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# A Pilot Study of Dialectical Behavioral Therapy Group Skills Training in Patients with Substance Use Disorder: Changes in Substance Use Severity, Mood and Relationship Skills

## Madde Kullanım Bozukluğu olan Hastalarda Diyalektik Davranış Terapisi Grup Becerileri Eğitimi Pilot Çalışması: Madde Kullanım Şiddeti, Duygudurum ve İlişki Becerilerindeki Değişiklikler

F. Işıl BİLİCAN[1], Mustafa ÇETİNKAYA[2], Elif ÇELEBİ[3], Birgül GÜLEN[4], Huzeyfe BARHAM[5]

[1]İstanbul Medeniyet University Department of Psychology, İstanbul, Turkey

[2]İstanbul University Faculty of Medicine, Department of Psychiatry, İstanbul, Turkey

[3]İstanbul Şehir University, İstanbul, Turkey

[4]Behavioral Sciences Institute, İstanbul, Turkey

[5]Kırklareli Training and Research Hospital, Kırklareli, Turkey

## Abstract

**Objective:** This pilot study aimed to investigate effects of Dialectical Behavior Therapy Group Skills Training (DBT-ST) on patients' severity of substance use status, mood and other psychological symptoms, difficulties in emotion regulation, interpersonal problem solving skills, and social competence.

**Method:** Nine outpatient males with substance use disorders were administered the DBT-ST for 20 weeks. Age ranged between 17 and 34. Average years of substance use was 1.61 (SD=.29). DBT-ST modules (mindfulness, emotion regulation, interpersonal skills, and distress tolerance) were administered for 20 weeks. Urine toxicology screenings, the Addiction Profile Index (API), the Symptom Check List-90-Revised (SCL-90-R), the Beck Depression Inventory (BDI), the Difficulties in Emotion Regulation Scale (DERS), the Interpersonal Problem Solving Inventory, and the Perceived Social Competence Scale were administered at pre and post-treatment.

**Results:** There were significant decreases in the severity of substance use with decreased number of positive drug screening test results and an increase in emotion regulation; decreases in the API total score, dependency diagnosis, and the effects of substance use on the user sub-scale scores; depression, hostility, and phobic anxiety sub-scale scores on the SCL-90-R; the BDI total score; and nonacceptance, strategies, clarity and impulsivity sub-scale scores of the DERS.

**Conclusion:** The findings indicated a 20 week DBT-ST helped participants increase their days of abstinence, regulate emotional regulation, decrease depressive and anxiety symptoms, and substance related difficulties.

**Keywords:** Substance use disorders, dialectical behavior therapy- skills training, emotion regulation, depression

## Öz

**Amaç:** Bu çalışmada, Diyalektik Davranışçı Terapi Grup Beceri eğitimi sonrasında (DBT-BE) bireylerin madde kullanım durumu, duygudurum ve diğer psikolojik semptomlar, duygu düzenlemede güçlükler, kişilerarası problem çözme becerileri ve sosyal etkinliklerindeki değişimleri incelemeyi amaçlamıştır.

**Yöntem:** Çoklu Madde Kullanım Bozukluğu olan ve ayakta tedavi edilen dokuz erkek hasta çalışmanın katılımcılarını oluşturmuştur. Katılımcıların yaşı 17 ve 34 arasında değişmiştir. Ortalama madde kullanım yılı 1,61'dir (SS=,29). DBT-BE modülleri (farkındalık, duygu düzenleme, kişilerarası ilişkiler ve stres toleransı) 20 hafta boyunca katılımcılara uygulanmıştır. Katılımcılara tedavi öncesi ve sonrasında idrar toksikoloji tarama testi, Bağımlılık

**Address for Correspondence/Yazışma Adresi:** F. Işıl BİLİCAN, İstanbul Medeniyet University Department of Psychology, İstanbul, Turkey
**E-posta:** isil.bilican @medeniyet.edu.tr
**ORCID ID:** 0000-0003-4546-8304

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Profil İndeksi (BAPİ), Belirti Tarama Listesi (SCL-90-R), Beck Depresyon Envanteri (BDE), Duygu Düzenleme Güçlüğü Ölçeği (DERS), Kişilerarası Problem Çözme Envanteri (KPÇE) ve Algılanan Sosyal Yetkinlik Ölçeği (ASYÖ) uygulanmıştır.

**Bulgular:** İdrar toksikoloji tarama testi sonuçları; BAPİ toplam puanı ile alt ölçekleri olan madde kullanımının kişinin yaşamına etkisi ve bağımlılık tanı ölçütleri; SCL-90-R'nin depresyon, hostilite ve fobik endişe alt ölçekleri; BDE toplam puanı; DERS kabul etmeme, stratejiler, açıklık ve dürtüsellik alt ölçeklerindeki düşüş madde kullanımının azaldığına, duygu düzenleme becerilerinin ise arttığına işaret etmiştir.

**Sonuç:** Bu pilot çalışmanın bulguları DBT-BE'nin bireylerin madde kullanmadığı günlerin sayısının ve duygu düzenlemenin artmasına, depresif ve endişe semptomlarının azalmasına ve madde kullanımın yarattığı sıkıntıların azalmasına yardımcı olabileceğini göstermiştir.

