

The Effect of Personality Traits on Cognitive Behavioral Therapy Outcomes in Student Pharmacists with Rat Phobia: A Randomized Clinical Trial

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What's Known

- To the best of our knowledge, no studies have assessed the effect of personality traits on the treatment outcomes of animal phobia.
- Personality traits act as a moderator and non-specific predictor of treatment outcome of disorders such as depression and anxiety.

What's New

- The extent to which personality traits influenced cognitive behavioral therapy for animal phobia was investigated.
- Rat phobia was associated with conscientiousness and agreeableness.

Abstract

Background: Little is known about which personality traits determine the effectiveness of various types of cognitive-behavioral therapy (CBT) on animal phobia. The objective of the present study was to investigate a possible association between personality traits and the outcome of single- and multi-session CBT.

Methods: The present randomized clinical trial was conducted from November 2018 to May 2019 in Shiraz, Iran. Forty female students with rat phobia, who met the Diagnostic and Statistical Manual of Mental Disorders (DSM-V) criteria, were systematically allocated into a single- and a multi-session therapy group (odd numbers one-session treatment, even numbers multi-session treatment). In both groups, the students were gradually exposed to rats as part of the treatment. Psychological measures (state-anxiety, rat phobia, and disgust questionnaires) were used to compare pre- and post-intervention outcomes. Multivariate analysis of covariance was used to assess which personality traits influenced the intervention outcome. The statistical analysis was performed using SPSS (version 20.0) and P values < 0.05 were considered statistically significant.

Results: Rat phobia was positively and significantly affected by conscientiousness (P=0.001) and agreeableness (P=0.003). Of these personality traits, only a higher degree of conscientiousness resulted in a further reduction of state anxiety after the intervention (P=0.005). There were no significant differences between the pre- and post-intervention outcomes.

Conclusion: The outcome of single- and multi-session rat phobia therapies was associated with specific personality traits of the participants, namely conscientiousness and agreeableness. Both intervention methods had an equal effect on reducing rat phobia.

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Introduction

For years, animal studies have significantly contributed to the advancement of medical sciences. Research using laboratory animals is nowadays an integral part of education in medical

sciences. As part of the pharmacy curriculum, undergraduate and post-graduate students are required to learn to work with laboratory animals in research studies. It is known that some students suffer from animal phobia, a subset of specific phobia, in which the fear is much greater than the real threat itself. Specific phobia is an anxiety disorder defined as an overwhelming and irrational fear of specific objects, situations, or circumstances, that provoke avoidance behavior.¹ Individuals with animal phobia refrain from any contact with the animals they fear. This might interfere with students' education and research activities in medical sciences.

Among laboratory animals, rats are one of the most used rodents because of their relatively large size, ability to learn certain tasks, and the possibility to induce diseases. In situations where contact with laboratory animals is unavoidable (i.e., *in vivo* studies), there is a need to address specific phobia. Among the known behavioral therapies for the treatment of specific phobia, *in vivo* exposure-based therapy is the most effective method, which has yielded good results.² In this method, an individual is gradually confronted with the feared stimulus until the fear response is not provoked anymore. Successful treatment of specific phobia has been reported for the phobia of animals such as spiders, rats, and dogs.³⁻⁵ The underlying mechanism of the treatment is habituation, in which the defensive response of a patient is reduced by frequent exposure to the stimulus.⁶ This treatment usually takes several sessions, however, some studies have reported rapid treatment with a single-session therapy.^{6, 7} In a previous study by Öst, all exposure therapy steps were summarized and packed into a single long-duration session.⁷ Some studies have reported that personality traits might influence a patient's response to pharmacological and psychological treatments. The personality structure is made up of a set of five personality traits. According to the five-factor model, it includes extroversion (defined by positive emotions and sociability), neuroticism (defined by negative emotionality and sensitivity), agreeableness (defined by kindness and friendliness), openness to experience (defined by intellectual curiosity and innovation), and conscientiousness (defined by motivation and responsibility).⁸ Based on this model, a previous study investigated the effect of personality traits, as a moderator and non-specific predictor of treatment outcome, on anxiety disorders.⁹ They reported that higher baseline neuroticism was associated with poorer outcomes in intervention methods such as cognitive-behavioral therapy (CBT),

