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Evaluation Of The Effectiveness Of Cognitive Behavioral Therapy On Emotional Regulation, Impulsivity And Interpersonal Functioning In Adolescents With Borderline Personality Traits

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Abstract

Objective: To assess the efficacy of CBT on emotion regulation, impulsivity, and interpersonal functioning in teenagers with borderline personality traits. Background: Palmtop borderlines (PTB; subthreshold Borderline Personality Disorder, BPD) in adolescents are characterized by severe emotional dysregulation, impulsivity, and troubled relationships and are likely to have low school performance as well as high risk for self-injury. CBT is beneficial for these symptoms; however, little research has examined the efficacy of CBT in adolescents. Method: This was a case-control study on adolescents aged 14 to 18 in Khyber Teaching Hospital Peshawar. Non-probability consecutive sampling was used in the study. Participants all had BPD traits and were divided into two groups: 64 adolescents who received CBT (cases) and 63 who received treatment as usual (controls). Demographic information, clinical data, and psychological data (obtained through standardized tools, including the Difficulties in Emotion Regulation Scale (DERS), Barratt Impulsiveness Scale (BIS-11), and Inventory of Interpersonal Problems (IIP-32)) were obtained. Follow-up evaluations were performed at 12 weeks after the intervention. The statistical analysis was performed using IBM SPSS, version 24, including paired t-tests, independent t-tests, and effect size values.Results: The CBT group exhibited improved emotional regulation with a mean DERS score reduction from 112.3±18.4 to 89.7±15.2 ($p<0.001$, Cohen's $d=1.34$). Scores of impulsivity (BIS-11) decreased from 78.6±12.1 to 65.4±10.8 ($p<0.001$, Cohen's $d=1.15$). On the IIP-32, interpersonal functioning improved from 95.8±16.7 to 74.2±13.9 ($p< 0.001$, Cohen's $d=1.42$). There was no difference in the control group in both measurements. There were distinct between-group analyses in favor of the CBT intervention ($p<0.001$ for all outcomes). Conclusions: CBT is effective at positively modifying emotional regulation, reducing impulsivity, and increasing interpersonal function in adolescents with borderline characteristics. These results support the placement of CBT as a first-line treatment for adolescents with BPF.

Keywords: Cognitive-Behavior Therapy, Borderline Personality Traits, Adolescents, Emotional Regulation, Impulsivity, Interpersonal Functioning.

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Introduction

Borderline Personality Disorder (BPD) is one of the most difficult mental illnesses, and it's not easy to deal with! It is more difficult for ill individuals to handle unstable partnerships and views of themselves, emotions, and control impulsively.[1] They can be distressing for those with them and their families and friends. Although classified personality disorders are generally not diagnosed in individuals under age 18, preliminary evidence suggests that borderline personality disorder and features of this disorder can be reliably assessed before adulthood. This understanding is essential because these features are correlated with considerable functional disability during this critical period of development.

Epidemiology 1–3% of adolescents fulfill the criteria for the borderline personality trait, and this rate increases to 11% in clinical settings.[2] It demonstrates that though BPD is seen as an adult disorder, it can develop at an early age , and the results have profound implications if left untreated. Adolescence as a stage of development is marked by dramatic neurobiological changes, particularly in the frontolimbic regions involved in emotional regulation and impulse control. This places adolescents with BPD-related traits at particular risk for emotional dysregulation, impulsivity, and social relationship problems. Another core characteristic of borderline personality traits is impulsivity. It is the impetus in action when one move is called or made without regard to the results. This impulsiveness can result in such risky behaviors as reckless driving, dangerous sexual liaisons, addiction, and self-harming. The mix of emotional dysregulation and impulsive behavior is a perilous set of symptoms that has the potential to significantly harm the adolescent and cause much distress within the family.[3]

The third domain affected adolescents with borderline personality traits. They often have difficulty sustaining relationships and sometimes shift from overvaluing people to devaluing them. One day, they worship a friend or family member; the next, they categorize them as all positive or negative... and yet, there is no positivity.[4]

For instance, a young person may act clingy and demanding to avoid abandonment yet engage in behavior that drives their peer group away, such as throwing tantrums or making accusations.[5] This interpersonal mayhem significantly affects adolescents' capacity to form attachments and acquire adequate social skills. A dearth of stable relationships can also compound feelings of loneliness and hopelessness, exacerbating the symptoms of BPD. Cognitive behavioral therapy (CBT) is one of the most widely studied and evidence-supported interventions for several adolescent mental health problems.[6] The theory of CBT is predicated on the belief that our thoughts, feelings, and behaviors influence one another, and changing negative thought patterns can lead to improved emotional regulation and functioning. The skills-oriented structure of CBT renders it particularly relevant to the types of deficits seen in BPD traits in young adolescents.

