The Efficacy of XRET Virtual Reality Exposure Therapy in Treating Ailurophobia: A Clinical Study with One-Month Follow-Up

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ABSTRACT

This study examined the effectiveness of XRET, a virtual reality exposure therapy device, in treating individuals suffering from ailurophobia (Fear of Cat). Thirty female participants aged 21 to 66, all diagnosed with specific phobia of cats, were recruited from Setareh Iranian Clinic, Tehran, Iran. Over ten sessions, participants experienced gradual and controlled virtual exposure to cats, ranging from distant observation to physical interaction. Measures included the Severity Measure for Specific Phobia, physiological heart rate during exposure, and follow-up assessments one-month post-treatment. The results indicated a statistically significant reduction in phobia severity and heart rate levels after the intervention. Furthermore, follow-up data revealed that therapeutic gains were largely maintained after one month, supporting the long-term effectiveness of the XRET protocol in treating animal phobias.

Keywords: *Ailurophobia, Virtual Reality Exposure Therapy (VRET), Specific Phobia, VR-based Therapy, XRET System*

1. *INTRODUCTION*

Specific phobia is one of the most common anxiety disorders, often impairing daily functioning and quality of life. Traditional exposure therapy has been shown to be effective in treating phobias, but logistical, ethical, and emotional challenges frequently hinder its application, especially in the case of animal phobias[1]. Virtual reality (VR) exposure therapy offers a promising alternative by enabling patients to face their fears in a safe, controlled, and customizable environment [2].

The XRET device was developed to address these limitations by offering a structured and sensor-integrated VR system capable of mimicking real-life encounters with feared stimuli. The aim of this study was to evaluate the effectiveness of the XRET VR device in reducing ailurophobia symptoms among clinical patients and to assess the persistence of these effects after one month. Additionally, the study investigated whether VR exposure translated into improved responses during real-life animal encounters [3].

Table 1:summaries of background of virtual reality treatment for phobias

Reference	Title	Community	Method	Follow-up	Results	Notes
Rentz TO et al. (2003)**[4]**	Active-imaginal exposure: examination of a new behavioral treatment for cynophobia	82 participants with DSM-IV criteria for specific phobia	Active-imaginal exposure, imaginal exposure, and graduated in vivo exposure	4 weeks	All methods were successful: IV 73%, IE 52%, AI 62%	Heart rate measurement during exposure

Reference	Title	Community	Method	Follow-up	Results	Notes
		(animal subgroup)				
Benavides (2015)[**5**]	Virtual reality in the treatment of cynophobia	19 participants with fear of Doberman dogs	Virtual exposure to dog breeds	Not mentioned	Virtual reality effectively triggered fear responses, and the breed-specific responses were recorded	Dog barking sounds increased fear responses
di Nardo et al. (1988)[**6**]	Etiology and maintenance of dog fears	16 students with fear of dogs and 21 control subjects	Questionnaires and exposure to a terrier dog	Not mentioned	Fear of dog bite is not always correlated with previous bite experiences	Fear of dogs may stem from exaggerated perceptions of danger
Suied et al. (2013)[**7**]	Auditory-visual virtual reality as a diagnostic and therapeutic tool for cynophobia	10 participants with cynophobia	3D auditory-visual VR exposure	Not mentioned	Effective use of 3D auditory and visual stimuli for therapy	Ideal to pair participants with a "brave" person before solo exposure
Williams TI et al. (2018)[**8**]	Treatment of dog phobia in young people with autism and severe intellectual disabilities	9 individuals with autism and intellectual disabilities	Exposure through images, videos, and real dogs	7 to 46 sessions	Successful treatment after multiple steps including gradual exposure	Music and small treats were used as rewards
Botella C et al. (2016)[**9**]	In Vivo versus Augmented Reality Exposure in the Treatment of Small Animal Phobia	60 participants with phobias of insects	In vivo vs augmented reality exposure	3 and 6 months follow-up	Augmented reality was less favored than in vivo exposure	Both methods were effective, but in vivo exposure was preferred
Taffou et al. (2014)[10]	Cynophobic fear adaptively extends peri-personal space	418 participants (236 women)	Auditory stimulus-based measurement of spatial extension	Not mentioned	People with cynophobia exhibit extended personal space	Important to address spatial perception in treatment
Oxley JA et al. (2022)[11]	A systematic scoping review of human-dog interactions in virtual and augmented reality	Review of previous studies	Review of dog breed models in VR and AR	Not applicable	Examined effectiveness of virtual dog models in reducing cynophobia	Limitations in behavioral change despite increased knowledge

