

Human Factors in Aviation and Aerospace

Review Article | Derleme Makalesi

 Open Access | Açık Erişim

The Role of Online Virtual Reality Therapy: New Approaches in Treatment of Aviophobia

Çevrimiçi Sanal Gerçeklik Terapisinin Rolü: Uçuş Fobisinin Tedavisinde Yeni Yaklaşımlar



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Abstract Aviophobia impacts a considerable portion of the population, inducing fear and anxiety. Symptoms vary from mild discomfort to intense panic episodes, affecting both personal and professional fields. Traditional therapy methods such as cognitive behavioural therapy (CBT) and exposure therapy are some of the most effective and widely used treatments for people with aviophobia. However, these therapeutic methods face several practical barriers for fear of flying. Virtual Reality Exposure Therapy (VRET) is the most employed alternative for addressing this problem. Given the limitations of VRET, Online Virtual Reality Therapy (OVRT) is a highly effective and readily available alternative treatment option for aviophobia, resulting in significant decreases in anxiety and avoidance behaviours. Also, OVRT is an innovative method using technology in an effective and easily available way. The article reviews in detail several studies comparing OVRT with traditional therapeutic approaches, including Standard Exposure Therapy (SE) and CBT. It also compares OVRT with VRET. The aim of the article is to compare traditional therapy approaches for aviophobia with OVRT in terms of treatment efficacy, potential future use, strengths, limitations, and potential side effects through overviewing the relevant literature.

Öz

Uçuş fobisi nüfusun önemli bir kısmını etkileyerek uçuş ile ilgili korku ve endişe gibi belirtilere yol açmaktadır. Belirtiler hafif rahatsızlıktan yoğun panik ataklara kadar değişmekte ve hem kişisel hem de mesleki alanları etkilemektedir. Bilişsel davranışçı terapi (BDT) ve maruz bırakma terapisi gibi geleneksel terapi yöntemleri, uçuş fobisi olan kişiler için etkili ve yaygın olarak kullanılan tedavilerden bazlıdır. Ancak bu terapi yöntemleri uçuş fobisi tedavisinde çeşitli pratik engeller barındırmaktadır. Sanal Gerçeklik Maruz Bırakma Terapisi (VRET) bu sorunu ele almak için kullanılan bir tedavi yöntemlerinden olmakla birlikte VRET de çeşitli kısıtlılıklar içermektedir. Çevrimiçi Sanal Gerçeklik Terapisi (OVRT), uçuş fobisi ile ilişkili kaygı ve kaçınmanın azalmasını sağlayan oldukça etkili bir alternatif tedavi seçenekidir. Ayrıca OVRT, teknolojiyi etkili ve kolay erişilebilir bir şekilde kullanan yenilikçi bir yöntemdir. Makale, OVRT'yi standart maruz bırakma terapisi, BDT ve VRET dahil olmak üzere çeşitli terapötik yaklaşımlarla karşılaştırınan birçok çalışmayı çalışmaları ayrıntılı olarak incelemektedir. Makalenin amacı, uçuş fobisi ile ilgili literatürü gözden geçirerek geleneksel terapi yaklaşımlarını; tedavi etkinliği, gelecekteki potansiyel kullanımı, güçlü yönleri, sınırlamaları ve potansiyel yan etkileri açılarından OVRT ile karşılaştırmak amaçlanmıştır.

Keywords Aviophobia • Virtual Reality Therapy (VRET) • Online Virtual Reality Therapy (OVRT) • Anxiety Disorders • Psychotherapy

Anahtar Kelimeler Uçuş fobisi • Sanal Gerçeklik Terapisi • Online Sanal Gerçeklik Terapisi • Kaygı Bozuklukları • Psikoterapi

Author Note The article was presented as an oral presentation at the 6th HUP Aviation, Space, and Psychology Congress.

Yazar Notu Bu makale 6. HUP Havacılık, Uzay ve Psikoloji Kongresi'nde sözlü bildiri olarak sunulmuştur.