CBT is meant to give teens the tools to recognize their emotions and the thoughts that drive them.[7] In learning to challenge negative cognitions and build healthier coping skills, young people can break free from the cycle of emotional dysregulation and impulsivity. For example, in CBT, a teenager may learn to identify when they are beginning to feel out of control and then practice grounding skills so that they do not act out impulsively.

Notwithstanding the promising theoretical underpinning and preliminary empirical support of CBT for borderline traits in adolescence, little research has yet been undertaken to systematically examine its effects concerning the primary features of

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emotion dysregulation, impulsivity, and dysfunctional relations. Most studies investigate adult subjects or analyze single outcome parameters rather than a complete set for evaluating treatment efficacy.[8] This critical question is particularly relevant to the clinical management and treatment planning of this high-risk group.

We seek to address this gap in the literature by conducting a high-powered examination of the effectiveness of CBT in adolescents endorsing borderline personality traits.[9] The multidimensional nature of the affected dimensions will be determined using instruments with established psychometric properties; since most measures are predicted to be positively related to the continuum of functioning and following a controlled research design, these dimensions will be evaluated to piece together a multi-faceted challenge to provide a strong evidence base for the benefits of CBT within this client group. The study will also carefully examine the effects of CBT on emotion regulation, impulsivity, and interpersonal problems.[10] By learning about how these treatment mechanisms work, clinicians may be able to provide treatment that more effectively targets the difficulties of adolescents with borderline features.

In sum, attention to borderline personality symptoms in adolescents has essential implications for the welfare of youth.[12] By the time we see them, the best we can do is administer cognitive behavioral therapy and let these young people know that they are not alone and support them in the pain of their growth.

Objective

The efficacy of Cognitive Behavioral Therapy (CBT) for emotion regulation, impulsivity, and interpersonal functioning in a sample of adolescents with BPT.

Operational Definitions

Borderline Personality Traits: Meeting criteria for at least 4 of the 9 DSM-5 borderline personality disorder criteria (modified for an adolescent's presentation), which include efforts to avoid real or imagined abandonment, unstable relationships, identity confusion/markedly and persistently unstable self-image or sense of self, impulsivity in at least two areas that are potentially self-damaging, suicidal and/or self-injurious behavior and recurrent suicidal threats, acts, or self-injurious behavior, affective instability/emotion dysregulation, chronic feelings of emptiness, intense uncontrollable anger, and transient stress-related paranoid ideation or severe dissociation.

Emotional Regulation: Assessed with the DERS, with scores >90 on DERS (all subscales combined), suggestive of severe emotional dysregulation.

Impulsivity: Measured with the Barratt Impulsiveness Scale-11 (BIS-11) with scores > 72 considered clinically significant impulsivity.

Interpersonal Functioning: The Inventory of Interpersonal Problems-32 (IIP-32) measures interpersonal functioning; scores above 80 indicate significant interpersonal problems.

Cognitive-behavioral intervention: Manualised 12-week individual CBT intervention using emotion regulation skills, impulse control strategies, and interpersonal effectiveness skills; sessions of 50 min conducted weekly.

Case: Adolescent with borderline personality features receiving CBT.

Controls: Adolescents with BPD traits were recruited from routine specialist psychiatric care and did not receive any structured CBT.

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Hypothesis: CBT was found to be an effective intervention in improving emotion regulation, reducing impulsivity, and ameliorating interpersonal difficulties compared to treatment as usual for adolescents with BPT.

MATERIALS AND METHODS

Design and Setting: A case-control study.

Setting: Psychiatry Department, Khyber Teaching Hospital Peshawar, Pakistan.

Duration of study: 18 months (6 months for recruitment, 12 weeks for intervention, follow-up)

Sample Size

The sample size was determined by G*Power 3.1.9.7 assuming the following:

- Expected effect size (Cohen's d) = 0.8 (large effect)
- Alpha error = 0.05
- Power = 80%
- Two-tailed test

Sample size, **n = 127** (64 cases, 63 controls)

Sampling Technique: Non-probability consecutive sampling technique

Sample Selection

Inclusion Criteria

- Youth between 14 and 18 years of age
- Both genders
- Fulfilling the operational definition of borderline personality traits
- Get to regular therapy sessions
- Parental/guardian consent and adolescent assent

Exclusion Criteria

- Current psychosis or bipolar disorder I
- Severe cognitive impairment
- Current use of substances and/or dependence
- Participation in other groups or organized psychotherapy
- High risk of suicide that requires inpatient treatment

Data Collection Procedure

Following clearance from the hospital's research review board and Ethics Committee, outpatients fulfilling the inclusion criteria were recruited. Parents/guardians provided written informed consent, and adolescents gave assent to the study.