and acceptance and commitment therapy. Studies on treating patients with depression have also reported that neuroticism was negatively associated with the outcomes.^{10, 11} However, some other studies have reported that neuroticism is a poor prognostic marker and should only serve as the severity indicator of a disorder.¹²⁻¹⁴ Another study investigated the differential effects of personality traits on the response to computer-based exposure treatment of agoraphobia.¹⁵ They reported a positive relationship between agreeableness and the treatment outcome, but a negative relationship with openness to experience. Similarly, another study in patients with depression reported that agreeableness was significantly related to more favorable outcomes in a group-based CBT program.¹¹ In contrast, another study reported that the outcomes were poor in those with very low agreeableness, while conscientiousness was significantly correlated with favorable outcomes. Furthermore, an association between extroversion and openness to experience about the treatment outcome has been reported.¹⁶

Overall, the majority of studies have indicated that personality traits act as a moderator for the treatment outcomes of disorders such as depression and anxiety. To the best of our knowledge, no studies have assessed the effect of personality traits on the treatment outcomes of phobias. The objective of the present study was to investigate the association between personality traits and the outcome of single- and multi-session CBT.

Materials and Methods

The present non-blinded randomized clinical trial was conducted at the University of Social Welfare and Rehabilitation Sciences (Tehran, Iran) in collaboration with Shiraz University of Medical Sciences (Shiraz, Iran) from November 2018 to May 2019. The target population was female pharmacy students studying at Shiraz University of Medical Sciences. The sample size was calculated using the highest and lowest scores obtained from the rat phobia questionnaire (range: 0-126). Based on the below formula¹⁷ (assuming a 95% confidence level, 80% power, and standard deviation of 26) a minimum of 16 students was required to detect a discrepancy of one standard deviation between two groups. Assuming 20% lost to follow-up, four additional participants were included bringing the total sample size to 20 students per group.

$$n_1 = n_2 = \frac{(Z_{1-\alpha/2} + Z_{1-\beta})^2 (\sigma_1^2 + \sigma_2^2)}{d^2}$$

The students were approached through various social networking tools. The inclusion criteria were students aged 18-35 years, expressing fear of mice and rats, and confirmed specific phobia according to the Diagnostic and Statistical Manual of Mental Disorders (DSM-V) diagnostic criteria. The exclusion criteria were previous exposures to mice/rats, attendance at a course on laboratory animals, consumption of certain medications (anti-anxiety, psychoactive, hormonal, and contraceptive drugs and beta-blockers), smoking, a history of disorders or diseases (such as psychiatric, endocrine, cardiovascular, chronic and infectious diseases) during one month prior to the study, and suffering from injection or blood phobia. Initially, 85 female students were selected and interviewed, from which 39 individuals did not meet the inclusion criteria. Out of the remaining 46 students, six individuals were reserved for possible modification of the therapeutic steps proposed by Öst.¹⁸ Eventually, 40 female students who met the inclusion criteria, with a mean age of 20.97±1.25 years (range: 18-24 years), were recruited. Because of the requirements of their studies, these students were highly motivated to overcome their animal phobia. Consequently, none of the students withdrew participation during the study. The participants were systematically allocated to two groups; namely a single-session (n=20) and a multi-session (n=20) therapy groups. The allocation process was based on the order-of-entry for participation, and the students with odd entry numbers were assigned

to the single-session group, and those with even numbers to the multiple-session group (figure 1).

The present study was registered at the Iranian Registry of Clinical Trials (number: IRCT20171123037602N1), and approved by the local Ethics Committees of the University of Social Welfare and Rehabilitation Sciences (IR.USWR.REC.1396.256) and Shiraz University of Medical Sciences (IR.SUMS.REC.1397.245). The study was performed in accordance with the ethical principles of the 1964 Declaration of Helsinki and its later amendments.¹⁹ Written informed consent was obtained from the participants.