 Citation | Atif: Özdemir Arıkan, Z. (2025). The role of online virtual reality therapy: New approaches in treatment of aviophobia. *Human Factors in Aviation and Aerospace*, 2(1), 57–69. <https://doi.org/10.26650/hfaa.2025.1607721>

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The Role of Online Virtual Reality Therapy: New Approaches in Treatment of Aviophobia

Aviophobia, or aerophobia, is a common anxiety disorder that may have major impacts on the individual's professional and private lives. Thereby, it has a high cost for individual and societal levels. Standard treatment techniques, such as cognitive-behavioural therapy (CBT) and exposure therapy, have demonstrated effectiveness in treating this phobia (Rothbaum et al., 2006). Online Virtual Reality Therapy (OVRT), on the other hand, is a new, easy-to-use, and inexpensive option that improves treatment results through immersive experiences (Anderson, & Molloy, 2020).

This article seeks to assess OVRT as a specialised therapy for aviophobia by emphasizing its accessibility, cost-effectiveness, and immersiveness. The study evaluates the treatment effects and practicality of OVRT compared to more standard therapeutic methods, including CBT and exposure techniques. The article also examines OVRT's potential future applications, strengths and weaknesses, and potential adverse effects. Therefore, it was aimed to offer a thorough knowledge of OVRT's function in treating aviophobia and its potential as an alternative to standard techniques by reviewing previous studies.

Aviophobia

According to the DSM-5, anxiety disorders are a set of symptoms marked by a high level of fear, anxiety, and avoidance. Anxiety disorders can lead to prevalent issues such as exhaustion, interference with everyday activities, impact on other health systems, and the emergence of serious medical problems (Stiede & Storch, 2024).

A particular phobia under the anxiety disorder category, aviophobia, is characterised by a severe avoidance of flying (American Psychiatric Association, 2023). Aviophobia is a type of phobia related to airline travel accompanied by symptoms of fear, anxiety, and avoidance. This fear may cause flight avoidance behaviours at a level that will affect private and work life in people with aviophobia (Rothbaum et al., 2000).

Aviophobia is a common mental illness that affects many people worldwide. Prevalence estimates vary between 10% and 40% across studies and regions (Gottlieb et al., 2021). Study findings in Western Europe and North America revealed that 10% and 40% of the population experienced aviophobia (Gerwen & Koopmans, 2018; Gottlieb et al., 2021). Individuals who have never flown before have higher levels of flight anxiety (Almen & Gerwen, 2013). Aviophobia affects a significant portion of the population and causes significant stress and anxiety for sufferers (Mühlberger et al., 2001). This phobia can significantly affect economic, social, and emotional aspects of life. It can also cause significant personal and professional difficulties (Gerwen & Koopmans, 2018). It is differentiated by various intensity levels, from little discomfort to preventing fear. Some of the symptoms could be nausea, sweating, rapid heartbeat, or even panic episodes (Oakes & Bor, 2010). Multiple aspects of the flight—take-off, turbulence, particularly the thought of getting on the aircraft—can develop these responses. Therefore, fear and anxiety result in avoidance of travel, lost opportunities, and lowering the general quality of life (Baños et al., 2002).

Effective Treatment Methods for Aviophobia

Efficient aviophobia treatment methods are crucial as they improve individual standards of life, reduce functional restrictions, and help people overcome destroying anxieties. It allows them to travel and engage in personal and professional activities without fear and anxiety (Fehribach et al., 2021).

Research indicates that pharmacology, CBT, exposure therapy, virtual reality therapy (VRET), and eye move-

ment desensitisation and reprocessing (EMDR) play significant roles in alleviating symptoms of aviophobia. Pharmacology has a role in alleviating anxiety by interacting with the brain's GABA-A receptors. The beta-blocker propranolol may alleviate anxiety by lowering activity in the amygdala. Aviophobia may be treated with benzodiazepines for instant relief and propranolol for long-term maintenance (Abuso, 2023). Although pharmacological therapy gives temporary relief for aviophobics, it does not address the psychological cause of the problem and does not result in a long-term remedy (van Gerwen et al., 2002).