Sixty-four adolescents participated in the CBT group and 63 in the control group. In the baseline assessment, these patients were evaluated based on extensive demographic and clinical data, psychiatric evaluations, and standardized psychological tests. The CBT intervention consisted of 12 weekly individual CBTs according to a manualized program, and the control intervention was standard psychiatric care, such as pharmacotherapy and supportive counseling, as clinically required.

Baseline Psychological Measures Comprised

DERS- 36 - 36-item scale DERS is a parameter that measures emotional dysregulation in a way closely parallel to the nine-factor DERS scale.

Barratt Impulsiveness Scale-11 (BIS-11) - 30-item instrument for assessing impulsivity Inventory of Interpersonal Problems-32 (IIP-32) -32 item measure of interpersonal functioning Beck Depression Inventory-II (BDI-II) – 21-item scale to evaluate depressive symptoms

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Beck Anxiety Inventory (BAI): A 21-item self-report instrument that measures anxiety symptoms.

Long-term assessments were conducted 12 weeks after the baseline using the same established instruments. All evaluations were performed by trained research assistants who were blind to the group allocation.

The CBT treatment was based on a protocolized manual including the following features:

• Weeks 1-3: Psychoeducation and training of emotional awareness
• Weeks 4-6: Use of cognitive restructuring strategies
• Weeks 7 to 9: Emotion regulation skills mediation
• Weeks 10-12: Interpersonal effectiveness, relapse prevention

Data Analysis Procedure

Data analysis was performed using IBM SPSS 24. Descriptive statistics, including means and standard deviations, were calculated for the continuous variables. Categorical variables were expressed as frequencies and percentages. A parametric (independent samples t-test) was used to compare baseline characteristics between the groups. Within-group changes from baseline to follow-up were evaluated using paired-sample t-tests. Between-group changes in scores were compared using independent samples t-tests. Cohen's d was used to estimate the effect size, and a p-value of less than 0.05 was considered significant.

Data Analysis

Demographic Characteristics

The investigation involved 127 adolescents with borderline personality traits, 64 in the CBT group and 63 in the control group. Demographic variables were compared for comparability between groups.

Table 1: Demographic and Clinical Characteristics of Study Participants

Characteristic	CBT Group (n=64)	Control Group (n=63)	P-value
Age (years)			
Mean ± SD	16.2 ± 1.4	16.0 ± 1.3	0.387
14-15 years	18 (28.1%)	21 (33.3%)	0.531
16-17 years	28 (43.8%)	26 (41.3%)	0.771
18 years	18 (28.1%)	16 (25.4%)	0.732
Gender			
Female	42 (65.6%)	39 (61.9%)	0.669
Male	22 (34.4%)	24 (38.1%)	0.669
Education Level			
Secondary school	38 (59.4%)	35 (55.6%)	0.668
Higher secondary	26 (40.6%)	28 (44.4%)	0.668
Family History of Mental Illness			
Present	31 (48.4%)	28 (44.4%)	0.651
Absent	33 (51.6%)	35 (55.6%)	0.651
Previous Self-Harm			
Yes	41 (64.1%)	38 (60.3%)	0.667
No	23 (35.9%)	25 (39.7%)	0.667
Duration of			

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Symptoms (months)			
Mean ± SD	14.7 ± 8.2	15.3 ± 9.1	0.712

Table 1 presents the demographic and clinical characteristics of the study participants, comparing a Cognitive Behavioral Therapy (CBT) group with a control group. The mean age of the CBT group was 16.2 (±1.4) years, and that of the control group was 16.0 (±1.3) years; however, there was no significant difference between the two groups (P = 0.387). Age distribution In terms of age distribution, the two groups were comparable in the comparison groups: 14-15 years old (28.1% CBT vs 33.3% control), 16-17 years old (43.8% CBT vs. 41.3% control), and 18 years old (28.1% CBT vs. 25.4% control), with all P-values suggesting no significant difference.

The gender ratio was also similar between the two groups, with females accounting for 65.6% and 61.9% in the CBT and control groups, respectively (P = 0.669). For the level of education, 59.4% of individuals in the CBT group were in secondary school, compared to 55.6% in the control group, which again was not significantly different (P = 0.668).

A family medical history of mental diseases was evident in 48.4% of the CBT group and 44.4% of the control group (P = 0.651). A history of prior self-harm was present in 64.1% of those in the CBT group compared with 60.3% of those in the control group (P=0.667). The average duration of symptoms was the same between groups (14.7 months for CBT vs. 15.3 months for the control group, P = 0.712). The two cohorts were generally similar in crucial demographic and clinical features.

Baseline Psychological Assessment Scores

Baseline psychological status was measured using standardized tests to facilitate comparisons between baseline and group levels.

