, acceptability, and effectiveness of treatment for anxiety. VR exposure therapy (VRET) permits individualized, gradual, controlled, immersive exposure that is easy for therapists to implement and **often more acceptable to patients than in vivo or imaginal exposure.** VR is a scalable tool that can augment access to and effectiveness of exposure therapy thus improving treatment of anxiety disorders.

Bouchard, S., Dumoulin, S., Robillard, G., Guitard, T., Klinger, É., Forget, H., Loranger, C., & Roucaut, F. X. (2017). Virtual reality compared with in vivo exposure in the treatment of social anxiety disorder: A three-arm randomised controlled trial. British Journal of Psychiatry, 210(4), 276–283.

https://doi.org/10.1192/bjp.bp.116.184234

Findings: Conducting exposure in VR was more effective at post-treatment than in vivo. Improvements were maintained at the 6-month follow-up. VR was significantly more practical for therapists than in vivo exposure. **Using VR can be advantageous over standard CBT as a potential solution for treatment avoidance and as an efficient, cost-effective and practical medium of exposure.**

Choy, Y., Fyer, A. J., & Lipsitz, J. D. (2007). Treatment of specific phobia in adults. Clinical Psychology Review, 27(3), 266–286.

https://doi.org/10.1016/j.cpr.2006.10.002

Findings: Comprehensive review of treatment studies in specific phobia. Acute and long-term efficacy studies of in vivo exposure, virtual reality, cognitive therapy and other treatments from 1960 to 2005. **Most phobias respond robustly to in vivo exposure, but it is associated with high dropout rates and low treatment acceptance.**

Clemmensen, L., Bouchard, S., Rasmussen, J., Holmberg, T. T., Nielsen, J. H., Jepsen, J. R. M., & Lichtenstein, M. B. (2020). Study protocol: Exposure in virtual reality for social anxiety disorder - a randomized controlled superiority trial comparing cognitive behavioral therapy with virtual reality-based exposure to cognitive behavioral therapy with in vivo exposure. BMC Psychiatry, 20(1).

https://doi.org/10.1186/s12888-020-2453-4

Findings: Cognitive Behavioral Therapy (CBT) is recommended for treatment, but a substantial part of individuals with SAD either do not seek treatment or drop-out. **CBT with Virtual Reality (VR)-based exposure has several advantages compared to traditional exposure methods, mainly due to increased control of situational elements.**

Donker, T., van Klaveren, C., Cornelisz, I., Kok, R. N., & van Gelder, J.-L. (2020). Analysis of Usage Data from a Self-Guided App-Based Virtual Reality Cognitive Behavior Therapy for Acrophobia: A Randomized Controlled Trial. Journal of Clinical Medicine, 9(6), 1614. https://doi.org/10.3390/jcm9061614

Findings: Study examined user engagement with ZeroPhobia, a self-guided app-based virtual reality (VR) Cognitive Behavior Therapy for acrophobia symptoms using cardboard VR viewers. Participants derived the most benefit when the practice time in the VR environment 25.5 min is irrespective of the amount of VR sessions. **The importance of feeling present in the VR environment was associated with better outcomes.** Self-guided VR acrophobia treatment is effective and leads to consistent reductions in self-reported anxiety both between levels and after treatment. Most participants progressed effectively to the highest self-exposure level, **despite the presence of a therapist.**

Fodor, L. A., Coteț, C. D., Cuijpers, P., Szamoskozi, Ștefan, David, D., & Cristea, I. A. (2018). The effectiveness of virtual reality based interventions for symptoms of anxiety and depression: A meta-analysis. Scientific Reports, 8(1).

https://doi.org/10.1038/s41598-018-28113-6

Findings: Meta-analysis of virtual reality (VR) interventions for anxiety and depression outcomes, as well as treatment attrition. There were no significant differences between VR-based and other active interventions. **VR interventions outperformed control conditions for anxiety and depression** but did not improve treatment drop-out.

Garcia-Palacios, A., Botella, C., Hoffman, H., & Fabregat, S. (2007). Comparing Acceptance and Refusal Rates of Virtual Reality Exposure vs. In Vivo Exposure by Patients with Specific Phobias. CyberPsychology & Behavior, 10(5), 722–724.

https://doi.org/10.1089/cpb.2007.9962

Findings: The present survey explored the acceptability of virtual reality (VR) exposure and in vivo exposure in 150 participants suffering from specific phobias. Seventy-six percent chose VR over in vivo exposure, and the refusal rate for in vivo exposure (27%) was higher than the refusal rate for VR exposure (3%). Results suggest that **VR**

exposure could help increase the number of people who seek exposure therapy for phobias.