CBT is a widespread approach for treatment of aviophobia. Through this form of treatment, patients can become aware of destructive emotional and mental patterns and alter their conduct accordingly. Cognitive restructuring and exposure techniques in CBT are incorporated into various therapeutic approaches (Triscari et al., 2015). Exposure and systematic desensitisation are CBT-based techniques that attempt to lessen flight-related anxiety and thereby deal with the fear gradually. Also, this technique is frequently used in combination with other forms of treatment (Shiban, 2018). Another technique that has been proven to be successful in treating flight anxiety is EMDR (Lapsekili & Yelboga, 2014). Additionally, research has shown that CBT and EMDR can effectively treat irrational fears of flying (Triscari et al., 2015). Considering current technical developments, VRET enhances the quality of life and decreases anxiety and fear related to fly. In contrast to standard therapeutic approaches, it exhibits promising outcomes for aviophobia (Ribé-Viñes et al., 2023).

Recent technological advancements have facilitated the emergence of novel treatment methods, displayed by OVRT (Maltby et al., 2002). OVRT has proven effective in treating various phobias, particularly anxiety disorders, due to its innovative approach that facilitates exposure in a controlled environment (Rothbaum et al., 2006).

The purpose of the study

This article evaluates the effectiveness of OVRT in treating aviophobia by comparing it to standard exposure therapy (SE) and VRET. It emphasizes the accessibility, cost-effectiveness, immersive quality, and effectiveness of OVRT in alleviating anxiety while also considering technology requirements, therapist training, and related barriers. The aim is to expand the existing knowledge base and suggest ways forward for future research in the field of OVRT for aviophobia.

While the literature includes many studies on VRET for the treatment of aviophobia, several studies on OVRT are very limited. Also, there are inadequate reviews on the comparison between standard therapy methods and OVRT specifically for aviophobia. So, the present article is expected to shed light on this gap in this field.

Traditional Therapies for Aviophobia

Traditional therapy approaches for aviophobia have a wide spectrum of treatment methods. These effective methods mainly emphasize cognitive-behavioural and exposure therapies. Integration of these methods may create a thorough personalised treatment plan.

Standard exposure therapy and other traditional therapeutic techniques are indicated to be helpful for treating aviophobia (Rothbaum et al., 2000). Standard therapeutic procedures often involve cognitive restructuring to address unreasonable concerns and progressive exposure to flight-related indications (Wiederhold & Wiederhold, 2003). Combining CBT with group cognitive-behavioural training results in a decrease in subjective anxiety related to aviophobia (Krijn et al., 2007).

Cognitive Behavioural Therapy (CBT)

CBT greatly impacts the treatment of anxiety disorders, reduce avoidance symptoms and improve general quality of life. CBT is based on the principle that maladaptive ideas exacerbate anxiety, and by restructuring these concepts, individuals may modify their emotional reactions and behaviours (Katzman et al., 2014). Meta-analytic findings demonstrate that CBT is efficacious for several anxiety disorders, such as generalised anxiety disorder, social anxiety disorder, and panic disorder, with significant decreases in anxiety symptoms observed (Weisz et al., 2017; Carpenter et al., 2018). It employs procedures like exposure therapy, cognitive restructuring, and relaxation measures, which assist patients in confronting their concerns and establishing coping skills (Saputri et al., 2024). Research has shown the significance of CBT in improving functional outcomes, as patients report symptom alleviation and enhancements in daily functioning and overall quality of life (Olatunji et al., 2010). Moreover, research indicates that the advantages of CBT may be preserved over time, with several individuals retaining their improvements even after the conclusion of therapy (Olatunji et al., 2010).

According to the research, CBT is the preferred first-line treatment in nearly 70% of anxiety disorders and is utilised 2-3 times more frequently than alternative therapies, such as psychodynamic therapy and schema therapy. It is the most employed psychotherapy modality in clinical practice for anxiety disorders (Shafran et al., 2009; Thomason et al., 2020).

One of the most successful therapies for aviophobia is CBT. This treatment method combines behavioural methods with cognitive restructuring to help people face and control their anxieties. By changing negative thinking patterns and behaviours connected with the aviophobia, CBT can significantly lower anxiety levels related to flying (Triscari et al., 2015; Miller & Berman, 1983). Studies demonstrate that CBT effectively alleviates symptoms of aviophobia (Ost et al., 1997). For example, in a longitudinal study, CBT was shown to reduce maladaptive cognitive coping strategies in individuals with fear of flying. This study revealed that reduced flight anxiety and flight avoidance behaviour were maintained in a 3-year long-term follow-up. (Busscher & Spinhoven, 2017). Similarly, individuals with aviophobia showed substantial long-term effects of CBT in lowering their fear of flying, as seen by continued decreases in flight anxiety at a 1-year follow-up (Triscari et al., 2015)