Table 2: Baseline Psychological Assessment Scores

Assessment Scale	CBT Group (n=64)	Control Group (n=63)	P-value
DERS Total Score			
Mean ± SD	112.3 ± 18.4	109.8 ± 17.2	0.431
BIS-11 Total Score			
Mean ± SD	78.6 ± 12.1	77.2 ± 11.8	0.512
IIP-32 Total Score			
Mean ± SD	95.8 ± 16.7	94.1 ± 15.9	0.557
BDI-II Score			
Mean ± SD	23.4 ± 8.9	22.8 ± 9.2	0.721
BAI Score			
Mean ± SD	19.7 ± 7.3	20.1 ± 6.8	0.753
Number of BPD Criteria Met			
Mean ± SD	5.8 ± 1.2	5.7 ± 1.1	0.629

Table 2 presents a Summary of test scores for the psychological assessment of the cognitive behavioral therapy (CBT) group (n = 64) and the control group (n = 63). Another interesting finding is that the scores provided in both groups are on par. The mean value for the DERS total was 112.3 (SD ± 18.4) in the CBT intervention group and 109.8 (SD ± 17.2) in the control group; P = 0.431. The Barratt Impulsiveness Scale (BIS-11) (CBT: M 78.6, SD 12.1; Control M 77.2, SD 11.8; there was no significant difference, P=0.512).

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For the IIP-32, the mean values in the CBT group and control group were 95.8 (SD ± 16.7) and 94.1 (SD ± 15.9), respectively (P = 0.557). The Beck Depression Inventory-II (BDI-II) means were 23.4 (SD ± 8.9) for the CBT group and 22.8 (SD ± 9.2) for the control group (P = 0.721). The Beck Anxiety Inventory (BAI) scores were also comparable (mean, 19.7 [SD, ±7.3] for CBT vs. 20.1 [SD, ±6.8] for the control; P = 0.753). Finally, the Borderline Personality Disorder (BPD) criteria were fulfilled similarly, with means of 5.8 (SD ± 1.2) in the CBT group and 5.7 (SD ± 1.1) in the control group (CG) (P = 0.629). Generally, this means the groups were comparable in the pre-test regarding the psychological measures.

Treatment Adherence and Completion Rates

We evaluated adherence and treatment completion during the study to assess the feasibility and engagement with the intervention.

Table 3: Treatment Adherence and Completion Rates

Parameter	CBT Group (n=64)	Control Group (n=63)
Session Attendance		
Mean sessions attended	10.8 ± 1.9	N/A
100% attendance (12/12)	28 (43.8%)	N/A
≥75% attendance (9-11/12)	24 (37.5%)	N/A
<75% attendance (<9/12)	12 (18.7%)	N/A
Study Completion		
Completed follow-up assessment	58 (90.6%)	57 (90.5%)
Lost to follow-up	6 (9.4%)	6 (9.5%)
Homework Compliance		
Excellent (>80% completed)	32 (55.2%)	N/A
Good (60-80% completed)	18 (31.0%)	N/A
Poor (<60% completed)	8 (13.8%)	N/A

Table 3 describes the treatment compliance and completion rates of participants in the Cognitive Behavioral Therapy (CBT) condition (n = 64) and the control condition (n = 63). The CBT treatment group participated in a mean (SD) number of sessions of 10.8 (± 1.9). Attendance rates showed that 43.8% had 100% attendance (i.e., 12/12 sessions), and 37.5% attended at least 75% of the sessions (i.e., 9-11 sessions out of 12). In contrast, 18.7% were "poor attendees" (attended .900) to 14.2 (SD ± 6.1) (t 27 > 5.7; p <.001), yielding a change score of –5.5 (SD ± 5.4). The control group increased by a small amount from baseline, from 20.1 (SD ± 6.8) to 19.3 (SD ± 6.5), with a change score of -0.8 (SD ± 4.7). The t-value was 5.6 (p<0.001), indicating statistically significant anxiety relief with CBT. In both instances, substantial benefits to therapy status were observed.

Primary Outcome Measures: Pre-Post Intervention Changes

The main outcomes included emotional regulation, impulsivity, and interpersonal functioning, which were measured from baseline to 12 weeks post-treatment.

Table 4: Changes in Primary Outcome Measures from Baseline to Follow-up

Measure	CBT Group (n=58)	Control Group (n=57)	Between-Group Comparison
DERS (Emotional Regulation)			
Baseline	112.3 ± 18.4	109.8 ± 17.2	
Follow-up	89.7 ± 15.2	106.2 ± 16.8	
Change score	-22.6 ± 12.3	-3.6 ± 8.9	t=10.2, p<0.001*