**Anahtar kelimeler:** Madde kullanım bozuklukları, diyalektik davranışçı terapi-beceri eğitimi, duygu düzenleme, depresyon

## Introduction

Dialectical Behavior Therapy (DBT) was shown to be efficacious in reducing psychological symptoms in patients with severe psychopathology, especially with patients who experience severe suicidality and Borderline Personality Disorder (BPD) (1,2). Standard DBT is a comprehensive treatment with four major components: Individual psychotherapy, group skills training, therapist consultation team, and as needed phone consultation. DBT Group Skills Training (DBT-ST) consists of mindfulness, emotion regulation, interpersonal skills, and distress tolerance modules (3). DBT was originally developed for individuals with BPD. Emotion regulation difficulty is considered a core characteristic of BPD (1). It was suggested that individuals with BPD engage in dysfunctional behaviors to avoid emotional distress. Therefore, reduction of experiential avoidance (EA) is a goal in DBT. DBT skills were designed to improve emotion experience, expression, and regulation (1,4). Emotion regulation difficulty plays a key role also in substance use disorders (SUDs) (5). According to EA model, addictive behaviors tend to alter negative emotions and provide negative reinforcement through short-term reduction of emotional distress (6). EA was associated with gambling behaviors, compulsory sex, compulsive shopping, and dysfunctional eating habits (7-11) Among individuals with SUDs, developing mindfulness skills reduced EA (12); distress tolerance and emotion regulation skills helped individuals not only reduce EA but also modulate emotional responses (3, 13). Improvements in emotion regulation were related to improvements in addictive behaviors (14). Following DBT-ST, EA significantly decreased in individuals with alcohol use disorder (15).

DBT was adapted for individuals with substance use disorders (SUDs) and personality disorders. Standard DBT was shown to be effective in decreasing severity of substance abuse and improve anger management in randomized controlled trials in patients with borderline personality disorder with concurrent SUDs (16). DBT was shown to be effective in decreasing dropout rates, dysfunctional eating behaviors and attitudes, and severity of substance use at post treatment compared to pretreatment (17). Women with SUDs and BPD showed improvements in emotion regulation, improved mood, and decreased substance use frequency after a 20-week standard DBT treatment (18). When patients with BPD and SUDs, who were in a DBT treatment program, were provided with a smartphone with a DBT application, DBT Coach, emotion intensity and substance use urges decreased within each coaching session; and participants reported less depressive symptoms and general levels of distress (19). Upon receiving DBT with specific cultural, traditional and spiritual practices, American Indian/Alaska Native adolescents with SUDs showed significant improvements in internalizing (e.g., depressive symptoms and anxiety) and externalizing difficulties (e.g., substance use and acting out) (20). Among homeless female ex-offenders, DBT-Corrections Modified predicted a decrease in drug use at six months as compared with health promotion program, which focused on drug and alcohol abstinence (21).

There are few recent studies, which investigated the role of only DBT-ST on substance abuse difficulties. Significant and moderate to large improvements in the number of consecutive days of abstinence (CDA), severity of alcohol use disorder (AUD) and concurrent substance use disorders (CO-SUDs) and difficulties in emotion regulation were found in patients with a primary diagnosis of AUD after entering a 3-month DBT-ST program treatment (15). After entering a 3-month DBT-ST program, 73.2% of the patients with alcohol or substance use at intake were abstinent at the end of the program and showed improvements in emotion regulation as measured by urine toxicology screening and Difficulties in Emotion Regulation Scale (DERS, 22). Improved emotion regulation partially mediated substance use outcomes (23). A randomized controlled study examined feasibility and efficacy of internet delivered DBT ST (iDBT-ST) for individuals with suicidal ideation and heavy episodic drinking. Compared to the participants in the control group, participants in the iDBT-ST group showed faster reductions in alcohol consumption, suicidal ideation, and emotion dysregulation (24). Patients with alcohol use disorder who received DBT-ST showed significant reductions in the negative attitude and physical difficulty sub-factors of depression and a significant increase in abstinence self-efficacy. Both gains were maintained at follow-up (25).

To the best of our knowledge there is limited literature regarding the relationship between DBT-ST, severity of substance use, and emotion regulation difficulties. It was hypothesized that

DBT-ST would decrease severity of substance use, general psychopathological symptoms, depressive symptoms, and difficulties in emotion regulations. Patients were expected to have better interpersonal problem solving skills and social competence at post-treatment.

## Method

### Sample

Criterion sampling and quasi experimental design were used in the study. Fifteen participants with SUDs who were treated at the outpatient clinic at Istanbul University Faculty of Medicine, Psychiatry Department, Addictions Clinic were originally involved in the study. However, 6 of them either dropped out or had to be excluded until the end of study. One of the members became agitated and was not deemed suitable for group participation. Two of the participants began heavily using substances and were therefore had to be hospitalized, the three of the participants did not attend the group regularly and thus the data could not be gathered from them. The participants who dropped out had comorbidity with ADHD, major depression, and antisocial personality disorder. Final group of participants were 9 males with a history of multiple SUDs. The group was a closed group. Age ranged between 17 to 34, as shown on Table 1. Mean years of substance use was 1.61 (SD=.29). The participants had comorbidity with ADHD, major depression, and antisocial personality disorder. Patients with psychosis and mental retardation were excluded from this study. Patients were diagnosed and medication management was provided by the treating psychiatrists at the Addictions Clinic. Medication management as usual for addictions were provided. The patients were stable on medications for at least 3 weeks prior to participating in the study. There were no changes in medication doses or choices of medication during the course of the study. The DBT-ST was offered as a part of treatment the patients received at the outpatient addictions clinic.