The Intervention Process

The therapy sessions were conducted by a clinical psychologist and an assistant, who was professionally trained in the field of working with laboratory animals. The single-session therapy lasted for three hours, whereas the multi-session therapy was performed in a weekly two hour session for four weeks. Before each phase of the therapy session, the students were requested to rate the intensity of fear based on the subjective units of distress scales (SUDS), describe negative and catastrophic thoughts, and to rate the trustworthiness of those thoughts. In line with previous studies, three aspects of cognitions were considered, namely harm (e.g., rats bite), disgust (e.g., a rat is furry), and coping (e.g., I cannot do this).^{20, 21} For each aspect, the therapist challenged negative thoughts by drawing a parallel between thought and reality. The SUDS and the percentage of

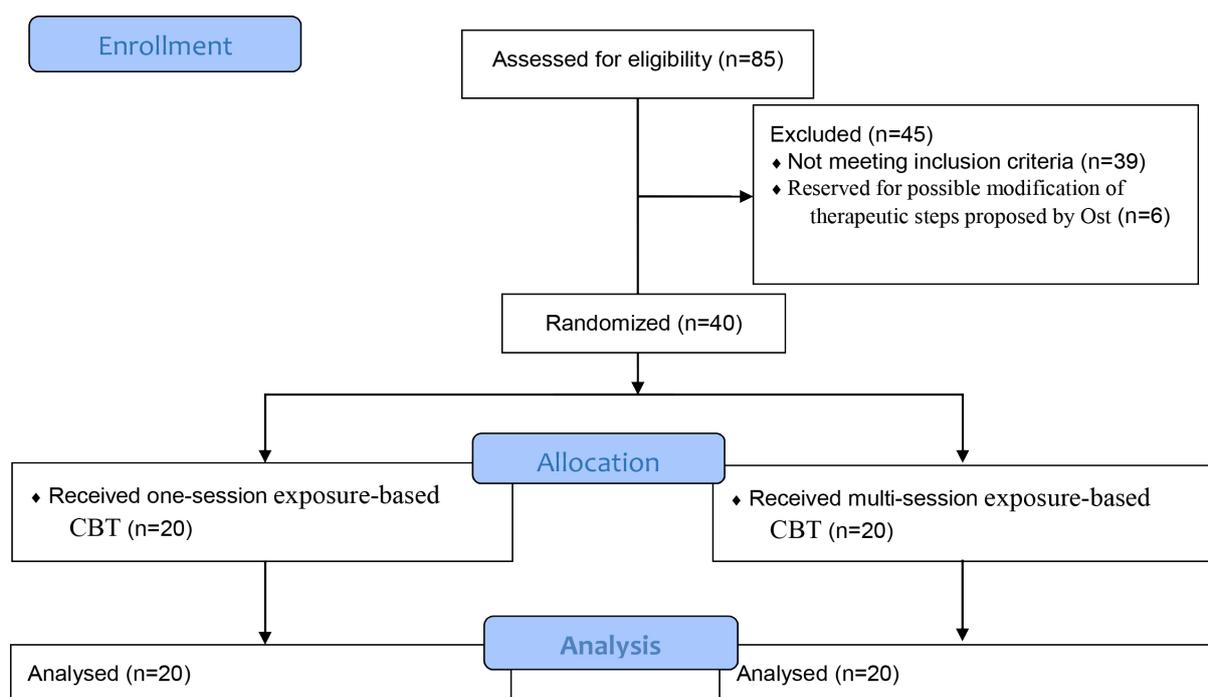


Figure 1: CONSORT diagram shows the flow of students through each group of the randomized trial.

trustworthiness of the thoughts were evaluated again. The therapist challenged negative thoughts by performing behavioral tests during each task. Next, the therapist assistant provided the necessary guidelines and demonstrated the correct execution of a task. The students then performed the task either together with the therapist assistant or independently. The participants repeatedly performed a task until the SUDS rating dropped below 20, or they could perform the task alone. The final part of the therapy involved holding and handling the rats and eventually displaying the gained confidence by taking a photo with the animals.