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Within-group p-value	<0.001*	0.003*	
Effect size (Cohen's d)	1.34	0.21	
BIS-11 (Impulsivity)			
Baseline	78.6 ± 12.1	77.2 ± 11.8	
Follow-up	65.4 ± 10.8	75.1 ± 11.2	
Change score	-13.2 ± 8.7	-2.1 ± 6.4	t=8.4, p<0.001*
Within-group p-value	<0.001*	0.019*	
Effect size (Cohen's d)	1.15	0.18	
IIP-32 (Interpersonal Functioning)			
Baseline	95.8 ± 16.7	94.1 ± 15.9	
Follow-up	74.2 ± 13.9	91.3 ± 15.1	
Change score	-21.6 ± 11.4	-2.8 ± 7.6	t=11.1, p<0.001*
Within-group p-value	<0.001*	0.008*	
Effect size (Cohen's d)	1.42	0.18	

*Statistically significant (p<0.05)

Table 4 presents the differences between baseline and follow-up values for primary outcome measures in participants of the CBT group (n = 58) and the control group (n = 57). The CBT group also showed a significant decrease in DERS scores, from a pretreatment mean of 112.3 (SD ± 18.4) to 89.7 (SD ± 15.2) at follow-up, representing a change score of -22.6 (SD ± 12.3). The control group's mean scores decreased slightly, from 109.8 (SD ± 17.2) to 106.2 (SD ± 16.8), with a change score of -3.6 (SD ± 8.9). The t-value across groups was 10.2 ($p < 0.001$), indicating a significant difference in the improvement of emotional regulation.

Concerning impulsivity, the CBT group's scores reduced from 78.6 (SD ± 12.1) to 65.4 (SD ± 10.8), and the control group, by comparison, barely improved their performance (baseline: 77.2, follow-up: 75.1). The difference score was -13.2 (SD ± 8.7) for CBT and -2.1 (SD ± 6.4) for the control, with a t-value of 8.4 (p<0.001).

In terms of interpersonal functioning (IIP-32), the CBT group reported a significant improvement from a mean baseline of 95.8 (SD = 16.7) to 74.2 (SD = 13.9). In contrast, the control group showed a slight decrease from 94.1 (SD = 15.9) to 91.3 (SD = 15.1). The change scores and effect sizes reflect CBT's marked superiority across all outcomes.

Secondary Outcome Measures: Depression and Anxiety

Additional outcomes included reductions in symptoms of depression and anxiety as secondary indicators of treatment efficacy.

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Table 5: Changes in Secondary Outcome Measures from Baseline to Follow-up

Measure	CBT Group (n=58)	Control Group (n=57)	Between-Group Comparison
BDI-II (Depression)			
Baseline	23.4 ± 8.9	22.8 ± 9.2	
Follow-up	15.8 ± 7.2	21.5 ± 8.6	
Change score	-7.6 ± 6.8	-1.3 ± 5.9	t=5.9, p<0.001*
Within-group p-value	<0.001*	0.114	
Effect size (Cohen's d)	0.94	0.14	
BAI (Anxiety)			
Baseline	19.7 ± 7.3	20.1 ± 6.8	
Follow-up	14.2 ± 6.1	19.3 ± 6.5	
Change score	-5.5 ± 5.4	-0.8 ± 4.7	t=5.6, p<0.001*
Within-group p-value	<0.001*	0.223	
Effect size (Cohen's d)	0.82	0.12	

*Statistically significant (p<0.05)

Table 5 shows the differences in secondary outcome variables between baseline and after the follow-up assessment for the CBT (n = 58) and control (n = 57) arms, with a focus on depression and anxiety.

Regarding the BDI-II, a significant decrease was observed in the CBT group from baseline (mean: 23.4; SD: ± 8.9) to follow-up (mean: 15.8; SD: ± 7.2), resulting in an overall change in score of -7.6 (SD: ± 6.8). Relative to females in the control group, who demonstrated a minimal change from 22.8 (SD ± 9.2) to 21.5 (SD ± 8.6), with a mean shift of –1.3 (SD ± 5.9). The between-group n comparison yielded a t-value of 5.9 ($p < 0.001$), demonstrating a significant difference in favor of the CBT group.

According to the Beck Anxiety Inventory (BAI), scores for the CBT group decreased from 19.7 (SD ± 7.3) at the 4-week baseline ratings to 14.2 (SD ± 6.1), reflecting a change score of -5.5 (SD ± 5.4). The control group increased slightly, from 20.1 (SD ± 6.8) to 19.3 (SD ± 6.5), with a change score of -0.8 (SD ± 4.7). The t-value was 5.6 (p<0.001), indicating that anxiety in the CBT group significantly improved. Both presented a large effect size for the CBT treatment compared to the control condition.

Subgroup Analysis by Severity

Subgroup analyses evaluated treatment efficacy by level of baseline severity of borderline personality traits.