### Urine Toxicology Screening Kit

Concateno Drug Screen Test. QuickTox Drug Screen Dipcard COC300/OPI300/THC50/AMP1000/BZO300/BAR300 was utilized to check substance in urine. Ref was DOA 319, LOT was G150106. QuickTox Drug Screen Dipcard Tests were formulated for use with urine specimens. Only freshly voided, untreated urine was used. The QuickTox® Drug Screen Dipcard Test is an in vitro screen test for the rapid detection of multiple drugs and drug metabolites in human urine at or above the following cutoff concentrations: COC Benzoylecgonine 300 ng/mL, OPI Morphine 300 ng/mL, OPI Morphine 2000 ng/mL, MET Methamphetamine 500 ng/mL, MET Methamphetamine 1000 ng/mL, THC 11-nor-Δ9-Tetrahydrocannabinol-9-carboxylic acid 50 ng/mL, AMP Amphetamine 1000 ng/mL, PCP Phencyclidine 25 ng/mL, BZO Oxazepam 300 ng/mL, BAR Secobarbital 300 ng/mL, MTD Methadone 300 ng/mL, TCA Nortriptyline 1000 ng/mL MDMA, 3,4-methylenedioxymethamphetamine 500 ng/mL, OXY Oxycodone 100 ng/mL, BUP Buprenorphine 10 ng/mL.

### Measures

#### The Addiction Profile Index (API)

The API is a self-report questionnaire measuring dimensions of addiction and addiction severity. It has 37 items and 5 sub-scales which are characteristics of substance use, dependency diagnosis, the effect of substance use on the user's everyday life, severe craving for substance use, and motivation to quit using substances. Characteristics of substance use measures frequency of alcohol and other substance use. Individuals with multiple substance use problems get higher scores on this sub-scale. This sub-scale also measures problems an individual experiences due to substance use. Even though some individuals infrequently use substance, they continue to experience problems due to substance use. Therefore this sub-scale assesses substance use frequency, number of substances used, and problems experienced due to substance use. Dependency diagnosis sub-scale screens for DSM and ICD substance dependency diagnostics criteria. The effects of substance use on the user's everyday life sub-scale assess effects of substance use on family life, work, physical health, mental health, economic wellbeing, social life, legal problems as well as unwanted events (e.g. unwanted pregnancies, fights, STDs). It inquires about substance use during daytime, substance urge despite not wanting to use, and concerns of family regarding individual's substance use. Severe craving for substance use assesses cravings for substance use. Increased scores on the motivation to quit using substances indicates an increased levels of substance use. Therefore, even though motivation is an important factor for treatment, it also indicates higher levels of substance dependence severity (26). The API also offers a total score. The sub-scales yield sum of the scores in relevant sub-scales. Higher scores indicate higher levels of difficulty with substance use. The API has high convergent validity. The Cronbach alpha level for the API total was .89 and it ranged from .63 to .86 for the sub-scales (27). In this study, Cronbach Alpha levels were .88 (characteristics of substance use), .88 (dependency diagnosis), .57 (the effects of substance use on the user), .42 (craving), and .81 (motivation to quit using substances) for pre-treatment assessment; .54 (characteristics of substance use), .94 (dependency diagnosis), .96 (the effects of substance use on the user), .73 (craving), and .97 (motivation to quit using substances) for post-treatment assessment. The Cronbach's alpha level for the API total score was .58 at pre-treatment and .96 at post-treatment. The Beck Depression Inventory (BDI). The BDI is a twenty-one-item multiple choice self-report questionnaire measuring emotional, cognitive, motivational, and behavioral aspects of depression (28). Turkish adaptation of the BDI was found to be reliable (.74) and valid

(29-30). Test scores range between 0 and 63. The clinical cutoff point for the BDI is 17. Higher scores indicate higher levels of depressive feelings. Cronbach alpha levels in this study were .67 (pre-treatment) and.82 (post-treatment).

### The Symptom Check List-90-Revised (SCL-90-R).

The SCL-90-R is a 90-item, self-report Likert scale, ranging from 0 (not at all) to 4 (extremely) (31). The SCL-90-R measures current psychological symptom status with a time reference of "the past 7 days including today." The nine sub-scales of the SCL-90-R include somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, psychoticism and a global severity index (GSI). Higher scores indicate higher levels of psychological difficulty. Reliability of the Turkish adaptation was .97. Convergent validity was established with the MMPI and BDI, and ranged from .33 to .82 (32). Cronbach alpha levels this study were .93 (pre-treatment) and .98 (post-treatment).