CBT for aviophobia faces practical barriers to in vivo exposure (e.g., cost and limited access to actual flights). However, virtual reality (VR) alternatives show promise but require specialised technology often unavailable in resource-limited settings (Opriş et al., 2012). CBT for flight-related anxieties might overlook other psychological requirements if caused by other anxiety disorders or trauma (van Gerwen et al., 2014). Further barriers to CBT availability include insufficient funding, regional inequalities, and a lack of qualified therapists, especially in areas of disadvantage. For varied groups, cultural mismatch with CBT's Western-centric cognitive restructuring procedures may diminish efficacy (Hofmann et al., 2012), and low client participation is caused by scepticism or homework. Adaptable, culturally sensitive, and resource-aware CBT is needed to address these issues.

Exposure therapy

Exposure therapy and systematic desensitisation are regarded as effective therapies for anxiety disorders, significantly enhancing patients' ability to manage their anxiety. Exposure therapy facilitates individuals in tolerating discomfort and reducing avoidance tendencies associated with their fears through a gradual and controlled confrontation with feared stimuli (Craske et al., 2014).

This approach depends on classical conditioning ideas, which hold that over time frequent exposure to anxiety-inducing stimuli reduces fear response. Combining relaxation methods with gradual exposure to

anxiety-inducing stimuli, systematic desensitisation is a type of exposure treatment that helps clients to face their worries in a setting of relaxation (Sulistiyoningrum & Mulawarman, 2020).

Randomised controlled studies have shown that exposure and regular desensitisation may decrease anxiety symptoms by 50–75%. This is why CBT is more commonly used than psychoanalytic or supportive treatment (Craske et al., 2014; Hofmann et al., 2012). Due to its immediate evidence-based effects on neurobiological mechanisms (e.g., amygdala activity decrease), these treatments have a 60–80% acceptance rate among practitioners; nonetheless, patient resistance and therapist training may be challenges (Wolitzky-Taylor et al., 2008; Tolin, 2010).

Another traditional approach of treating aviophobia is exposure therapy—more especially, systematic desensitisation. Exposure therapy seeks to help individuals overcome their fears of flying by regulated and gradual exposure to flight-related stimuli. This might include flights carried under controlled conditions, visualisers, or simulations. Studies show that exposure treatment can effectively treat aviophobia (Rothbaum et al., 2000). Exposure and systematic desensitisation have been empirically indicated to decrease substantial decreases in anxiety and panic associated with flying (Triscari et al., 2015; Miller & Berman, 1983).

Longitudinal studies have also demonstrated the effect of exposure. A long-term study examined the role of subjective and physiological anxiety responses during in vivo exposure sessions. Lower self-reported anxiety during flight exposure has been associated with lower flight anxiety and more traveling for three years after therapy (Busscher et al., 2015).

Exposure therapy and systematic desensitisation are effective interventions for aviophobia. However, they face challenges such as a high rate of withdrawal due to treatment-related distress, logistical barriers to in vivo exposure (e.g., cost, access), and the variable efficacy of relaxation techniques for people with high baseline anxiety (American Psychological Association [APA], 2020; Rothbaum et al., 2006). Ethical issues include temporary anxiety increasing and informed consent, as well as cultural or individual therapy acceptance, hinders execution (Craske et al., 2014). Comorbidities, including panic disorder and resource-intensive demands like time and therapist skills, may hinder treatment results (Oar et al., 2015). Exposure reduces certain constraints, but cost and individual adaptability are essential for optimal results (Rothbaum et al., 2006).

Innovative Treatments for Aviophobia

Virtual Reality Therapy (VRET)

Many new forms of psychotherapy have emerged, along with the latest technological developments. A successful treatment approach created in this environment and widely applied in the field is VRET (Rothbaum et al., 2000). Systematic reviews have demonstrated that VRET can lower particular phobic symptoms like dental fear, aviophobia, and spider phobia. Participants getting VRET demonstrated notably lower phobia symptoms than those in waitlist and placebo groups (Botella et al., 2017; Krzystanek et al., 2021; Ribé-Viñes et al., 2023). Notably, VR environments elicit a strong sense of presence, which is essential for effective exposure treatment.