Table 6: Treatment Effectiveness by Baseline Severity of Borderline Personality Traits

Severity Level	CBT Group	Control Group	Between-Group Effect Size
Moderate Severity (4-5 BPD criteria)			
n	24	26	

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DERS change score	-18.4 ± 10.2	-2.1 ± 7.8	d = 1.78
BIS-11 change score	-10.7 ± 7.9	-1.4 ± 5.6	d = 1.35
IIP-32 change score	-17.2 ± 9.8	-1.9 ± 6.9	d = 1.76
High Severity (6+ BPD criteria)			
n	34	31	
DERS change score	-25.8 ± 13.1	-4.7 ± 9.4	d = 1.86
BIS-11 change score	-15.1 ± 9.2	-2.6 ± 7.1	d = 1.53
IIP-32 change score	-24.7 ± 12.3	-3.5 ± 8.2	d = 1.97

Table 6 presents results on treatment efficacy for the severity of Borderline Personality Disorder (BPD) traits at baseline as the moderator and presents for both the effectiveness of treatment between the Cognitive Behavioral Therapy (CBT) condition and the control condition.

For participants with moderate severity (4-5 criteria met), there was a significant effect of the CBT group on emotional regulation, with a DERS change score of -18.4 (SD ± 10.2) in the CBT group (n = 24) versus -2.1 (SD ± 7.8) in the control group (n = 26). This measure yielded a large effect size (d = 1.78). Another focus of interest, impulsivity, as measured by the BIS-11, decreased by 10.7 (SD ± 7.9) in the CBT group compared to -1.4 (SD ± 5.6) in the control group (d = 1.35). Interpersonal functioning (IIP-32) also improved significantly, with a change of -17.2 (SD ± 9.8) for the CBT arm and -1.9 (SD ± 6.9) for the controls (d = 1.76).

Significant effects favoring CBT were even more potent for the high-severity group (6+ criteria, n=34 CBT; n=31 control). The change in DERS was –25.8 (SD ± 13.1), while the control group changed by –4.7 (SD ± 9.4), with an effect size of 1.86. Findings were replicated for impulsivity and interpersonal functioning, suggesting the cross-severity effectiveness of CBT for BPD traits.

Clinical Significance Analysis

Clinical significance was also evaluated by analysing the percentage of patients with reliable change and clinically significant improvement.

Table 7: Clinical Significance of Treatment Outcomes

Outcome	CBT Group (n=58)	Control Group (n=57)	P-value
DERS Reliable Change			
Improved	47 (81.0%)	12 (21.1%)	<0.001*
No change	9 (15.5%)	41 (71.9%)	
Deteriorated	2 (3.4%)	4 (7.0%)	
BIS-11 Reliable Change			
Improved	43 (74.1%)	8 (14.0%)	<0.001*
No change	13 (22.4%)	46 (80.7%)	
Deteriorated	2 (3.4%)	3 (5.3%)	
IIP-32 Reliable Change			
Improved	49 (84.5%)	9 (15.8%)	<0.001*
No change	7 (12.1%)	44 (77.2%)	
Deterioraated	2 (3.4%)	4 (7.0%)	
Overall Clinical Response			
Improved on ≥2 measures	52 (89.7%)	11 (19.3%)	<0.001*

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Improved on 1 measure	4 (6.9%)	18 (31.6%)
No improvement	2 (3.4%)	28 (49.1%)

*Statistically significant (p<0.05)

Table 7 Clinical significance of treatment response in the Cognitive Behavioral Therapy (CBT) group (n=58) and the control group (n=57).

On the DERS, 81.0% of the CBT group showed reliable improvement compared with 21.1% of the control group (Fisher exact test, P < 0.001). A large proportion of control group participants (71.9%) remained stable, while 3.4% of them worsened.

In impulsivity, as assessed by the Barratt Impulsiveness Scale (BIS-11), 74.1% of participants in the CBT group showed improvement, compared with 14.0% in the control group (P < 0.001). 80.7% of the control group showed no change again. For interpersonal functioning, as measured by the IIP-32, 84.5% of the CBT group and 15.8% of the control group improved (P < 0.001).

Overall, 89.7% of the CBT group improved on at least two measures, whereas only 19.3% of the control group did so (P < 0.001). The findings are consistent with the conclusion that CBT has a strong effect in most dimensions and is more effective than standard treatment.

Discussion

This controlled trial provides strong evidence for the efficacy of CBT for adolescents with BPT across domains of emotional regulation, impulsivity, and interpersonal functioning. Most measurements revealed impressive changes in the CBT group, with large effect sizes, while minimal changes were found in the control group.