### The Difficulties in Emotion Regulation Scale (DERS)

The DERS (22) is a 36-item, five-point Likert scale, self-report measure which assesses difficulties in emotion regulation in

**Table 1. Demographic characteristics of the participants**

| | | N | % | M | SD |
|---|---|---|---|---|---|
| **Gender** | | | | | |
| | **Female** | 0 | 0 | | |
| | **Male** | 9 | 100 | | |
| **Age** | | | | 25.78 | 5.36 |
| **First age of substance use** | | | | 18.11 | 5.60 |
| **Marital status** | | | | | |
| | **Single** | 7 | 78 | | |
| | **Married** | 2 | 22 | | |
| **Religion** | | | | | |
| | **Muslim** | 6 | 75 | | |
| | **Other** | 2 | 25 | | |
| | **Missing** | 1 | | | |
| **Ethnic background** | | | | | |
| | **Turkish** | 7 | 88 | | |
| | **Kurdish** | 1 | 12 | | |
| | **Missing** | 1 | | | |
| **Employment status** | | | | | |
| | **Employed** | 6 | 75 | | |
| | **Unemployed** | 2 | 25 | | |
| | **Missing** | 1 | | | |
| **Annual income** | | | | | |
| | **5,000 TL and below** | 6 | 75 | | |
| | **5,001-10,000 TL** | 1 | 12.5 | | |
| | **10,001-30,000 TL** | 1 | 12.5 | | |
| | **Missing** | 1 | | | |
| **Substances used** | | | | | |
| | **Marijuana** | 7 | 78 | | |
| | **Methamphetamine** | 3 | 33 | | |
| | **Heroin** | 1 | 11 | | |
| | **Alcohol** | 2 | 22 | | |
| | **Bonsai** | 4 | 44 | | |
| | **Kuber** | 3 | 33 | | |
| | **Cocaine** | 2 | 22 | | |

six domains: lack of emotional awareness (AWARENESS), lack of emotional clarity (CLARITY), nonacceptance of emotional responses (NONACCEPTANCE), difficulties engaging in goal-directed behavior (GOALS), impulse control difficulties (IMPULSE) and limited access to emotion regulation strategies (STRATEGIES). Higher scores on each sub-scale indicate greater difficulties in emotion regulation. Cronbach alpha level for the Turkish adaptation was .94, test-re-test reliability was .83 (33). Cronbach alpha levels in this study were .93 (pre-treatment) and .95 (post-treatment).

### The Interpersonal Problem Solving Inventory (IPSI)

The IPSI is a 50-item self-report measure which was originally developed to assess college students' problem solving strategies and abilities. It has five sub-scales: Approaching problems in a negative way, Constructive problem solving, Lack of self-confidence, Unwilling to take responsibility, and Insistent-persevering approach. Cronbach Alfa levels for the sub-scales ranged between .67 and .91; the test-retest reliability ranged between .69 and .89. (34). Cronbach alpha levels in this study were .92 (pre-treatment) and .96 (post-treatment).

### The Perceived Social Competence Scale (PSCS)

The PSCS assesses perception of the self in social interactions (35). The PSCS is a self-report Likert scale, ranging from 1 (does not agree at all) to 5 (Completely agree). It has 6 questions including, I am good at making friends, I help other people, I share what I have with others, I ask others if I can be of help, I get along well with others, and I do nice things for people. Scores range between 6 and 30. Cronbach alpha coefficient of the scale of Turkish translation was .80. Concurrent validity was established with measures of social competence, internal self-confidence, and external self-confidence (36). Cronbach alpha levels this study were .60 (pre-treatment) and .74 (post-treatment).

## Procedure

The study was originally planned to last for 24 weeks but had to be completed earlier due to closure of the unit with an administrative decision. Final version of the treatment included 20 weeks of DBT-ST with substance use modules (3). It included following modules in the following order: Mindfulness (2 weeks), Distress Tolerance (6 weeks), Mindfulness (2 weeks), Emotion Regulation (7 weeks), and Interpersonal Effectiveness (3 weeks). Content of the training was shown on Table 2. The participants were administered the API, BDI, SCL-90-R, DERS, IPSI, and PSCS at the beginning and at the end of treatment. All of the participants answered the questionnaires at the same time. Urine toxicology screenings were used for substance use screening for the first 15 weeks. Even though abstinence was an ultimate goal, patients who were using substances were accepted to the program. Participation was voluntary and all of the participants signed the written consent form after the procedures had been fully explained. Ethical approval was obtained from the Istanbul Medeniyet University Institutional Social Sciences Review Board (Date: 08.01.2021, No: 2021/2). This study was conducted in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the World Medical Association (WMA) Declaration of Helsinki Ethical Principles For Medical Research Involving Human Subjects revised in 2013.

## Statistical Analysis

SPSS 21 was utilized to compute the analyses. Correlations were computed between demographic variables and dependent variables. Pearson correlation coefficients were reported. Demographic variables that need to be controlled in the analyses were treated as covariates. Repeated Measures ANCOVA's were computed to analyze change from pretreatment to post treatment on outcome measures. Skewness and kurtoses were computed for all the outcome variables. In a distribution, skewness and kurtosis values between +2 and -2 were considered normal (37). Kolmogorov-Smirnov tests were computed to test whether scores were likely to follow a normal distribution (38). Skewness, kurtosis and Kolmogorov-Smirnov test values showed that all outcome values but anxiety subscale of the SCL-90-R were distributed normally. Therefore, parametric tests were computed despite small N because most of the variables showed a normal distribution. For the anxiety subscale of the SCL-90-R, a nonparametric test, Wilcoxon matched-pair signed-rank test (2 samples) was computed.