Instruments

Anxiety Disorders Interview Schedule (ADIS-IV)

The ADIS-IV was used to screen the students since the diagnostic criteria of specific phobia in DSM-IV and DSM-V are similar. The ADIS-IV is a structured interview designed to assess episodes of anxiety and measures other disorders that usually coincide with anxiety.^{20, 22}

Fear of Rats Questionnaire (FRQ)

This questionnaire is an adaptation of Fear of Spiders Questionnaire (FSQ) to evaluate rat phobia. The FSQ is an 18-item self-report tool, scored on a 7-point Likert-type scale (from 0 to 6) to assess the level of spider phobia.²³ The FSQ was translated into the Persian language, and the word spider was replaced with the word rat. In addition, the format of the questions was modified to suit the rat phobia assessment. The Whatls and Bassel's method was used to measure the content validity index (CVI) by summing up the highest scores for each item (scale response: it is necessary) divided by the number of experts (psychologists and psychiatrists, n=20). The CVI of the scale was 0.84; values above >0.79 were considered acceptable.²⁴ The content validity ratio (CVR) was calculated for each question based on the response of each expert (n=20). The obtained CVR value was >0.42, and all of the questions were valid.

Subjective Units of Distress Scale

The SUDS is a self-statement subjective tool rated on a scale of 0-100 (some prefer to use 0-10 scale). Score 0 indicates the least anxiety, and score 100 (or 10) indicates severe anxiety. The SUDS was used by students to subjectively rate their anxiety or the severity of the phobia during exposure to rats.

The Disgust Propensity and Sensitivity Scale-Revised (DPSS-R)

The scale assesses the incidence of disgust

occurrence (disgust propensity) and the emotional impression of the experience (disgust sensitivity). The 16-item scale is rated from 1 (never) to 5 (always). A previous study confirmed its reliability with Cronbach's alpha coefficient for the subscale disgust propensity ($\alpha=0.78$) and disgust sensitivity ($\alpha=0.77$).²⁵ The psychometric properties of DPSS were assessed in a sample of the Iranian population, and adequate factor structure, convergent validity, test-retest reliability ($r=0.44$), and internal consistency ($\alpha=0.83$) were reported.²⁶

The State-Trait Anxiety Inventory (STAI)

The self-evaluation STAI questionnaire contains 40 separate questions for measuring the state (S-scale) and trait (T-scale) anxiety.²⁷ Each item is rated on a 4-point Likert scale ranging from 1 to 4. In the present study, we only used the S-anxiety scale (STAI Form Y-1) to assess the participants. The Persian version of the STAI was developed by Mahram and the internal consistency of the state and trait items (Cronbach's alpha 0.91 and 0.90, respectively), and the validity of STAI was confirmed.²⁸ Another Iranian study reported the reliability of the S-scale and T-scale with Cronbach's alpha ($\alpha=0.93$ and 0.90), respectively.²⁹

NEO Personality Inventory-Revised (NEO-PI-R)

This self-report tool contains 240 items (48 items per domain) measuring five major domains of personality (the big five), namely neuroticism (N), extraversion (E), openness to experience (O), agreeableness (A), conscientiousness (C). The items are rated on a 5-point Likert-type scale ranging from 1 (strongly agree) to 5 (strongly disagree).³⁰ The Cronbach's alpha for each domain was N=0.81, E=0.71, O=0.57, A=0.71, and C=0.83. Based on estimates from a previous study among an Iranian population, the test-retest reliability over six months for each of these traits was N=0.53, E=0.74, O=0.76, A=0.60, and C=0.64.³¹

The Assessment Process

Initially, all participants were interviewed using the ADIS-IV to diagnose a specific phobia followed by the completion of the FRQ. The assessment of each group was performed in three distinct stages, namely pre-intervention, therapeutic intervention, and post-intervention.

Pre-intervention

In this stage, the psychological symptoms and personality traits were evaluated using the SATI and NEO-PI-R instruments. Then, the students were individually taken to an animal laboratory,

and confronted with four adult Sprague Dawley rats (200-250 grams) confined in a glass cage placed on a table. The exposure lasted for about 5-7 minutes and was conducted under the supervision of a laboratory animal technician and the therapist assistant. The participants had to take eight steps toward the rats and their ability to take each step was noted (yes/no response), and the intensity of fear in each subsequent step was measured using the SUDS. Since it was important to measure the true level of anxiety, when confronted with the rats, the students were requested to push past their anxiety limits. However, they were not compelled to complete the tasks. In case of extreme emotional reactions, based on the clinical judgment of the therapist, the exposure could be discontinued. However, all participants completed the pre-intervention stage. When the SUDS of a student reached 100, the exposure stopped, and each student was taken to another room for psychological assessments, using the STAI, FRQ, and DPSS-R instruments.

