



The Effectiveness of Cognitive Behavioral Therapy on Childhood Trauma, Rumination, and Hypochondriasis in Patients with Panic Disorder

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ABSTRACT

Background: Panic disorder is a chronic and debilitating psychological condition characterized by recurrent, unexpected attacks that significantly impair patient functioning. Cognitive Behavioral Therapy (CBT) is recognized as a leading evidence-based intervention, specifically designed to restructure maladaptive thought patterns and mitigate symptoms associated with this disorder.

Aims: This study aimed to examine the effectiveness of CBT on childhood trauma, rumination, and hypochondriasis in patients with panic disorder.

Methods: The present study employed a semi-experimental design with a pretest–posttest control-group structure. The statistical population consisted of patients with panic symptoms who were referred to psychological clinics and medical centers in Mashhad in 2025. Using convenience sampling, 36 participants were recruited and randomly assigned to either an experimental (n=18) or control group (n=18). Data were collected using the Acute Panic Inventory (Dillon et al., 1987), Childhood Trauma Questionnaire (Bernstein et al., 2003), Rumination Questionnaire (Nolen-Hoeksema & Morrow, 1991), and Hypochondriasis Questionnaire (Evans, 1980). Participants in the experimental group received ten 90-minute CBT sessions based on the protocol of Marchand et al. (2018). Statistical analysis was conducted using multivariate covariance analysis with SPSS version 30.

Results: The results indicated that CBT significantly reduced physical abuse ($F=54.32$), emotional abuse ($F=54.35$), physical neglect ($F=56.18$), emotional neglect ($F=53.91$), sexual abuse ($F=47.22$), rumination ($F=64.11$), and hypochondria in patients with panic disorder ($F=70.75$) ($P<0.001$).

Conclusion: This study highlights the therapeutic efficacy of CBT in alleviating long-term psychological burdens and maladaptive preoccupations among individuals with panic disorder. By addressing underlying childhood trauma and ruminative tendencies, this intervention serves as a robust clinical tool for stabilizing symptom-related distress and fostering psychological resilience.

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Extended Abstract

Introduction

Panic disorder is a common and handicapping condition that refers to repeated episodes of unexpected panic attacks, i.e., rapid and intensive increase of fear or discomfort which reaches its maximum in a few minutes, with the presence of physiological symptoms like palpitations, dyspnoea, sweating, trembling, etc. (Miqdadi et al., 2025). It is dominated by continued worry concerning coming attacks and by avoidance behaviour changes. Such changes could produce important limitations on social life and on occupation and school settings (Carpita et al., 2026). As this disorder is well correlated with the increasing number of visits to the doctor, the strong correlation with depression, and the reduction of quality of life (Wideburg et al., 2024), the knowledge of its causes is important.

There is extensive evidence to indicate that early life experiences of childhood trauma, such as emotional abuse, physical abuse, neglect, and exposure to ongoing family conflict, are reliable predictors of panic disorder (Kay et al., 2024). Exposure to childhood adversity may lead to dysregulation in the normal development of emotional regulation systems and increase an individual's stress vulnerability, thus rendering him or her more predisposed to later anxiety disorders (Liu et al., 2025). People who have experienced childhood trauma tend to form maladaptive cognitive schemas (i.e., they often hold unstable, vulnerable, and danger-centered beliefs of themselves and the world) and have a propensity to be overly apprehensive of bodily sensations (Hong et al., 2025), which may lead to increased anxiety sensitivity.

Rumination (a recurrent, passive, persistent, repetitive consideration of distress and its meaning) has become more and more linked to the maintenance

of panic disorder (Petwal et al., 2023). Those higher on the rumination dimension think repeatedly of past attacks, fear of physical symptoms, and of attacks that may occur again (Dell'Osso et al., 2024). Rumination in particular intensifies attention on the self and also increases bodily self-monitoring, and this causes little physical sensations to be interpreted as threatening (Sabatini et al., 2023). Rumination is therefore thought to impede appropriate emotional processing and keep the person locked onto fearful cognition, increasing the catastrophic interpretations and anticipatory fear (Gerdan, 2025).