**Table 2. Content of the training**

| DBT modules | Content |
|---|---|
| **Mindfulness** | Wise mind, what skills, how skills. |
| **Distress tolerance** | Crisis survival skills (i.e. STOP, pros and cons, TIP, distraction, self-soothing, improving the moment), reality acceptance skills (i.e. radical acceptance, turning the mind, willingness, half-smiling, willing hands, and mindfulness of current thoughts), skills when the crises is addiction. |
| **Emotion regulation** | Understanding and naming emotions, changing emotional responses (i.e. checking the facts, engaging in opposite action, and problem solving), reducing vulnerability to emotion mind (i.e. accumulating positive emotions, building mastery, coping ahead of time with difficult situations, and taking care of mind by taking care of the body). |
| **Interpersonal effectiveness** | Goals, objectiveness effectiveness, relationship effectiveness, self-respect effectiveness. |

Table 3. Bivariate correlations of the demographic variables and SCL-90-R subscales at treatment termination

| | Variables | M | SD | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Marital status | 1.78 | .44 | — | | | | | | | | | | | | |
| 2 | Have children | 1.78 | .44 | -1.0** | — | | | | | | | | | | | |
| 3 | Income | 1.38 | .74 | -.52 | -.52 | — | | | | | | | | | | |
| 4 | Somatization | .62 | .63 | -.46 | -.46 | .56 | — | | | | | | | | | |
| 5 | Obsessive-compulsiveness | 1.30 | .72 | -.63 | -.63 | .56 | .88** | — | | | | | | | | |
| 6 | Interpersonal sensitivity | 1.19 | .81 | -.38 | -.38 | .20 | .79** | .77* | — | | | | | | | |
| 7 | Depression | 1.03 | .78 | -.18 | -.18 | .74* | .86** | .72* | .81** | — | | | | | | |
| 8 | Anxiety | .79 | .62 | -.74* | -.74* | .55 | .91** | .91** | .82 | .75* | — | | | | | |
| 9 | Hostility | 1.02 | .96 | -.89** | -.89** | .64 | .56 | .70* | .49 | .42 | .79* | — | | | | |
| 10 | Phobic anxiety | .51 | .45 | -.82** | -.82** | .39 | .65 | .77* | .69* | .48 | .87** | .81** | — | | | |
| 11 | Paranoid ideation | 1.21 | .89 | .54 | -.54 | .34 | .90** | .88** | .96 | .81* | .93** | .61 | .74* | — | | |
| 12 | Psychoticism | .77 | .61 | -.52 | -.52 | .75* | .92** | .75* | .69* | .87** | .88** | .62 | .60 | .81** | — | |
| 13 | Total SCL-90 | .93 | .64 | -.60 | -.60 | .62 | .95* | .92* | .88** | .87** | .97* | .73* | .79* | .95** | .92** | — |

Note. * Coefficients are significant at p≤ .05.

** Using the Bonferroni approach, coefficients are significant at p=.0

## Results

100% of the participants used substance at pre-treatment, 11% of the participants used substances at week 15 as evidenced by urine toxicology screening tests. A Repeated Measures ANOVA showed there was a significant increase from pretreatment (M=1.00, SD=.00), to week 15 (M=1.89, SD=.33) on days of abstinence, F (1,8)=64, p=.00, np2=.89, (1 refers to currently using any substances, 2 refers to currently not using any substances). The average number of substance use was 1.61 (SD=.29), number of patients using substances per week and mean number of substances used were shown on Figure 1. Frequency of use per substance was shown on Table 1. Correlations were computed to assess whether demographic variables were in a relationship with the API scores. There was a significant correlation between ethnicity and craving at pre-treatment, r=-.70 p=.05. A Repeated Measures ANOVA was computed to investigate whether there was a difference between pre-treatment and post-treatment on the API total and sub-scale scores. The results showed that there was a significant effect of time (difference between pre-treatment and post-treatment), F (1, 7)= 27.96, p= .00, np2=.80, the API sub-scale scores F (1, 7)= 14.84, p= .01, np2=.68, and an interaction effect of treatment phase and the API sub-scale scores, F (1, 7)= 18.67, p= .00, np2=.73. In order to examine change in the API sub-scale scores from pre-treatment to post-treatment, Repeated Measures ANOVA's and Repeated Measures ANCOVA's were computed, as shown on Figure 2. Repeated Measures ANOVAs showed there was a significant change on the Dependency Diagnosis sub-scale, F (1, 8)= 14.82, p= .00, np2=.65, pre-treatment (M=15.89, SD=6.30) to post-treatment (M=8.28, SD=7.21); and the Effects of Substance Use on the User, F (1, 7)= 17.95, p= .00, np2=.72, pre-treatment (M=27.75, SD=5.78) to post-treatment (M=17.25, SD=12.34). There was no significant change on the Characteristics of Substance Use sub-scale, F (1, 8)=1.71, p=.23, np2=.18, pre-treatment (M=2.48, SD=1.18) to post-treatment (M=1.97, SD=1.48). A Repeated Measures ANCOVA showed, when ethnicity was controlled, there was no significant change on the Craving sub-scale, F (1,8)=1.83, p=.23, np2=.59 pre-treatment (M=6.37, SD=2.67) to post-treatment (M=2.50, SD=1.93). Repeated Measures ANOVAs showed there was no significant change on the Motivation to Quit Using Substances sub-scale, F (1, 8)= .19, p= .68, np2=.02, pre-treatment (M=8.78, SD=2.82) to post-treatment (M=8.22, SD=4.47); while there was a significant change on the API Total Score, F (1, 7)= 10.20, p= .02, np2=.59, pre-treatment (M=11.11, SD=2.72) to post-treatment (M=7.62, SD=4.66