Reference	Title	Community	Method	Follow-up	Results	Notes
Hemyari C et al. (2021)[12]	The effect of personality traits on cognitive behavioral therapy outcomes in rat phobia	Participants with rat phobia	Cognitive Behavioral Therapy	Not mentioned	Personality traits had a significant impact on treatment outcomes	Key findings: certain traits influenced therapy success
Oxley JA et al. (2022)[13]	A pilot study investigating human behaviour towards DAVE (Dog Assisted Virtual Environment)	Participants exploring virtual dog interactions	Exploration task in virtual dog environment	Not mentioned	VR environment with non-reactive and aggressive dog behaviors	Reactions to aggressive dogs were crucial for therapy design
Marine Taffou (2012)[14]	Inducing feelings of fear with virtual reality	Not mentioned	Creation of virtual dogs to induce fear	Not mentioned	Fear levels increased with proximity to virtual dogs	Used virtual stimuli for exposure therapy
T Szymczyk (2015)[15]	The study of human behaviour in a laboratory setup with the use of innovative technology	28 participants	VR exposure to height phobia	Not mentioned	Successful treatment for height-related fears	Focused on visual stimuli and participant's comfort
Dr. Annie Swanepoel (2022)[16]	A pilot study demonstrating that a dog trainer in a non-clinical setting can effectively treat children with cynophobia	Children with cynophobia	Gradual exposure to dogs through various stages	Not mentioned	Non-clinical setting showed success in overcoming fear	Step-by-step gradual approach
Doogan et al. (1992)[17]	Origins of fear of dogs in adults and children: The role of conditioning processes and prior familiarity with dogs	Children and adults	Analysis of conditioning experiences	Not mentioned	Childhood exposure was crucial in preventing phobia development	Lack of familiarity with dogs increases the likelihood of phobia
Antony M. & McCabe R. E. (2006)[18]	Overcoming animal and insect phobia	Not specified	Gradual exposure	Not specified	Prolonged exposure leads to reduced anxiety	Essential to include long exposure durations
Lipp A et al. (2023)[19]	The role of self-efficacy in specific fears	Not mentioned	Study of self-efficacy in	Not mentioned	Self-efficacy plays a critical role in	Essential to assess self-

Reference	Title	Community	Method	Follow-up	Results	Notes
			phobia treatments		overcoming phobias	efficacy levels in treatment
Taffou et al. (2012)[20]	Auditory-Visual Integration of Emotional Signals in a Virtual Environment for Cynophobia	11 participants with cynophobia	Auditory-visual integration of fear signals	Not mentioned	Significant therapeutic effect	Integrated emotional signals in virtual environments for enhanced therapy

Source: Author's own compilation

2. METHODS

2.1 Participants

Thirty female participants, aged between 21 and 66, were selected from patients referred to the Setareh Iranianan Clinic for treatment of ailurophobia. Inclusion criteria included a formal diagnosis of specific phobia related to cats and willingness to participate in all therapy and follow-up sessions [21].

2.2 Instruments

Phobia severity was measured using the Severity Measure for Specific Phobia, a 10-item self-report scale that assesses emotional, cognitive, and behavioral aspects of fear [22]. Physiological response was measured via heart rate monitoring during exposure to the virtual cat in the first and last sessions. Real-world behavioral observation and a follow-up assessment using the same severity scale were also conducted one month after the final session.

2.3 Procedure

Participants underwent a 10-session VR exposure therapy program using the XRET system. The sessions followed a structured hierarchy starting with exposure to the virtual cat from outside a room and gradually progressing to close interaction, including touch. The final session involved a complete, immersive confrontation. Data were collected at four points: pre-treatment, post-treatment, real-life confrontation, and one-month follow-up [2].

3. *RESULTS*

Analysis revealed a substantial decrease in both subjective and physiological indicators of ailurophobia. The average pre-treatment phobia score was 39.3, which dropped to 5.1 immediately after treatment. Similarly, the mean heart rate decreased from 103.7 beats per minute (BPM) at baseline to 82.4 BPM post-treatment. During real-life exposure, most participants demonstrated minimal fear responses. At the one-month follow-up, the average phobia score remained low, indicating that the therapeutic effects were largely retained [3].