The nature of illness anxiety or hypochondriasis shows similarities to panic disorder, as hyper-vigilance to the body and catastrophizing misinterpretations appear to be core in these conditions (Lim et al., 2026). For example, individuals with hypochondriacal tendencies excessively monitor bodily states and treat harmless physical states as indicative of serious illness (Mataix-Cols et al., 2024). Health anxiety and the over-vigilance it entails appear to relate to panic disorder, because for individuals with a diagnosis of panic disorder, normal physical states may be interpreted as indicating serious, life-threatening disease (e.g., palpitations as an indication of a heart attack, chest tightness as a heart attack) (Orman et al., 2026). Such misinterpretations augment and reinforce anxious feelings and can trigger subsequent panic attacks (Hannah et al., 2023). Health anxiety symptoms are maintained through repeated consultations and reassurances from doctors and constantly scanning for symptoms, as this provides short-term alleviation of the emotional and physiological consequences of worry. This then perpetuates the belief of illness as the patient does not have the opportunity to challenge their beliefs, and that the illness must be real as doctors say so (Chen & Wang, 2025).

Cognitive Behavioral Therapy (CBT) is a type of therapy that's very structured and has been proven to work. It is based on the idea that our thoughts, feelings, and actions are all connected (Atik et al., 2026). CBT says that when we are unhappy, it is not because of what's happening to us but because of how we think about what is happening. We often think about things in a way that's not true, and this makes us feel bad (Bagheri Sheykhgafshe et al., 2024). Then we do things that make us feel a little better for a time, but they do not really help us. The goal of behavioral therapy is to help people change the way they think and behave (Tremblay et al., 2023). It does this by helping people identify thoughts that are not true, such as thinking that something is much worse than it really is (Bjarke et al., 2025). CBT also helps people learn skills to deal with problems. This helps people be more flexible and able to deal with situations. It helps people stop doing things that make their problems worse (Moshe-Cohen et al., 2024). It gives them the tools they need to take care of themselves. CBT is an approach in which the therapist and the person work together to achieve the person's goals (Strauss et al., 2022). CBT helps people change their thoughts and behaviors by teaching them skills and ways of thinking. This process is called reappraisal and behavioral experimentation. It means that people learn to think about things in a way and try new behaviors (Zainal et al., 2023). This helps people be better able to deal with situations and take care of themselves. CBT helps people recover from their problems and live a functional life. CBT is a helpful type of therapy that can make a big difference in people's lives (Jung et al., 2025).

This model stands out in the treatment arena of anxiety disorders for its direct approach to undermining the self-reinforcing cycle of 'fear of fear,' in which the benign variations in one's own

bodily responses are seen as proof that some sort of calamity is about to occur (Stech et al., 2020). This intervention systematically undermines the mechanisms by which the condition maintains itself by coupling psychoeducation with advanced exposure-based strategies, which establish inhibitory learning (Oh et al., 2020). By using interoceptive exposure to produce feared bodily sensations on command and in a safe, controlled environment, this treatment serves to extinguish hyperarousal of the autonomic nervous system and to provide evidence against catastrophic misappraisals about the sensations (Efron & Wootton, 2021). Also, by reducing and extinguishing the tendency to engage in safety-seeking behavior along with situational exposure, this treatment breaks down avoidance responses and rebuilds the person's belief in their ability to handle the environment (Schwartz et al., 2022). Eventually, as reality-based, non-catastrophic interpretations take the place of catastrophic misappraisals and awareness of internal stimuli is desensitized, this empirically supported model results in marked, sustained reduction of symptomatology and anticipatory anxiety (Renner et al., 2026).

To conclude, panic disorder is a complex and disabling psychological disorder whose symptoms are underpinned by psychological and developmental risk factors like childhood trauma, rumination, and hypochondriacal preoccupations (Arnfred et al., 2025). All these factors, individually, are positively correlated with the onset of the disorder and symptoms of panic disorder. Yet, there appears to be a conspicuous lack of research to guide the treatment of these cognitive and affective factors using CBT (Atik et al., 2026). It is therefore relevant that this study may shed more light on whether CBT not only reduces panic symptoms but also its cognitive and affective underlying causes to enable symptom maintenance. The findings might also lead to

improvement in the assessment and direction of therapy toward the relevant targets and in therapy planning for patients with panic disorder. In view of this, the current study sought to investigate the effects of CBT on childhood trauma, rumination, and hypochondriasis in patients with panic disorder.

