

Potential Utility of a Cost-Effective Virtual Reality System for Treatment of Fear of Flying

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Aviophobia- Etiology, Prevalence, and Impact

Fear of flying (aviophobia) is clinically defined as a specific phobia characterized by a marked persistent excessive fear that is precipitated by the experience or immediate prospect of air travel.¹ Aviophobia may be accompanied by a sense of shame or heightened emotional distress and limit career options which involve flying.¹⁰ The lifetime prevalence of the disorder ranges from 3–13%,^{3,6,15} with females more prone to this phobia.² Fear of flying is not a unitary phenomenon but, rather, has multiple etiologies.^{7,9,17} Broadly speaking, people with aviophobia partition into two subsets. The first group is described as having a simple situational phobia and includes individuals who fear an aviation mishap. For the second group, fear of flying is a presentation of an anxiety condition.^{9,10} Commonly these include claustrophobia, agoraphobia, acrophobia (fear of heights), and panic disorder.^{9,16}

From a carrier perspective, airlines lose close to \$1.6 billion annually (1982 dollars) as anxious passengers fly two-thirds less often than individuals comfortable with the flight environment.⁵ Additionally, 2% of the U.S. public does not make use of this mode of transportation.⁵ Also relevant is delays caused with aircraft having to return to the departure gate for passenger de-planement and, in some cases, luggage retrieval from the aircraft hold. Lastly, belligerence and/or aggressive behavior fueled by anxiety in passengers self-medicating with alcohol raise an additional concern of flight safety.¹⁰

Treatment for Fear of Flying

Effective treatment for fear of flying is typically multicomponent, including psychotherapy,⁸ providing aviation-related information,¹¹ and, lastly, but equally important, repeated exposure to the stimulus itself. As for all phobias, in vivo exposure

(i.e., to the actual stimulus) represents the gold standard to achieve habituation (reduction in anxiety level by repeated presentation of the stimulus for prolonged periods) and to increase an individual's tolerance to distress. However, accomplishing these goals has its challenges. The cost of airline tickets, the time involved inclusive of airport travel time, security, boarding, and the fact that for any round trip only limited exposure can be achieved to a particular phase of operation (e.g., two takeoffs) all conspire to make in vivo exposure impractical.

Utility of Virtual Reality in Fear of Flying Treatment

Virtual reality (VR) represents an alternative to an actual flight and has the advantage of allowing for the repeated exposure to a particular phase of flight in a time-effective manner. The environment is created either via a head-mounted display or via a computer automated virtual environment and, in some instances, involves full motion.^{4,12} The efficacy of VR, in combination with the aforementioned components, in treatment of aviophobia is well documented.^{4,13,14} Patients most likely to benefit from VR are those who achieve a sense of presence in the virtual environment, i.e., perception that one is actually in the environment.¹¹

The iPhone VR Therapy System

Notwithstanding the efficacy of VR in fear of flying treatment, such systems, to date, have required substantial financial investment (sometimes requiring monthly licensing fees as well) likely beyond the reaches of many clinicians in private practice.

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DOI: 10.3357/AMHP.4719.2016

The iPhone VR Therapy system (Virtually Better, Inc., Decatur, GA), recently came to market (2015), is substantially less expensive (approximately \$1300 for a complete system), and comprises (Fig. 1) a laptop, an iPhone 5, both loaded with the fear of flying programs, a head-mounted display holder, and a navigation controller. For clinicians with their own laptop and iPhone (on which the software can be installed at no additional charge) the cost of the system reduces to approximately \$600.00. Noteworthy is that the software code for the iPhone VR Therapy System was newly written, allowing for higher resolution of virtual assets (e.g., cabin interior) and stereoscopic effects, creating superior depth perception. The system requires a network (but not internet access) to which both the iPhone and the laptop are connected.

From the patient perspective, flight scenarios (e.g., boarding, takeoff, landing) are viewed on the iPhone itself, which is housed in the binocular head-mounted display, the latter adjustable for near or far-sighted vision. The iPhone with its accelerometers senses movement and the view presented changes in accordance with head movement. Realistic audio is provided by way of speakers or ear-buds connected to the laptop or directly to the iPhone.

A clinical session will require the individual with aviophobia to wear the head-mounted display into which the iPhone is inserted. Clinicians select the flight scenarios via the “clinician’s interface” on the laptop. Scenarios include the passenger located at the boarding gate, walking down the jetway onto the aircraft and thence the aircraft aisle, taxiing, takeoff, cruise, and landing. Some (e.g., jetway to boarding and takeoff to cruise), but not all (taxi-takeoff or cruise to landing), scenarios will automatically sequence. Walking the jetway or through the cabin is achieved using a button on the navigation controller manipulated either by the clinician or the patient. A variety of sounds (crying baby, passengers talking, flight phase-specific cabin bell/announcements, even anxious responses of other passengers) can be added to the flight scenario for increased realism via corresponding radio buttons. In addition, patients averse to “bad weather” can be exposed to virtual flights in

stormy conditions, inclusive of lightning/thunder. Some of the audio is automatic. For instance, the jet engines are “on” during takeoff, but have to be manually selected for taxiing and midflight.

Limitations

Nevertheless, the system does suffer some limitations relative to the more sophisticated unit. For example, it is not possible to create the G forces associated with turbulence, whereas vibrotactile chairs are included in high end systems for this purpose. Also, some features warrant further development. The addition of more passengers for scenarios such as the boarding area, the jetway, and in cabin might enhance treatment efficacy for claustrophobic individuals with aviophobia.⁹ Finally, inclusion of night flight, go-arounds, the aircraft banking, and preflight security scenarios would expand the virtual flight experience. Finally, not unexpected with a new application, the software sometimes has to be rebooted.

Summary

For the person with aviophobia, repeated exposure by way of actual flights represents a critical part of effective treatment. However, such in vivo exposure is itself fraught with limitations in terms of expense, time commitment, and limited exposure to a phase(s) of flight that triggers intense distress. While high end virtual reality systems have proved efficacious toward this end, the substantial financial outlay has, to a large extent, reduced their penetration into the market. For practitioners seeking to treat patients with aviophobia, the iPhone VR Therapy system provides a realistic, cost-effective means of providing a virtual flight environment.

ACKNOWLEDGMENTS

Neither author has any conflict of interest to disclose.

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Fig. 1. The iPhone VR Therapy system.

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