The Effectiveness of CBT on Emotional Regulation

The largest treatment effect was observed in emotional dysregulation, where CBT was compared with a control group, resulting in a mean decline of 22.6 points on the DERS, compared with 3.6 points in the control group counterparts (Cohen's d = 1.34). The significant magnitude of this effect demonstrated that CBT was highly effective in facilitating adolescents' adoption of more adaptive strategies in emotional regulation. Of particular note is the emotional regulation finding, as emotional dysregulation is a central feature of borderline personality features and is related to multiple negative outcomes (e.g., self-injurious behaviors, suicidal behaviors, functional impairment). [12]

There are numerous reasons for the efficacy of CBT as an emotion-regulation strategy. The psychoeducational component of the program taught adolescents how thoughts, feelings, and behavior are interconnected, and the cognitive restructuring exercises helped them identify and challenge irrational thoughts that contribute to emotional dysregulation. Furthermore, the emotion regulation skills training offered specific tools for handling strong emotions, including mindfulness exercises, distress tolerance skills, and skills that foster effective communication.[13]

Previous findings have shown that, in adolescents, the experience of borderline is associated with difficulties in even the most fundamental aspects of ER, which leaves them exposed to intense levels of affective activation and impulsive behaviors. The more structured approach of CBT would seem to compensate for this lack and may offer a scaffolding for a rational, linear approach to understanding and managing emotions. Its substantial efficacy in the present study supports CBT as a first-line intervention for emotion dysregulation in this group.

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Impact on Impulsivity

The effect of CBT in reducing impulsivity was significant; participants in the CBT group experienced a reduction of 13.2 points on the BIS-11, whereas in the control condition, the reduction was only 2.1 points (Cohen's d = 1.15). This substantial magnitude effect, along with the prospect of reducing such costs, suggests that CBT effectively improves adolescents' capacity for impulse control —a key ingredient in preventing risky behavior and overall functioning.

The decrease in impulsivity was likely a derived effect from different CBT procedures, including cognitive restructuring that reduces impulsive cognitive patterns, behavioral activation that helps adolescents become more involved in healthy activities, and problem-solving skills training that enables adolescents to take the perspective of others and consider the consequences of their actions. "[This work] provided adolescents with alternative ways of managing intense emotions so that they didn't have to rely on impulsive behavior," she said.

Adolescent impulsive behaviors in those with borderline traits are commonly motivated by overwhelming emotions and an attempt to get relief from psychological pain. By instructing teens on how to manage and tolerate distress through healthy coping mechanisms, CBT, it seems, breaks that cycle and inhibits emotional intensity from prompting impulsive acts. This finding has critical implications for preventing the adverse outcomes of impulsivity, such as self-injury, substance misuse, and risky sexual behaviors.

Interpersonal Change

The most significant improvement was in interpersonal functioning. On average, CBT participants reduced their scores by 21.6 points on the IIP-32 scale, compared with a 2.8-point reduction among control participants (Cohen's d = 1.42). This significant effect indicates that CBT was highly beneficial in helping adolescents improve their interpersonal skills and develop solid relationships.

Enhanced interpersonal functioning may be related to components of the CBT intervention, such as interpersonal effectiveness training, communication skill acquisition, and work on cognitive distortions related to interpersonal relationships. Teens learned to look for patterns in their relationships, question the narratives they'd constructed about others' intentions, and improve how they communicated their needs and set boundaries. [14] Interpersonal problems in adolescents with borderline personality features are typically related to abandonment fears in combination with poor communication skills and emotional dysregulation. The CBT program focused on these vulnerabilities, helping young people understand their relationships and patterns more clearly, form more realistic expectations of potential partners, and develop skills for building healthy relationships. The dramatic clinical recovery in this area is especially noteworthy as interpersonal problems are known to remain and lead to persisting functional disability.

Secondary Outcomes: Depression and Anxiety

There were also large to moderate improvements in depression and anxiety symptoms (depression: d = 0.94; anxiety: d = 0.82). These gains are remarkable because they occurred in the presence of comorbidity in CHAR with both depression and anxiety, disorders that frequently co-occur with borderline personality features and can make successful treatment more challenging. The decreased dyspeptic symptoms likely contributed to the improved overall functioning and quality of life.

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Enhancements in depressive and anxious symptoms may be attributed to several mechanisms, including improved emotion regulation, reduced impulsivity, and enhanced interpersonal relationships, which in turn lead to more effective coping strategies. The cognitive restructuring and behavioral activation featured in CBT may have assisted these adolescents in recognizing and challenging the negative thinking patterns that fuel their depression and anxiety and in becoming active in doing things that matter to them. [15]

Clinical Relevance and Real-World Applicability

Clinical significance examination showed that 89.7% of CBT conditions demonstrated reliable change on at least two primary outcome measures, whereas, for control conditions, this was only 19.3%. This information suggests that the statistical improvements translate into clinically significant changes that will likely be noticeable for these adolescents, their families, and healthcare providers.

The high rate of clinical response in the CBT group suggests that the treatment is not just statistically effective but also generates functionally significant changes. This is crucial for adolescents exhibiting BPD features, for whom every bit of improvement in emotional regulation, impulsivity, and interpersonal functioning can make a massive difference to their academic success, family life, and quality of life.