Method

The present study employed a semi-experimental design with a pretest–posttest control-group structure. The statistical population consisted of patients with panic symptoms who were referred to psychological clinics and medical centers in Mashhad City in 2025. Using a convenience sampling method, 80 patients were initially assessed. To identify eligible participants, the Acute Panic Inventory (API), developed by Dillon et al. (1987), was administered to all 80 patients. Participants were considered eligible if they scored above 26 on the API and met the formal diagnostic criteria for panic disorder, which were confirmed through a clinical interview. Following the application of the inclusion and exclusion criteria, 36 patients were selected for the final sample. Based on the G*Power analysis, the sample size was determined to include 18 participants per group. Participants were then randomly assigned to either the experimental group ($n = 18$) or the control group ($n = 18$).

The inclusion criteria were: (a) providing informed consent, (b) scoring above 26 on the API, (b) being aged between 18 and 35 years, and (d) having a confirmed clinical diagnosis of panic disorder. The exclusion criteria included: (a) absence from more than two therapy sessions, (b) incomplete questionnaire responses, (b) receiving concurrent psychological or pharmacological treatment during the study period, and (d) significant worsening of panic symptoms during the intervention. All ethical principles were strictly observed in accordance with

the Declaration of Helsinki. Written informed consent was obtained from all participants, and confidentiality of personal data was maintained throughout the study.

Tools

The Acute Panic Inventory (API): was developed by Dillon et al (1987) to assess the severity of acute panic symptoms. The inventory consists of 17 items in which respondents rate the extent to which they experience each symptom using a four-point Likert scale (never, mild, moderate, severe). Items are scored from 0 to 3, resulting in a total score ranging from 0 to 51, with higher scores indicating greater severity of panic symptoms. The instrument is widely used in clinical and research settings to evaluate the characteristics and intensity of panic attacks. Psychometric studies have reported satisfactory reliability and validity for the API in both clinical and non-clinical samples. Dillon et al. (1987) reported a Cronbach's alpha of 0.83 for the scale, and in the present study, the Cronbach's alpha coefficient was 0.88, indicating good internal consistency.

The Childhood Trauma Questionnaire (CTQ): was developed by Bernstein and colleagues to assess childhood trauma and maltreatment. In 1995, the second version, consisting of 53 items, was introduced. Ultimately, the final 34-item version was developed and recommended in 1998. Following further revisions, the current 28-item version, also known as the short form, was created (Bernstein et al., 2003). Responses are rated on a 5-point Likert scale based on the frequency of experiences, ranging from Never (1) to Always (5). The questionnaire measures dimensions of abuse and neglect through five subscales: physical abuse, emotional abuse, physical neglect, emotional neglect, and sexual abuse, each assessed with five items. In scoring, items 2, 5, 7, 13, 19, 26, and 28 are reverse-scored. Scores for each subscale range from 5 to 25, with higher scores

indicating greater experiences of childhood trauma. Bernstein et al. (2003) reported Cronbach's alpha coefficients for the subscales of physical abuse, emotional abuse, physical neglect, emotional neglect, and sexual abuse as 0.87, 0.86, 0.95, 0.89, and 0.78, respectively. In addition, concurrent validity with therapists' ratings of childhood trauma ranged from 0.59 to 0.78. The reliability of the questionnaire, assessed using test-retest and Cronbach's alpha, was reported to range from 0.79 to 0.94 (Bernstein et al., 2003). In the present study, Cronbach's alpha coefficients for the total score and the subscales ranged from 0.82 to 0.89.

Rumination Questionnaire (RQ): This scale was developed by Nolen-Hoeksema & Morrow in 1991, and has 22 items. The items of this scale are scored based on a four-option Likert scale from never (1) to always (4). As a result, the range of scores is between 22 and 88, and higher scores indicate higher rumination. Nolen-Hoeksema & Morrow (1991) evaluated the content validity of this scale as favorable and reported its reliability in the retest method from 0.48 to 0.82. Also, its reliability coefficient, obtained using Cronbach's alpha, was 0.90. In our current study, the Cronbach's alpha coefficient was 0.92.