Kaczkurkin, A. N., & Foa, E. B. (2015). Cognitive-behavioral therapy for anxiety disorders: An update on the empirical evidence. Dialogues in Clinical Neuroscience, 17(3), 337–346.

Findings: A review of 5 studies found that **patients report high satisfaction with VR based therapy and may find it more acceptable than traditional approaches. VR eliminates a barrier** for patients who may have trouble with imagining or visualization. **VR affords complete control over ET aspects. VRET protects confidentiality while** conducting exposures which might not be found in in-vivo exposures.

Morina, N., Ijntema, H., Meyerbröker, K., & Emmelkamp, P. M. G. (2015). Can virtual reality exposure therapy gains be generalized to real-life? A meta-analysis of studies applying behavioral assessments. Behaviour Research and Therapy, 74, 18–24.

https://doi.org/10.1016/j.brat.2015.08.010

Findings: A meta-analysis of clinical trials applying VRET to specific phobias.

Patients undergoing VRET:

- Did significantly better on behavioral assessments following treatment than before treatment.
- Performed better on behavioral assessments at post-treatment than patients on wait-list.
- Behavioral assessment at post-treatment and at follow-up revealed **no significant differences between VRET and exposure in vivo.**
- Behavioral measurement effect sizes were similar to those calculated from self-report measures.

The findings demonstrate that **VRET can produce significant behavior change in real-life situations and support its application in treating specific phobias.**

Steinman, S. A., Wootton, B. M., & Tolin, D. F. (2016). Exposure Therapy for Anxiety Disorders. In Encyclopedia of Mental Health (pp. 186–191). Elsevier.

https://doi.org/10.1016/B978-0-12-397045-9.00266-4

Findings: Exposure-based therapy is the gold-standard treatment for anxiety and related disorders. **Research suggests that exposure, alone or in combination with**

cognitive restructuring, can significantly reduce anxiety symptoms across diagnoses. Further, treatment gains tend to be maintained over time.

Wechsler, T. F., Kümpers, F., & Mühlberger, A. (2019). Inferiority or Even Superiority of Virtual Reality Exposure Therapy in Phobias?—A Systematic Review and Quantitative Meta-Analysis on Randomized Controlled Trials Specifically Comparing the Efficacy of Virtual Reality Exposure to Gold Standard in vivo Exposure in Agoraphobia, Specific Phobia, and Social Phobia. Frontiers in Psychology, 10

https://doi.org/10.3389/fpsyg.2019.01758

Findings: **No evidence has found that VR exposure is significantly less efficacious than in vivo exposure in Specific Phobia and Agoraphobia.** The wide range of study specific effect sizes, especially in Social Phobia, indicates a high potential for VR. In **Social Phobia, a combination of VR exposure with cognitive interventions and the realization of virtual social interactions targeting central fears might be advantageous.** Considering the advantages of VR exposure, its dissemination should be emphasized. Improvements in technology and procedures might even yield superior effects in the future.

Other References:

American Psychiatric Association (2013). Severity Measure for Specific Phobia—Adult. American Psychiatric Association.

https://www.psychiatry.org/File%20Library/Psychiatrists/Practice/DSM/APA_DSM5_Severity-Measure-For-Specific-Phobia-Adult.pdf

Marks, I. M., & Mathews, A. M. (1979). Brief standard self-rating for phobic patients. Behaviour Research and Therapy, 17(3), 263–267. https://doi.org/10.1016/0005-7967(79)90041-X

Wiederhold, B. K., Gao, K., Sulea, C., & Wiederhold, M. D. (2014). Virtual Reality as a Distraction Technique in Chronic Pain Patients. Cyberpsychology, Behavior, and Social Networking, 17(6), 346–352. https://doi.org/10.1089/cyber.2014.0207

Witmer, B. G., & Singer, M. J. (1998). Measuring Presence in Virtual Environments: A Presence Questionnaire. Presence: Teleoperators and Virtual Environments, 7(3), 225–240. https://doi.org/10.1162/105474698565686

Wolpe, J. (1969). The practice of behavior therapy (1st ed.). Pergamon Press.