Early research on VRET interventions focussed on the treatment of aviophobia, and this method is a highly effective and validated alternative for addressing aviophobia (North & North, 1994). This is supportive of in vivo exposure treatment (Ribé-Viñes et al., 2023) and CBT. Moreover, VRET and standard exposure therapies efficiently lower aviophobia; 92% of VRET participants and 91% of standard therapy participants had flown in an aircraft during a 12-month follow-up (Rothbaum et al., 2002). VRET improved aviophobia results more than imagery therapies, with 80% of individuals able to fly without medication following therapy compared to 20% after imaging therapy (Wiederhold et al., 2001).

For instance, a study assessing multiple therapy modalities found that combining CBT with VRET significantly improved therapy effectiveness, suggesting that a multimodal approach may be the most successful strategy for managing aviophobia (Triscari et al., 2015; Fehribach et al., 2021). The use of relaxation techniques such as diaphragmatic breathing in VRET, integrated with exposure therapy, plays an important role in reducing the individual's anxiety level and making the therapeutic process more effective (Shiban et al., 2017).

It was shown that VRET effectively treated aviophobia by reducing subjects' fear and avoidance and allowing them to experience flying with little anxiety after treatment (Baños et al., 2002; Mühlberger et al., 2001). Moreover, supporting these conclusions were physiological and cognitive ones. Effective therapy for aviophobia depends critically on VR settings exposing patients to visual and audio stimuli. VRET was shown to reduce fear levels in people right after treatment and at 6-month follow-ups, therefore proving that the advantages of therapy remained (Mühlberger et al., 2003).

In addition, physiological monitoring during VR sessions revealed decreased patient arousal, demonstrating effective desensitization to flight-related stimuli (Wiederhold et al., 1998). The use of multimodal signals, such as vibrotactile stimulation, can increase the sense of presence, although its effect on reducing anxiety is inconsistent (Ribé-Viñes et al., 2023). Moreover, respondents stated less catastrophic ideas and anticipatory anxiety, which promotes the role of VR in cognitive features of aviophobia (Botella et al., 2004; Baños et al., 2002).

VRET is used as a more regulated and easily available alternative for standard exposure therapy, especially in anxiety disorders including phobias, social anxiety, and PTSD, its frequency in clinical practice is still limited. However, studies show that CBT is dominant in 60–80% of anxiety treatments while VRET is preferred in only 15–20% (Powers & Emmelkamp, 2008; Carlin et al., 1997).

Although similar effect sizes (45–65%) with traditional methods have been reported in randomised studies, their widespread use depends on obstacles such as therapist training and patient acceptance. Its application is growing mainly among specialty clinics and research procedures with technical advancements and lowering prices (Wechsler et al., 2019; Oing & Prescott, 2018).

Though it is not without limits, the use of VRET to treat anxiety disorders, including aviophobia, has become quite common. One main issue is the diversity in treatment results as not everyone responds to VRET identically. Studies show that although VRET works well for some phobias, like aviophobia, its efficacy decreases for more complex anxiety disorders such panic disorder and social anxiety disorder, where the evidence base is less (Meyerbröker & Emmelkamp, 2010).

Cybersickness, also known as motion sickness in VR, is a condition that causes people to feel sick, dizzy, and to strain their eyes. It is usually caused by an imbalance between visual and vestibular stimuli during VR events (Kourtesis et al., 2023). Cybersickness caused by VR can lower therapeutic efficacy and client satisfaction by itself. Adults are susceptible; discomfort grows with increasing exposure intervals (Li et al., 2023). The varying generalisation of gains produced in virtual environments to real-life situations calls into question the long-term usefulness of VRET as well (Opriş et al., 2011). Patients may feel less nervous during virtual meetings, but studies have shown that this does not always translate to less anxiety in real life, which is important for complete therapy (Morina et al., 2015; Opriş et al., 2011). Also, the therapeutic benefits might be restricted because not all patients can fully feel the presence, which is a key part of VRET working (Morina et al., 2014; Botella et al., 2017).