Evans Hypochondria Questionnaire (EHQ): was developed by Evans (1980) to assess individuals' preoccupation with illness, health-related concerns, and hypochondriacal behaviors. This instrument is considered one of the valid tools for evaluating hypochondriasis and has been widely used in psychological and clinical research. The Evans Hypochondriasis Questionnaire consists of 36 items, and responses are scored based on a Likert scale. The total score ranges from 0 to 72, with higher scores

indicating greater preoccupation with illness, more intense health-related anxiety, and stronger tendencies toward hypochondriacal behaviors. Based on the total score, individuals are classified into five categories: healthy (0–18), borderline (19–30), mild (31–40), moderate (41–60), and severe (above 60) (Evans, 1980). The validity and reliability of this questionnaire have been examined in several studies. Evans reported a Cronbach's alpha coefficient of 0.81, indicating good internal consistency. In addition, the strong correlations between this questionnaire and other measures of hypochondriasis, including the Hypochondriasis subscale of the Minnesota Multiphasic Personality Inventory (MMPI) and the Symptom Checklist-90 (SCL-90), support its convergent validity. In the present study, the Cronbach's alpha coefficient for this questionnaire was 0.86, indicating satisfactory reliability in the study sample.

Cognitive Behavioral Therapy (CBT): The intervention was delivered in 10 weekly sessions, each lasting approximately one hour, and was conducted by a clinical psychologist. The treatment protocol was adapted from the CBT program for panic disorder developed by Marchand et al. (2018). It incorporated empirically supported components, including psychoeducation about anxiety and panic, cognitive restructuring, interoceptive exposure, exposure to avoided activities and situations, and relapse prevention to maintain treatment gains. A summary of the session contents is presented in Table 1. The control group did not receive the intervention during the study period; however, following the post-test assessment, the same treatment protocol was offered to participants in the control group.

Table 1. Summary of Cognitive-Behavioral Therapy (CBT) Sessions for Panic Disorder

Session	Objectives / Content	Homework
1	Introduction and welcome; explanation of group rules; psychoeducation about the mind–body relationship and the role of psychological factors in medical problems; explanation of the cognitive triangle (thoughts, emotions, physiology, behavior) and the ABC model; illustrative examples; guided imagery relaxation exercise.	Guided imagery relaxation practice.
2	Review of previous homework; discussion of negative thoughts and alternative interpretations; identifying negative automatic thoughts; introduction to cognitive distortions; exercises on recognizing logical errors and distorted thinking.	Identify logical errors in daily thoughts.
3	Review of homework; discussion of the benefits of stopping negative thoughts; exercises including focusing attention on an object and describing details, mental exercises (e.g., backward counting), recalling pleasant memories and engaging in positive imagery, and identifying enjoyable activities.	Mental exercises (e.g., backward counting).
4	Review of homework; introduction to Greenberg’s emotional model; explanation of emotional processing techniques; exercises on accessing emotions, therapeutic writing, and identifying emotional blocks.	Practice emotional processing techniques.
5	Review of homework; rationale for muscle relaxation; practice of progressive muscle relaxation for 16 muscle groups (hands, arms, legs, abdomen, chest, shoulders, neck, jaw, eyes, and forehead).	Progressive muscle relaxation for 16 muscle groups.
6	Review of homework; practice of progressive muscle relaxation with fewer muscle groups; relaxation training for 8 muscle groups followed by 4 muscle groups.	Progressive muscle relaxation for 4 muscle groups.
7	Review of homework; introduction to systematic desensitization; imaginal exposure and flooding techniques.	Imaginal exposure practice.
8	Review of homework; identifying dysfunctional assumptions and rules; cognitive analysis exercises; logical analysis of beliefs (e.g., metaphor of the “Loch Ness monster”).	Logical analysis of dysfunctional beliefs.
9	Review of homework; discussion of maladaptive schemas and their relationship with dysfunctional assumptions and automatic thoughts; identification of schemas using the downward arrow technique; thought insertion exercises.	Thought insertion practice.
10	Review of homework; perceptual/cognitive change techniques; completion of cognitive restructuring worksheets; voluntary cortical inhibition exercises.	Completing cognitive change worksheets.

Statistical Analyses

After collecting the research data, all responses were entered into SPSS software version 30. Multivariate Analysis of Covariance (MANCOVA) was employed to analyze the scores. The significance level for testing the assumptions was set at 0.05.