Therapeutic Intervention

The students were assigned to a single-session or multi-session group. For practical reasons, each group was divided into four smaller groups of five students each. The participants of the single-session group underwent therapeutic intervention after the pre-intervention stage. For the multi-session group, we held the first of the four sessions immediately after the pre-intervention stage to ensure that the students were not left with anxiety until the second session.

Post-intervention

In this stage, the students were again

confronted with the rats after both groups completed the therapeutic intervention. Psychological evaluations were performed similar to the pre-intervention stage.

Statistical Analysis

The data were analyzed using the SPSS software, version 22.0. The independent *t* test was used to compare variables between the groups. The outcome of the interventions (rat phobia, disgust, and state anxiety) was determined by comparing the pre- and post-intervention scores. Multivariate analysis of covariance (MANCOVA) was used to determine the personality traits that influenced the intervention outcomes. The covariates were personality traits, type of intervention, and the pre-intervention score of the corresponding outcome. The Data were expressed as mean±SD and P values<0.05 were considered statistically significant.

Results

The mean age of the participants in the single-session and multi-session groups was 21.15±1.38 and 20.8±1.10 years, respectively. The difference in the mean age was not statistically significant (P=0.38). The mean scores of the NEO-PI-R, STAI, DPSS-R, and rat phobia in both groups are shown in table 1. Regardless of the type of intervention, all participants gained the ability to handle rats post-intervention. Both intervention methods had a significant effect on alleviating the symptoms of rat phobia. The improvement was to the extent that the participants displayed their confidence by taking a photo with the animals as a memento. The pre-intervention scores

Table 1: The scores of personality traits, rat phobia, state anxiety, and disgust in single-session and multi-session therapy groups

Variable	Therapy groups		P value	
	One-session (n=20)	Multi-session (n=20)		
Age	21.15±1.38	20.80±1.10	0.38	
Neuroticism	93.10±11.26	96.15±17.46	0.51	
Extraversion	110.40±19.65	113.80±19.66	0.58	
Openness	119.80±18.16	113.95±11.54	0.23	
Agreeableness	109.65±14.06	114.30±16.00	0.33	
Conscientiousness	109.20±20.03	119.20±11.72	0.06	
Trait anxiety	41.10±8.27	39.40±6.45	0.47	
Rat phobia scores	Pre-intervention	71.6±23.74	86.65±12.41	0.01
	Post-intervention	18.65±20.44	17.60±12.11	-
	Difference	52.95±24.98	69.05±12.7	-
State anxiety scores	Pre-intervention	53.95±10.89	57.80±7.23	0.19
	Post-intervention	31.05±9.43	28.50±4.91	-
	Difference	22.90±12.94	29.30±8.84	-
Disgust scores	Pre-intervention	45.40±8.58	51.25±7.46	0.02
	Post-intervention	36.35±8.49	41.10±8.80	-
	Difference	9.05±7.52	10.15±9.05	-

Data are expressed as mean±SD

Table 2: The result of multivariate analysis of covariance on the effect of personality traits between pre- and post-intervention stages

Change in variables			B	Standard error	F	P value
Rat phobia	Type of therapy	Single-session	-7.53	4.78	2.48	0.12
		Multi-session	Reference	-	-	-
	Conscientiousness	0.66	0.14	20.26	<0.001	
	Agreeableness	0.52	0.16	10.32	0.003	
	Neuroticism	-0.02	0.16	0.01	0.90	
	Extraversion	-0.17	0.13	1.57	0.21	
	Openness	-0.02	0.16	0.01	0.90	
State anxiety	Type of therapy	Single-session	-4.38	3.43	1.63	0.55
		Multi-session	Reference	-	-	-
	Conscientiousness	0.31	0.10	8.89	0.005	
	Agreeableness	0.03	0.11	0.08	0.76	
	Neuroticism	0.04	0.12	0.15	0.70	
	Extraversion	-0.05	0.10	0.31	0.57	
	Openness	0.21	0.11	3.31	0.07	
Disgust	Type of therapy	Single-session	-0.84	3.02	0.07	0.78
		Multi-session	Reference	-	-	-
	Conscientiousness	0.06	0.09	0.45	0.50	
	Agreeableness	0.01	0.10	0.00	0.92	
	Neuroticism	-0.01	0.10	0.02	0.87	
	Extraversion	-0.09	0.08	1.04	0.31	
	Openness	0.01	0.10	0.01	0.92	

*Multivariate analysis of covariance (MANCOVA)

between the group for personality traits and state anxiety were not statistically significant. However, the mean scores of rat phobia ($t(38)=-2.51$, $P=0.01$) and disgust ($t(38)=-2.3$, $P=0.02$) were different.