In sum, studies showing notable improvements in flight activity after treatment, such as increased flights, have demonstrated the long-term efficacy of VRET for aviophobia (Gottlieb et al., 2021). Research suggests that VRET is as effective as both CBT and in vivo exposure therapy in reducing flight anxiety. When exposure

is not possible, VRET can be an effective alternative and assist CBT become more successful (Ribé-Viñes et al., 2023). However, it has some limitations. VRET treatment has limitations, including the expensive cost of software systems and the need for face-to-face therapy owing to VR gadgets. The limited generalisability because of the controlled lab environment and the possible effects of a sense of presence and cybersickness should be considered as well (Garrett et al., 2018).

Online Virtual Reality Therapy (OVRT)

OVRT is a new discipline that uses technology to treat aviophobia with an accessible and efficient way. Recent research about VR modalities for aviophobia indicated encouraging results (Banos et al., 2002; Botella et al., 2017). OVRT uses VR technology to produce immersive flight simulators and allows people to face their fears in controlled and safe circumstances. This method substitutes several aspects of actual flying, and it enables exposure therapy in virtual environment (Rothbaum et al., 2006).

OVRT has become more common, especially after the pandemic, because it is easy to get and can be used in a variety of ways to help people with anxiety disorders. This is true even though it only works 10–15% of the time and is not as well-known as standard CBT. People with social anxiety and fears respond well to OVRT. It will be used more in the future if problems like therapy training and technology infrastructure are fixed. Effect sizes (40–60%) obtained in randomised trials correspond to those of traditional methods (Lindner et al., 2019; Carl et al., 2019).

OVRT offers an accessible, cost-effective, and flexible therapeutic alternative for aviophobia (Garcia-Palacios et al., 2001; Ong et al., 2022). Numerous studies have shown that OVRT holds remarkable promise. Self-help and automated VR applications have shown considerable effectiveness in reducing flight anxiety. In addition, relaxing methods such as diaphragmatic breathing may also improve outcomes (Fehribach et al., 2021). For example, OVRT treated a patient with a significant aviophobia who had previously resisted standard techniques. After undergoing several OVRT treatments, the patient eventually overcame his anxiety and was able to fly without experiencing panic attacks (Smith & Jones, 2022).

Recent advancements in VR technology have improved the realism and accessibility of online VR training. High-fidelity graphics, motion platforms, and interactive scenarios enhance immersion, which may improve the effectiveness of therapy (Maltby et al., 2002). Configurations that are user-friendly for exposure to VR, along with low to medium-cost VR systems like PlayStation VR, Oculus Rift, and Samsung Gear VR, facilitate greater accessibility of VR technology for therapists and clients (Anderson & Molly, 2020). A study indicated that, in comparison to a control group, computerised mobile virtual reality cognitive behaviour therapy (VR-CBT) significantly reduced symptoms of aviophobia in a follow-up assessment. The therapy demonstrates long-term effectiveness, as evidenced by 3-month and 12-month follow-ups, and offers accessibility by being conducted in participants' environments (Donker et al., 2023).

One of the key benefits of OVRT is its accessibility, clients may engage in therapy from the comfort of their homes. It is advantageous for people who may have mobility challenges or are living in isolated places with limited access to mental health facilities (Opris et al., 2011; Morina et al., 2015). OVRT eliminates the need for expensive equipment and allows for flexible scheduling, which can improve patient adherence (Bouchard et al., 2017). Online therapy's confidentiality and anonymity may lead to less stigmatisation, and clients might avoid face-to-face treatment (Krijn et al., 2004).

OVRT offers several specific benefits compared to the standard therapy modalities. It offers a regulated environment where individuals can confront their fear of flying without the uncertainties associated with actual flights (Rothbaum et al., 2006). The availability of Internet platforms facilitates help-seeking by allowing people with severe phobias to receive therapy from home. Participants receiving OVRT showed

much lower levels of anxiety than those receiving standard therapy (Anderson & Molloy, 2020). **Table 1** comprehensively compares standard exposure therapies, VRET, and OVRT.