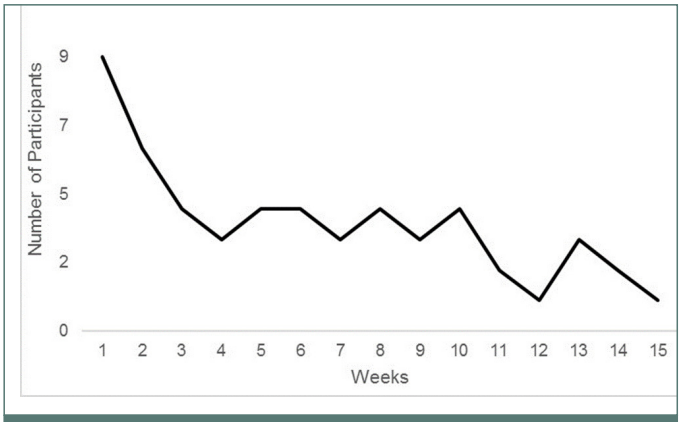


**Figure 1.** Number of participants using substances per week over 15 weeks, as checked by urine toxicology screening

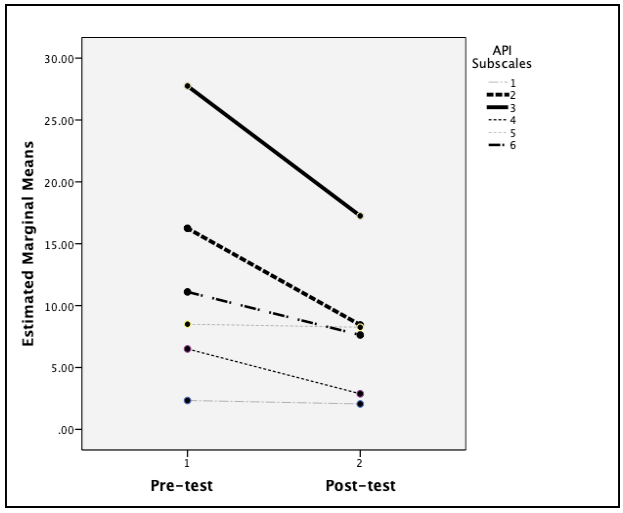


**Figure 2.** Changes on the API scores over 20 weeks

Note. Characteristics of substance use (1), diagnostic criteria of addiction (2), the effect of substance use on the user's everyday life (3), severe craving for substance use (4), motivation to quit using substances (5), and the API total score (6)

No demographic variables were found to be correlated with the BDI. A Repeated Measures ANOVA showed, there was a significant decrease on the BDI scores from pretreatment (M=38.89, SD=6.88) to post treatment (M=32.22, SD=7.89), F (1, 8)=6.30 p=.04 np2=.44.

Correlations were computed between demographic variables and SCL-90-R sub-scales at intake and termination. As shown on Table 3, there were significant correlations between marital status, having children, and income and the SCL-90-R sub-scale scores. There were no significant correlations between ethnic background, religious identity, age, gender, and employment status and SCL-90-R sub-scale scores. These 3 demographic variables were employed as covariates in the following analyses to control for their effects on the dependent variables.

A Repeated Measures ANCOVA showed there was a significant change from pretreatment (M=1.11, SD=.45), to post treatment (M=.84, SD=.57), on depression sub-scale of the SCL-9-R, F (1, 6)= 21.42, p= .00, np2=.78, when income was controlled. The results showed that there was an interaction effect of the depression score and income, F (1, 6)= 17.60, p= .01, np2=.75. There was a significant change on the hostility sub-scale from pretreatment (M=1.52, SD=.91) to post treatment (M=1.02, SD=.96), F (1, 7)= 13.32, p=.01, np2=.66, when marital status and having children were controlled. There was a significant change on the phobic anxiety sub-scale from pretreatment (M=.60, SD=.44) to post treatment (M=.51, SD=.45), F (1, 7)= 7.67, p=.03, np2=.53, when marital status and having children were controlled. Wilcoxon matched-pair signed-rank test (2 samples) showed there was no difference between pre and post-test in how participants ranked their anxiety, p>.05.