Results

The mean age of participants in the experimental group was 25.17 ± 5.28 years, while the control group had a mean age of 25.86 ± 5.10 years. Results from the chi-square test indicated no significant differences between the experimental and control groups in terms

of sex, duration of panic, marital status, or age category ($p > 0.05$), confirming baseline equivalence between the groups. The means and standard deviations of pre-test and post-test scores for childhood trauma, rumination, and hypochondriasis among patients with panic disorder in both groups are presented in Table 2. The Shapiro–Wilk (S–W) test was conducted to examine the normality of data distribution for each variable. As shown in Table 2, the Shapiro–Wilk statistics were non-significant across all variables, indicating that the data met the assumption of normality and were suitable for further parametric analyses.

Table 2. Descriptive Indices of Study's Variables in Control and Experimental Groups

Variables		Groups	Mean	SD	S-W	P*
Panic Disorder	Pre-test	Experimental	26.18	2.35	0.119	0.052
		Control	25.71	2.08	0.096	0.070
	Post-test	Experimental	19.29	2.11	0.083	0.063
		Control	25.03	2.52	0.087	0.058
Physical Abuse	Pre-test	Experimental	18.50	1.20	0.091	0.053
		Control	18.44	1.14	0.105	0.069
	Post-test	Experimental	15.43	1.61	0.109	0.071
		Control	18.66	1.13	0.085	0.055
Emotional Abuse	Pre-test	Experimental	17.43	1.19	0.102	0.078
		Control	17.51	1.38	0.096	0.062
	Post-test	Experimental	14.27	1.87	0.115	0.069
		Control	17.72	1.27	0.097	0.057
Physical Neglect	Pre-test	Experimental	19.45	1.04	0.083	0.061
		Control	19.38	1.37	0.119	0.072
	Post-test	Experimental	16.01	2.05	0.096	0.062
		Control	19.61	1.09	0.087	0.052
Emotional Neglect	Pre-test	Experimental	18.38	1.03	0.105	0.071
		Control	18.33	1.08	0.108	0.065
	Post-test	Experimental	15.16	1.61	0.119	0.079
		Control	18.55	1.02	0.095	0.061
Sexual Abuse	Pre-test	Experimental	20.72	1.31	0.091	0.069
		Control	21.11	1.32	0.094	0.054
	Post-test	Experimental	17.33	2.27	0.117	0.058
		Control	20.88	1.40	0.106	0.059
Rumination	Pre-test	Experimental	48.55	3.55	0.085	0.055
		Control	48.88	3.49	0.096	0.056
	Post-test	Experimental	41.66	3.39	0.107	0.074
		Control	47.78	4.02	0.086	0.060
Hypochondria	Pre-test	Experimental	42.38	1.46	0.095	0.061
		Control	42.72	1.63	0.103	0.073
	Post-test	Experimental	36.38	2.47	0.101	0.069
		Control	41.94	1.43	0.093	0.057

* Shapiro-Wilk test

MANCOVA was used to evaluate the effectiveness of CBT in childhood trauma, rumination, and hypochondriasis among patients with panic disorder. The results of the Levin test to examine the homogeneity of variance of dependent variables in groups showed that the variance of childhood trauma, rumination, and hypochondriasis was equal in the groups ($P < 0.001$). The results of the box test to evaluate the equality of the covariance matrix of dependent variables between the experimental and control groups also showed that the covariance matrix of the dependent variables is equal (Box M= 35.12, $F = 0.98$, $P = > 0.504$). The significance of the box test is greater than 0.05, so this assumption is valid. Also, the results of the Chi-square-Bartlett test to examine the sphericity or significance of the relationship

between childhood trauma, rumination, and hypochondriasis showed that the relationship between them is significant ($\chi^2 = 132.52$, $df = 24$, $P < 0.01$). Another important assumption of multivariate analysis of covariance is the homogeneity of regression coefficients. It should be noted that the homogeneity test of regression coefficients was examined through the interaction of dependent variables and independent variables (intervention method) in the pre-test and post-test. The interaction of these pre-tests and post-tests with the independent variable was not significant and indicated the homogeneity of regression slope; Therefore, this assumption also holds. Due to the establishment of multivariate analysis of covariance, the use of this test will be allowed. Then, to find out

the differences between the groups, a multivariate analysis of covariance was performed (Table 3).