Table 1

Comparison of Standard Exposure Therapy (SE), Virtual Reality Exposure Therapy (VRET), and Online Virtual Reality Therapy (OVRT)

Therapy type	Accessibility	Cost-effectiveness	Immersion level	Effectiveness in reducing anxiety	Technological requirements	Therapist training	Challenges
Standard Exposure Therapy (SE)	Limited requires physical presence	Moderate cost of therapist and physical setup	Low Real-world simulations with therapist	Effective with gradual exposure and cognitive restructuring (Rothbaum et al., 2006)	Low requires physical settings for exposure	Standard training in exposure therapy and CBT	Availability of suitable exposure settings, patient compliance
Virtual Reality Exposure Therapy (VRET)	Moderate requires VR set up at specific locations	Moderate cost of VR equipment and therapist	High Virtual simulations closely mimic real experiences	High effective at 6- and 12-month follow-up (Wiederhold & Wiederhold, 2003)	High requires VR equipment in a clinical setting	Specialized training in VR technology and exposure principles	Cost of VR equipment, access to specialized clinics
Online Virtual Reality Therapy (OVRT)	High accessible remotely via the internet	High lower cost due to remote access and reduced setup	Moderate Virtual simulations accessible remotely	High comparable to VRET, significant reductions in anxiety (Anderson & Molloy, 2020)	High requires VR equipment and stable internet connection	Specialized training in VR technology, exposure principles, and remote supervision	Technological limitations (VR quality, internet stability), therapist training

Additionally, the requirement for therapist engagement in VRET might make treatment logistics more difficult because it calls for qualified specialists to lead the sessions whereas online treatments can sometimes be self-guided or need little supervision (Bouchard et al., 2017; Boeldt et al., 2019). Reliance on specialised technology and software is a significant disadvantage of VRET since it may restrict accessibility for many patients, especially those who live in distant places or have little financial resources (Opriş et al., 2011; Ebert et al., 2018). On the other hand, online interventions are more accessible and more straightforward to use since they can frequently be accessed through standard devices like computers or smartphones (Ebert et al., 2018).

Despite the promising potential of OVRT, it faces several barriers. Technological limitations such as unreliable internet connections and low-quality VR equipment can jeopardise the effectiveness of the treatment (Opriş et al., 2012). For the success of OVRT, it is crucial to ensure that clients have access to high-quality VR headsets and stable internet. Another substantial concern is the potential lack of immersion and presence that can be accomplished in a controlled clinical setting compared to in-person VRET, which may reduce the therapeutic effects (Kampmann et al., 2016). The online format may not entirely mirror real-world interactions and circumstances, making it challenging to apply virtual abilities to real-life situations (Price et al., 2011). Expanding research on online therapy to encompass aviophobia will significantly enhance the utilisation of VRET treatment in digital formats moving forward.

This article underlines OVRT's effectiveness and accessibility in treating aviophobia, therefore highlighting its ability to alter standard treatments. By providing a scalable, immersive solution and addressing the constraints of traditional approaches, the review of OVRT helps future research and more general treatments of different anxiety disorders.

Therapists' perspectives on OVRT and training requirements

Although there is little research on therapist perspectives towards OVRT, therapists prefer online and VRET for aviophobia since VR provides controlled exposure without real-life threats. A study pointed out that therapists recommended using VR for exposure treatment for fear of flying (Ong et al., 2024). A study involving 185 therapists indicated a generally positive attitude toward VRET, mainly due to advancements in VR technology that have enhanced accessibility and affordability (Lindner et al., 2019).

The need for specialised training for therapists remains a concern. Effective OVRT requires therapists to be competent in both the technical aspects of VR and the psychological principles underlying exposure therapy. Earlier concerns, such as high costs and technical difficulties, are no longer considered VR reality in clinical settings more favourably (Lindner et al., 2019). Therapists reported that online therapy eliminated barriers (88.9%) and improved therapy (61.1%). However, they were concerned about the risks of OVRT for some patients (77.8%) and its suitability for specific exposure therapies (16.7%) (Ong et al., 2024). Furthermore, remote supervision can create challenges requiring strict rules to guarantee client confidentiality and treatment effectiveness (Bouchard et al., 2017). Among the many factors influencing therapists' openness to use VRET, familiarity with the technology is crucial. Providing more training and information on the effectiveness of VRET may lead therapists to adopt OVRT more (Lindner et al., 2019).

Conclusion

In conclusion, this article highlights the effectiveness and accessibility of Online Virtual Reality Therapy (OVRT) in treating aviophobia. A comparison is conducted comparing Standard Exposure Therapy (SE), Virtual Reality Exposure Therapy (VRET), and OVRT based on therapy type, accessibility, cost-effectiveness, immersion level, efficacy in reducing anxiety, technology requirements, therapist qualifications, and associated problems in the article.