Subgroup Analyses by Severity

The subgroup analysis indicated that the more borderline traits at baseline, the greater the absolute improvement found for adolescents after CBT. However, the effect sizes were comparable across severity levels. This is an exciting result, as it implies that CBT works best for patients who need it the most, for whom there are few effective treatments and the worst prognosis.

Given the degree of impairment they suffer, the higher absolute improvement obtained by more impaired adolescents might derive from their greater capacity for improvement and their increased willingness to participate in treatment. Furthermore, the CBT approach might be helpful for teenagers who have severe symptoms and need concrete strategies for dealing with life issues.

Adherence to Treatment and Feasibility

These treatment meetings may contribute to the continued high results completion rate (90.6%) and good session attendance (81.3% of young people attended more than 75% of sessions), suggesting that CBT is a feasible treatment for young people with BPT. Indeed, the high homework completion rate (86.2% completed ≥60%) indicates that adolescents were actively engaged in treatment and open to practicing skills outside of the sessions.

These results are encouraging since youths with borderline tendencies pose particular challenges in treatment engagement, with significant emotional instability, relational struggles, and resistance to change. The organized structure of CBT and the emphasis on skill building may help improve treatment retention compared to less structured treatments. [16]

Biological and Psychosocial Pathways

The efficacy of CBT for adolescent BPTs can be explained in terms of both neurobiological and psychological mechanisms. Biologically, the teenage brain is not yet fully mature, particularly in the regions of the brain that influence emotional regulation and decision-making. This neuroplasticity may render adolescents more responsive to interventions that focus on these specific skills. [17]

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From a psychological standpoint, CBT focuses on underlying cognitive and behavioral patterns that serve to perpetuate borderline personality-related characteristics. By assisting youth in recognizing and challenging these maladaptive thought patterns and in acquiring better emotional regulation skills and more effective interpersonal repertoires, CBT appears to be able to break the cycle of emotional dysregulation, impulsivity, and interpersonal chaos.

Cognitive restructuring, behavioral skills training, and interpersonal effectiveness techniques in CBT constitute a comprehensive therapeutic approach that simultaneously targets multiple aspects of functioning. This multimodal treatment may be particularly suitable for borderline personality traits that comprise deficits in several domains of functioning.

Conclusion

Summary of Findings

This research offers strong evidence for the utility of CBT in improving emotional regulation, reducing impulsivity, and promoting interpersonal functioning in borderline personality indicators in adolescents. The findings showed that significant gains were made on all primary outcome variables from pre-treatment to the 3-month follow-up for the CBT group compared to the control group, highlighting the potential of CBT as an effective intervention for this high-risk group.

Clinical Significance

The results underscore the necessity for applying CBT as the initial treatment among adolescents showing BPT. Due to the significant decreases in emotional dysregulation, impulsivity, and interpersonal distress, CBT should be favored in clinical settings. This is a clear treatment protocol that not only provides a solid foundation of coping skills for adolescents and young adults but also facilitates dramatic improvements in emotional and relational health, leading to healthier overall mental health and acculturation.

Additionally, the CBT group demonstrated excellent treatment adherence rates, suggesting that adolescents are generally willing to engage in CBT. The structured form of CBT with psychoeducation and skill training seems to be well received by participants, rendering it appropriate for a population frequently described as being treatment refuse.

Mechanisms of Change

There are several possible mechanisms by which CBT may result in HA reduction. The psychoeducation components of CBT serve in part to help adolescents learn that the way they think, feel, and act are intricately related. Through the delivery of cognitive restructuring skills, teenagers are taught how to challenge erroneous beliefs, which are considered fuel for emotional dyscontrol and impulsivity. This shift in perspective is the key to achieving more balanced emotions.

Second, the skills training component of CBT, such as emotion regulation and interpersonal effectiveness, teaches adolescents how to regulate their emotions and engage in more effective social interactions. These abilities enable them to organize their relationship universe in a way that reduces the interpersonal chaos commonly found in BPT.

Limitations and Future Work

The results, although positive, are not without limitations. Sampling was localized to a particular geographical area; therefore, the findings cannot be assumed to be representative of broader populations. Future studies should seek to replicate the present

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findings in multiple contexts and with broader population subgroups to increase external validity.

Furthermore, longitudinal research is necessary to investigate the long-term effects of CBT on emotional regulation, impulsivity, and interpersonal functioning. Insight into the sustainability of treatment gains will have implications for the durability of the therapeutic impact of CBT in adolescents with BPD.

Conclusion

In sum, the current study demonstrates clinically meaningful improvements for adolescents with borderline personality features using CBT. CBT targets the key issues this population faces by improving emotional functioning, decreasing impulsivity, and enhancing interpersonal skills. These results support treatment with CBT as a standard of care for adolescents with BPT to provide an effective intervention to support mental health and well-being. The use of CBT with adolescents is an area of clinical significance, and this approach retains significant clinical relevance as mental health professionals are discovering appropriate treatments for adolescents.

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