Table 3. The Results of Multivariate Analysis of Covariance on Mean Post-Test Scores

Test	Value	F	df	Error df	P	Effect Value
Pillai's Trace	0.766	9.814	7	21	<0.001	0.76
Wilks Lambda	0.234	9.814	7	21	<0.001	0.76
Hotelling Trace	3.271	9.814	7	21	<0.001	0.76
Roy's Largest Root	3.271	9.814	7	21	<0.001	0.76

According to Table 3, the results showed the effect of the independent variable on the dependent variables; In other words, experimental and control groups have a significant difference in at least one of the variables of childhood trauma, rumination, and hypochondriasis, which according to the calculated effect size, 76% of the total variance of experimental and control groups is due to the effect of the

independent variable. Also, the statistical power of the test is equal to 1, which indicates the adequacy of the sample size. However, to determine in which areas the difference is significant, a univariate analysis of the covariance test was used in the MANCOVA, the results of which are reported in Table 4.

Table 4. Results of Univariate Analysis of Covariance on the Mean of Post-Test Scores of Dependent Variables in Experimental and Control Groups

Variables	SS	DF	MS	F	P	Effect Value
Physical Abuse	95.160	1	95.160	54.32	<0.001	0.68
Emotional Abuse	104.026	1	104.026	54.35	<0.001	0.69
Physical Neglect	122.846	1	122.846	56.18	<0.001	0.67
Emotional Neglect	104.692	1	104.692	53.91	<0.001	0.66
Sexual Abuse	91.613	1	91.613	47.22	<0.001	0.64
Rumination	302.395	1	302.395	64.11	<0.001	0.71
Hypochondria	244.819	1	244.819	70.75	<0.001	0.73

According to the contents of Table 4, the F-statistic is significant for physical abuse ($F=54.32$), emotional abuse ($F=54.35$), physical neglect ($F=56.18$), emotional neglect ($F=53.91$), sexual abuse ($F=47.22$), rumination ($F=64.11$), and hypochondria ($F=70.75$) at the level of 0.001. These findings indicate that there is a significant difference between the groups in these variables. Also, according to the calculated effect size, 68% of physical abuse, 69% of emotional abuse, 67% of physical neglect, 66% of emotional neglect, 64% of sexual abuse, 71% of rumination, and 73% of hypochondria were independent of the effect of the variable; As a result, it can be stated that CBT significantly reduces childhood trauma, rumination,

and hypochondriasis among patients with panic disorder.

Discussion

The present study aimed to investigate the ability of CBT to decrease childhood trauma, rumination, and hypochondriasis in panic disorder patients. Results found CBT to reduce childhood trauma, rumination, and hypochondriasis and indicated that this therapy may influence not only the more observable symptoms of panic disorder but also many of the underlying cognitive and emotional processes that mediate its maintenance. These results suggest that CBT may be a useful intervention in reducing factors that mediate chronicity and vulnerability to relapse for panic pathology, beyond mere manipulation of

several deeper factors that influence the stability of illness. The results are noteworthy given that panic disorder is characterized not just by an episodic attack of fear, but by maladaptive cognitive styles, illogical appraisal of physical sensations, and unresolved earlier experiences. Thus, it is plausible that therapy that can alter such processes may foster durable, lasting change. The present findings are consistent with this notion in that they lend support to CBT as a powerful therapy that is capable of bringing about change across multiple domains of psychological functioning in the panic patient.

An important finding of the current study was that CBT decreased childhood trauma-related outcomes in panic disorder. While the past is immutable, ongoing psychic implications of a childhood trauma may be modified in treatment (Schwartz et al., 2022), and the patient with childhood trauma experiences of panic disorder may have higher levels of maladaptive schemas, increased threat sensitivity, and continued feelings of helplessness and vulnerability (Efron & Wootton, 2021). Through such modification in CBT treatment, patients may reframe and restructure maladaptive beliefs, catastrophizing beliefs, and replace dysfunctional responses with adaptive thought and feeling processes (Jung et al., 2025). The observed finding that CBT decreased childhood trauma outcomes may be related to CBT's effect on the cognitive and avoidance patterns related to trauma and panic disorders (Moshe-Cohen et al., 2024). With psychoeducation, cognitive restructuring, and exposure-based techniques, the patient with panic disorder learns that their bodily experiences are less threatening and also decreases fear-based avoidance behaviors (Atik et al., 2026). Also, CBT may also improve the patient's coping skills and sense of self-efficacy, helping patients have a sense of control over their responses (Zainal et al., 2023), therefore decreasing the ongoing psychic consequences of a

childhood trauma and promoting feelings of greater emotional control and psychological safety (Renner et al., 2026).