Table 2. Descriptive Statistics:

Metric	Pre-Treatment Phobia Intensity	Post-Treatment Phobia Intensity	Pre-Treatment Heart Rate	Post-Treatment Heart Rate
Mean	39.3	5.1	103.7	82.4
Standard Deviation	1.21	6.69	6.62	3.86

Table 3. Statistical Test (Paired t-test)

Variable	t-value	p-value	Result
Phobia Intensity Before vs. After Treatment	28.94	0.000000000000000000000602	Significant
Heart Rate Before vs. After Treatment	20.71	0.000000000000000000006367	Significant

3-1 Interpretation of Results:

Phobia intensity has significantly decreased following the interventions using the XRET device (the mean decreased from 39.3 to 5.1). The t-test showed that this decrease is statistically significant ($p < 0.001$).

Heart rate also significantly decreased, indicating a reduction in anxiety levels and the physiological response of patients when exposed to cats.

Table 4. Descriptive Statistics of Phobia Scores and Heart Rate

Measurement Time	Severity Score (Mean)	Heart Rate (Mean BPM)
Pre-Treatment	39.3	103.7
Post-Treatment	5.1	82.4
Real-World Exposure	3.7	80.5
One-Month Follow-Up	4.3	Not Measured

Table 5. Participant-Level Data

ID	Age	Gender	Pre-Treatment Score	HR Pre	Post-Treatment Score	HR Post	Real-World Score	Follow-Up Score
1	23	Female	40	110	3	82	0	0
2	34	Female	40	98	4	85	0	0
3	47	Female	39	99	0	79	0	0
4	27	Female	39	98	0	80	0	0
5	24	Female	36	95	0	80	0	0
6	42	Female	40	111	17	88	25	30
7	56	Female	40	98	0	81	2	0
8	23	Female	40	115	10	83	7	5
9	26	Female	40	111	0	80	0	0
10	55	Female	40	110	0	82	0	0
11	21	Female	40	110	11	89	7	5
12	22	Female	36	100	9	84	6	5

ID	Age	Gender	Pre-Treatment Score	HR Pre	Post-Treatment Score	HR Post	Real-World Score	Follow-Up Score
13	31	Female	38	102	0	82	0	0
14	35	Female	40	97	0	82	0	0
15	25	Female	40	103	4	80	2	0
16	44	Female	40	104	0	80	0	0
17	33	Female	40	101	0	83	0	0
18	47	Female	40	100	9	80	0	9
19	24	Female	39	97	0	77	0	0
20	51	Female	40	104	9	80	15	30
21	38	Female	37	93	0	80	0	0
22	24	Female	40	104	9	86	0	9
23	27	Female	40	110	12	88	30	30
24	43	Female	38	97	0	80	0	0
25	66	Female	40	115	28	93	33	37
26	34	Female	40	110	0	80	0	0
27	55	Female	38	95	0	80	0	0
28	27	Female	39	100	9	80	14	18
29	29	Female	40	112	12	90	8	0
30	37	Female	40	112	7	78	0	0

4. *DISCUSSION*

The findings of this study support the effectiveness of the XRET system in treating ailurophobia. Participants not only experienced reduced subjective fear but also showed decreased physiological arousal, which aligns with prior research supporting the efficacy of VR in exposure-based therapies [22]. Notably, the retention of gains after one month and the successful confrontation with real cats post-treatment is encouraging indicators of both immediate and sustained effectiveness [1].

While a small subset of participants exhibited mild recurrence of symptoms at follow-up, the overall pattern suggests that XRET could serve as a reliable alternative to live animal exposure. The use of sensors for real-time physiological monitoring further allows for personalized pacing of exposure, enhancing both safety and therapeutic precision [2].

5. *CONCLUSION*

XRET presents a safe, accessible, and effective method for treating specific animal phobias. Its ability to simulate realistic yet controlled encounters help patients overcome avoidance behaviors and physiological fear responses. The treatment's enduring effects make it a promising tool for phobia treatment protocols, especially in cases where live exposure is impractical or ethically challenging [1]. Future research should

explore its application to other types of phobias, include more diverse samples, and investigate long-term effects beyond one month [3].

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