Repeated Measures ANCOVAs were computed to analyze change in emotion regulation difficulties as measured by the DERS scores. There were significant correlations between STRATEGIES and income at post-treatment, r=.76, p=.03; IMPULSE and age, r=-.81, p=.01. There was a marginally significant relationship between income and NONACCEPTANCE, r=.68, p=.06 at post-treatment. When income was controlled, there was a significant decrease on the DERS STRATEGIES sub-scale scores, pretreatment (M=22.87, SD=4.82) to post treatment (M=18.63, SD=6.39), F (1, 8)= 5.69 p=.05, np2=.49. When income was controlled, there was a significant decrease on the DERS NONACCEPTANCE sub-scale scores pretreatment (M=15.13, SD=3.94) to post treatment (M=12.25, SD=4.89), F (1, 8)= 8.99 p=.02, np2=.49. There was a significant decrease on the DERS CLARITY sub-scale scores pretreatment (M=15.89, SD=3.52) to post treatment (M=13.00, SD=2.65), F (1, 8)= 5.96 p=.04, np2=.43. There was a significant decrease on the DERS IMPULSE sub-scale scores from pretreatment (M=19.67, SD=3.00) to post treatment (M=15.44, SD=4.64), F (1, 7)= 9.37, p=.02, np2=.57, when age was controlled. In addition, there was a significant interaction effect between change on the IMPULSE scores in time and age, F (1, 7)= 6.61, p=.04 np2=.49. No changes were observed on the GOAL and AWARENESS sub-scales of the DERS from pretreatment to post treatment, F (1, 8)= 1.83, p=.21, np2=.19, F (1, 8)= 1.88, p=.21, np2=.19, respectively. Repeated Measures ANCOVAs were computed to examine change on the IPSI. The correlation between demographic variables and the IPSI scores were shown on Table 4. There were no significant changes from pretreatment (M=2.95, SD=.93) to post treatment (M=3.35, SD=.95) on the IPSI Constructive problem solving, F (1, 7)= 1.80, p=.22, np2=.21. Controlling for marital status and having children there were no significant changes pretreatment

**Table 4. Bivariate correlations of the demographic variables and THE IPSI at treatment termination**

| | Variables | M | SD | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Marital status | 1.78 | .44 | __ | | | | | | | |
| 2 | Have children | 1.78 | .44 | 1.00** | __ | | | | | | |
| 3 | Income | 1.38 | .74 | -.52 | -.52 | __ | | | | | |
| 4 | CPS[!] | 3.35 | .95 | -.58 | -.58 | .55 | __ | | | | |
| 5 | LSC[+] | 1.93 | .70 | -.82* | -.82* | .61 | .47 | __ | | | |
| 6 | UTR[^] | 2.18 | .70 | -.72* | -.72* | .46 | .07 | .81* | __ | | |
| 7 | IPA[#] | 3.46 | .59 | -.31 | -.31 | .37 | .75* | .00 | -.20 | __ | |
| 8 | APNW[%] | 2.30 | .83 | -.73* | -.73* | .79* | .55 | .80* | .72* | .26 | __ |

Note. * Coefficients are significant at p≤ .05. ** Using the Bonferroni approach, coefficients are significant at p=.00.

[!]Constructive problem solving, [+]Lack of self confidence, [^] Unwilling to take responsibility, [#]Insistent-persevering approach, [%]Approaching problems in a negative way

(M=2.27, SD=.59) to post treatment (M=1.93 SD=.70) on the IPSI Lack of self-confidence, F (1, 6)= .71, p=.43, np2=.11. Controlling for age, marital status, and having children, there were no significant changes on the IPSI Unwilling to take responsibility scores, F (1, 5)= 1.50, p=.27, np2=.23, pretreatment (M=2.65, SD=.61) to post treatment (M=2.18, SD=.70). There were no significant changes pretreatment (M=3.02, SD=.52) to post treatment (M=3.45, SD=.59) on the IPSI Insistent-persevering approach, F (1, 7)= 2.24, p=.18, np2=.24. When income, marital status, having children were controlled, there was a significant interaction between time and income, pretreatment (M=2.59, SD=.80) to post treatment (M=2.30, SD=.83) on the IPSI-Approaching problems in a negative way sub-scale. F (1, 5)= 6.15, p=.05, np2=.55. In other words, controlling for indicated demographic variables, there was an interaction between change on the IPSI-approaching problems in a negative way sub-scale from pretreatment to post treatment among participants with different income levels.

Repeated Measures ANCOVAs were computed to examine change on the PSCS. Controlling for age, religion, and student status, there were no significant changes the PSCS pre-treatment to post-treatment, F (1, 4)= .53, p=.51, np2=.11.

## Discussion

This study showed that there was a decrease in substance use after entering a 20-week DBT-ST program in individuals with SUDs as evidenced in urine toxicology screenings results and supported by the API results. Considering that patients were stable on medications throughout the treatment, decreases on both the API and substance use as evidenced by urine toxicology screenings suggest that the DBT-ST might be a plausible treatment for patients with SUDs for reducing addiction severity and related symptoms. Even though this study is a pilot study, the findings are promising regarding the influences DBT-ST might have on patients with SUDs. Further studies with control groups would help to contribute to the findings of this study. Not all of the participants in this study quit using substances, though there was a significant decrease in use of substances and the number of substances used. This finding suggests that, DBT-ST can be a harm reduction strategy. Therefore, DBT-ST can be provided to individuals with SUDs and also those at risk for using substances. Previous research also showed mindfulness-based treatments reduced the substance use including alcohol, cocaine, amphetamines, marijuana, cigarettes, and opiates to a significantly greater extent than waitlist controls, non-specific educational support groups, and some specific control groups (39). A meta-analysis of DBT for treating substance use showed DBT was more effective compared to alternative treatment and waitlist groups at post-treatment (40).