One other finding of note was that CBT significantly lowered rumination among patients with panic disorder. Rumination can be defined as repeated patterns of thoughts that focus attention on the symptom, on bodily sensations, or on a fear of another panic attack (Stech et al., 2020). This seems to lead to greater self-focused attention and catastrophic interpretations of normal changes in physiological processes among individuals with panic disorder (Schwartz et al., 2022). The fact that CBT decreased rumination indicates that it was effective in eliminating one critical cog in the development and maintenance of panic symptoms (Tremblay et al., 2023). The mechanism by which this occurs is most likely due to the principles that guide CBT treatment in general. Because the focus of CBT is to alter and eliminate problematic thoughts (Jung et al., 2025), cognitive restructuring allows for the questioning of the validity of repetitive maladaptive and catastrophic thinking, and behavioral components help to decrease mental and internal monitoring. CBT may enhance metacognitive ability, helping patients learn to recognize that thoughts are not realities and that one does not need to continuously engage with every thought (Bjarke et al., 2025). Eventually, patients who are able to accept the presence of uncertainty in the absence of negative thoughts can disengage from rumination, leading to improvements in emotion regulation (Moshe-Cohen et al., 2024).

It was also found that patients with panic disorder reported a significant decrease in hypochondriasis as a result of CBT. This is congruent with the cognitive theory of panic, which postulates that catastrophic misinterpretations of physical symptoms (e.g., panic) are largely responsible for perpetuating panic experiences. Panic disorder individuals may

misinterpret symptoms such as palpitation, vertigo, or shortness of breath as an indication of a dangerous state, leading to increased fear, repeated reassurance seeking, and excessive attention and monitoring of bodily states. A significant reduction in hypochondriasis suggests that CBT helped patients overcome health-related fears and misattributions. One possible explanation for the observed decrease in hypochondriasis is that it fostered more realistic beliefs about bodily experience. Psychoeducation, cognitive restructuring, and interoceptive exposure encouraged patients to experience bodily sensations as temporary and relatively harmless, rather than as dangerous. Behaviors, such as repeated checks of one's health and reliance on reassurances from medical authorities or other individuals, can fuel hypochondriacal tendencies over long periods of time, but CBT intervention directly aims to address and prevent these behaviors. Thus, participants reported improved perceived safety and diminished fearfulness regarding their bodies as a consequence of therapy.

Limitation and Recommendations

Despite robust findings that demonstrate the potential for CBT to shape symptom severity and cognitive distortions among individuals with panic disorder at this juncture in treatment, the lack of a probabilistic sample and of longitudinal follow-up makes it difficult to assess the long-term durability of the effects of CBT therapy at this point of intervention. Future studies need to employ randomized control trial designs with participants from varied demographic profiles, as well as utilize EMA data collection to record the real-time relationship of the rumination cycle and panic events. Additionally, researchers can further explore neurobiological mediation of cognitive benefits (i.e., functional connectivity of the prefrontal cortex) to examine both

the 'top-down' and 'bottom-up' mechanisms that may drive them. In practice, its utility as an adaptable and personalized approach to address treatment-resistant panic symptoms coupled with childhood adversities and health anxieties is considerable, and integration into primary care practice warrants future consideration.

Conclusion

In sum, CBT appeared to effectively reduce childhood trauma-related outcomes, rumination, and hypochondriasis among patients with panic disorder. This implies that CBT can effectively treat panic disorder not by primarily ameliorating acute symptoms of the disorder but rather through its capacity to restructure broader cognitions and emotions which underlie the development and maintenance of chronic panic disorder. By reducing dysfunctional schema related to negative childhood events, repetitive negative thinking, and catastrophes regarding the meaning of physical symptoms, CBT appeared to offer an effective, comprehensive, and clinically relevant treatment.

Ethical Considerations

Compliance with ethical guidelines: This study was conducted in accordance with ethical principles and approved by the Department of Psychology, Ferdowsi University of Mashhad, and Tarbiat Modares University of Tehran. All ethical considerations, including informed consent, confidentiality, and the right to withdraw, were fully observed.

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