The outcome of the interventions was determined by comparing the pre- and post-intervention scores of rat phobia, state anxiety, and disgust. The results of these outcomes, based on the MANCOVA analysis, are shown in table 2. We found that changes in the score of rat phobia were significantly influenced by the personality traits conscientiousness and agreeableness. There were no significant effects associated with the type of intervention and other personality traits. Higher scores in conscientiousness were related to further reduction of state anxiety post-intervention. However, the other covariate variables were not significantly associated with state anxiety changes. The difference between the pre- and post-intervention scores of disgust was not significantly affected by the examined variables (table 2). The results of the MANCOVA analysis showed that the type of intervention did not affect the intervention outcomes. In other words, no significant difference was observed between the single-session and multi-session interventions in reducing the scores of phobia, state anxiety, and disgust.

Discussion

In the present study, a positive relationship

between the score of conscientiousness in rat phobia and state anxiety was found. Regardless of the type of intervention, those participants with a higher score on conscientiousness exhibited a better response to the therapy. Other studies have also strongly suggested a significant correlation between the score of conscientiousness and the CBT outcome.^{12, 13, 16, 32} More specifically, our results were in line with some studies that showed conscientiousness was directly associated with favorable responses in group psychotherapy.^{32, 33} Moreover, a previous study suggested that conscientiousness was correlated with disciplined, such as achievement striving, dutifulness, and responsibility.³⁴ We found that students with a higher score of conscientiousness were more likely to make an effort to handle the animal they feared and to tolerate discomfort with animals. This could be due to the fact that such individuals are well-organized, disciplined, determined, and consequently adhere better to the therapy. Those with a low score of conscientiousness, despite their efforts, are less likely to alter their behavior. Inspiration and persuasion by therapists could, however, help these individuals to better respond to the therapy.¹⁶

In line with previous studies, we found a positive relationship between agreeableness and therapy outcomes.^{11, 15, 35, 36} Individuals scoring high on agreeableness tend to be trusting, sympathetic, and cooperative. These individuals work well with others, feel comfortable in a group setting, and

perform tasks better. In contrast, low scores on agreeableness are associated with guardedness, unfriendliness, and unwillingness to help others.³³ A previous study reported that exposure-based therapy can be effective in reducing small-animal phobias. In this meta-analysis, the results of 33 randomized studies on specific phobia concluded the superiority of exposure-based therapy over other therapeutic methods.³⁷ Unlike other disorders, specific phobias can be treated with *in vivo* exposure-based methods even in a single session.³⁸ The results of our study were in line with previous evidence that one-session therapy resulted in a considerable reduction of specific phobias.^{38,39} Our data were in agreement with a study by Öst reporting that 85-90% of patients with specific phobias, which showed improvements after 3-hour therapy.³⁹

In vivo exposure therapy is the treatment of choice, but it has the disadvantage of high dropout rates and low treatment acceptance.² Fortunately, none of our participants withdrew from the study, since working with rats formed an integral part of their practical classes or research project. The main limitations of the present study were the inclusion of only female participants and young students (18-25 years). On a more positive note, our participants were not only highly educated compared with the general population of the same age group, but were also motivated to overcome their fears to be able to complete their studies.

Conclusion

Our findings highlight the importance of assessing all five personality traits to design a personalized therapeutic program to achieve an optimal outcome. We identified the personality traits that affect CBT outcome, which in turn helps the therapist to deal with phobic patients more effectively. Single-session therapy reduced rat phobia, anxiety, and disgust at the same level as multi-session therapy. Therefore, single-session therapy is recommended, since it is fit for purpose, cost-effective, and less time-consuming. In future studies, however, comparing these methods in other populations, disorders, personality questionnaires, and additional psychological factors are warranted.

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