A closer examination of the API sub-scales suggested that after a 20-week DBT-ST, patients with SUDs showed a downward trend on the characteristics of substance use sub-scale, but it did not reach significant level. This sub-scale measures not only the frequency of substance use but also difficulties experienced due to substance use. Despite a decrease in substance use, as supported by urine toxicology screening tests, a lack of change on this sub-scale might be due to continued difficulty with experiencing problems (such as black outs or loss of control) when participants used substances.

The change on the dependency diagnosis sub-scale on the API after entering the DBT-ST suggested, through screening DSM and ICD substance dependency diagnostics criteria, while patients were diagnosed with a SUD at pretreatment that was no longer the case at post-treatment. This finding suggested DBT-ST appeared to help participants use substances less, experience effects of the substance less, experience tolerance and withdrawal less, gain more control in reducing quantity of substance used, spending less time in searching and using substance, and renouncing other activities less in favor of

substance use. At post-treatment, patients reported their relationship with family, work performance, physical and mental health, economic wellbeing, interpersonal relationships, legal status were less effected by substance use compared to pre-treatment. They also reported more control in managing urges to use substances. A lack of change on the motivation to quit using substances sub-scale suggest no change in substance dependence severity. Since increased scores on the motivation to quit using substances indicates increased levels of substance use, a lack of change on this sub-scale was a positive sign for treatment outcome. Individuals who quit using substances tend to continue to crave for substances for months or years after their last use (41), therefore a lack of change on the craving sub-scale was apprehensible.

Compared to pre-treatment, participants had easier time accepting their emotional responses at post-treatment. Compared to pre-treatment, participants had greater access to emotion regulation strategies, their emotional clarity increased, and their impulse control difficulties decreased at post-treatment. One of the major goals of DBT-ST is to help patients recognize and regulate their emotions (1). In this study, patients worked on emotion recognition and regulation for 7 weeks. This might allowed them to manage their emotions better at post-treatment. Previous studies also showed mindfulness based treatments helped patients regulate emotions better (42). Substance use disorders are often accompanied by impulsivity. A decrease in impulsivity scores after entering treatment again indicates a positive outcome for DBT-ST (43).

This study showed that there was a decrease in some of the psychological symptoms of the patients after entering 20-week of DBT-ST. Specifically, there was a significant improvement in patients' depressive feelings, hostility, and phobic anxiety from pre-treatment to post-treatment. This finding supports findings of previous studies which showed DBT-ST treatments helped to reduce psychological symptoms (44). However, changes in interpersonal problem solving was not evident in the findings. Interpersonal Effectiveness module was originally planned to be covered for 7 weeks, but could only be covered for 3 weeks. Thus patients had limited time to practice these skills. Lack of changes on the IPSI and PSCS could be influenced by limited time allocated for the Interpersonal Effectiveness module. Linehan (3) suggests spending 5 weeks for interpersonal effectiveness module, and coverage the module for only 3 weeks might not be just enough to promote changes in this area. In addition, changing interpersonal dynamics tend to take longer time then changing individual dynamics. Lack of change on these two scales might be influenced by nature and timing of change process in interpersonal relationships. Furthermore, patients with SUDs tend to have maladaptive interpersonal styles. For instance, couples in which one partner has an SUD tend to engage in more hostile and less warm interpersonal behaviors (45). Couples with SUDs were perceived as verbally abusive, more blaming and less skilled in problem solving (46). Even though, there are changes in patients' interpersonal behaviors, since individual psychopathology negatively affects interpersonal relationships (47), it might take longer for their friends and family to adjust to these changes, trust that change is long-lasting and respond to the patients such that patients develop a sense of change in interpersonal relationships.

On the other hand, people with different income levels showed differences on changes on the IPSI from pretreatment to post-treatment. This suggests that income has an effect on how individuals with substance use disorders perceive interpersonal difficulties and whether they approach interpersonal difficulties from a negative perspective. Previous studies also showed among several demographic variables income affected presence of psychological symptoms in individuals (48-50).

There are several limitations of this study. First of all, this study did not have a control group, which makes it harder to compare this intervention to treatment as usual or to passage of time. Second, lack of a follow-up group prevents one from tracking stability of the gains of the intervention. Only 15 urine checks were completed as opposed to 20 urine checks as initially planned. If 20 urine checks were completed, different patterns of change might have been observed. Interpersonal effectiveness module was originally planned to be covered in the last seven weeks of the treatment. However, the content had to be covered only in three weeks. Therefore, lack of changes observed in interpersonal skills and social capacity might be due to the limited time devoted to this module. Future studies might choose to allocate more sessions on that module.

In conclusion, this study was planned as a pilot study to observe the relationships between DBT-ST treatment and psychological and interpersonal symptoms. The findings showed entering DBT-ST was associated with increased days of abstinence, better emotion regulation, decreased depressive symptoms and hostility, and substance related difficulties. This study pointed DBT-ST could be a valuable tool among individuals with SUDs. Further studies are needed to establish more robust results.

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