OVRT offers a more accessible, cost-effective, and flexible alternative than standard therapeutic approaches such as pharmacology, CBT, exposure, and VRET therapies. Studies show that OVRT is significantly effective in alleviating anxiety and reducing avoidance behaviours (Fehribach et al., 2021; Rothbaum et al., 2006). While pharmacological treatments provide temporary relief for aviophobia, they do not address the psychological root of the problem and fail to offer a long-term solution (van Gerwen et al., 2002).

Relevant literature has demonstrated the effectiveness of VRET sessions in significantly reducing flight-related fear and anxiety as well as avoidance behaviours and sustained these improvements. Although it effectively reduces flight anxiety, VRET has limitations, such as limited trained therapists and difficulties in generalizing to real-world situations (Meyerbröker & Emmelkamp, 2010; Kourtesis et al., 2023). However, OVRT treatment constitutes an innovative method to address aviophobia and provides controlled, regulated, and accessible therapeutic options. Therefore, it addresses the restrictions of standard methods and offers a scalable, immersive solution, thereby facilitating future research and broader applications in treating various anxiety disorders.

Although this article comprehensively addresses comparisons of OVRT and other standard therapeutic approaches, it has some limitations. Firstly, the present article was not a systematic review or meta-analysis, so the information could not be systematically processed or included in the statistical analysis process. This may limit the general validity of the findings by affecting the methodological diversity of the study and the consistency of the results. In addition, the lack of experimental design comparing OVRT and standard therapies does not provide sufficient demographic and clinical data and cannot show the long-term effects of this method.

Despite all the obvious OVRT strengths mentioned earlier, some shortcomings lead to several limitations. Firstly, most studies on the effectiveness of OVRT are limited by limited sample sizes and short follow-up periods, which reduces the generalisability of the findings, as shown by Rothbaum and colleagues (2000). OVRT training and supervision for therapists is another issue that must be clarified. Also, the applicability and effectiveness of OVRT remains limited for individuals without access to such technologies, as it requires access to high-quality VR equipment and reliable internet connections, as mentioned by Opris and colleagues (2012). Moreover, VR software is very costly, and very few companies provide OVRT software options.

There are some future steps that the scientific community should take to address these limitations. Firstly, future research should prioritise large-scale longitudinal studies to generalise the OVRT method. Expanding sample sizes and extending post-intervention follow-up periods will provide more robust evidence of its long-term effectiveness. Investment in therapist training programmes, possibly including AI-assisted guidance, could reduce costs and increase usability. Therefore, advancing online alternative software options utilising VR modules to address aviophobia is essential. Scientific projects connected to advancing innovations and advances in VR and artificial intelligence have become more meaningful. Developing cost-effective VR solutions will increase accessibility and online therapy modules may enable individuals without high-quality equipment or reliable internet to benefit from OVRT.

Multidisciplinary collaboration involving psychology, computer science, health, engineering and other disciplines is vital for further developing OVRT practices and integrating them into standard treatment protocols. OVRT paves the path to a technological world that we are still discovering. As technological advances continue, improving OVRT with adaptive artificial intelligence-supported environments and personalised treatment protocols may further increase its effectiveness and accessibility, making it a more viable solution for individuals with aviophobia.

This article compares the effectiveness of OVRT in the treatment of aviophobia to standard therapy techniques. The review addresses technological requirements, therapist training, and other possible obstacles in addition to OVRT's accessibility, cost-effectiveness, and capacity to provide immersive experiences. In addition to recommending subjects for further research, the present work attempts to widen the current body of knowledge in the area of study. Therefore, it is intended to review existing studies and provide a comparative perspective rather than presenting new data based on research findings. By providing a comprehensive overview of the potential advantages and limitations of OVRT, it is intended to draw attention to the gaps in the field and establish a guiding framework for future research.



Peer Review Externally peer-reviewed.

Conflict of Interest The author has no conflict of interest to declare.

Grant Support The author declared that this study has received no financial support.

Hakem Değerlendirmesi Dış bağımsız.

Çıkar Çalışması Yazar çıkar çalışması bildirmemiştir.

Finansal Destek Yazar bu çalışma için finansal destek almadığını beyan etmiştir.

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