BPD Compass: A Randomized Controlled Trial of a Short-Term, Personality-Based Treatment for Borderline Personality Disorder

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Abstract

Borderline personality disorder (BPD) is a heterogeneous condition that is particularly associated with three broad personality dimensions: neuroticism (i.e., high negative affectivity), agreeableness (i.e., low antagonism), and conscientiousness (i.e., low disinhibition). The purpose of the present study was to explore whether treatment with BPD Compass, a novel personality-based intervention for BPD, results in greater reductions in BPD symptoms, neuroticism, agreeableness, and conscientiousness compared to a waitlist control (WLC) condition. We also aimed to characterize within-treatment effects for participants assigned to the BPD Compass condition and evaluate patients' satisfaction with treatment. Participants ($N = 51$; $M_{age} = 28.38$; 83.3% female; 93.8% white; 54.2% sexual minority) meeting DSM-5 criteria for BPD were enrolled in a randomized controlled trial to evaluate the efficacy of BPD Compass. Patients were randomly assigned to receive 18 sessions of BPD Compass or complete an 18-week waiting period. BPD Compass led to larger reductions in BPD symptoms (assessor-rated [$\beta = -.47$] and self-reported [$\beta = -.62$]) and neuroticism ($\beta = -.37$), but not agreeableness ($\beta = .08$) or conscientiousness ($\beta = .10$), compared to the WLC condition. Within the BPD Compass condition, pre- to post-treatment improvements in BPD symptoms, neuroticism, and conscientiousness were significant and large in magnitude (Hedges' gs: -1.38- -1.08). Patients were highly satisfied with BPD Compass and generally perceived it to be an appropriate length. Thus, BPD Compass may be an accessible and useful complement to more specialty or intensive treatments for BPD.

Keywords: borderline personality disorder, five-factor model, treatment, personality

BPD Compass: A Randomized Controlled Trial of a Short-Term, Personality-Based

Treatment for Borderline Personality Disorder

Borderline personality disorder (BPD) is a severe psychiatric condition defined by impairment across several areas of functioning, including include emotional difficulties (labile affect and intense anger), interpersonal problems (efforts to avoid abandonment and unstable relationships), behavioral dysregulation (chronic suicidality, self-injury, and other impulsive actions), among others (American Psychiatric Association [APA], 2013). Despite this heterogeneity of impairments, researchers have shown that BPD symptoms can be understood as a manifestation of three personality dimensions drawn from the five factor model of personality (FFM; Costa & McCrae, 1990): neuroticism (i.e., frequent and intense experiences of negative emotion), low agreeableness (i.e., a lack of compassion for or general mistrust of others), and low conscientiousness (i.e., disinhibition, disorganization, and inefficiency). BPD has been significantly correlated with neuroticism ($r = .54$), low agreeableness ($r = –.24$), and low conscientiousness ($r = –.29$) in meta-analytic work (Samuel & Widiger, 2008), and profiles of FFM traits have been used to assess BPD and demonstrate nearly identical predictive validity as BPD symptoms (Miller et al., 2012; Trull et al., 2003).

The Alternative Model of Personality Disorders (AMPD; APA, 2013) in DSM-5 was designed in part to characterize personality dysfunction according to maladaptive aspects of the FFM. The AMPD is currently a hybrid model, linking categorically defined personality disorders, such as BPD, to dimensional ratings of FFM traits. In the AMPD, BPD is diagnosed, in part, by the presence of maladaptive aspects of neuroticism (i.e., negative affectivity), agreeableness (i.e., antagonism), and conscientiousness (i.e., disinhibition). Together, these traits are classified as Criterion B. When combined with other criteria (e.g., self and interpersonal

dysfunction, pervasiveness, age of onset), these traits can be used to diagnose BPD.

Existing interventions for BPD tend to be focused on a single Criterion B dimension (for a review, see Sauer-Zavala, Southward, Hood, et al., 2022). For example, dialectical behavior therapy (DBT; Linehan, 1993) is designed to target emotional difficulties, analogous to the AMPD dimension of negative affectivity. DBT teaches patients skills to tolerate and change emotions. Relationally-focused interventions for BPD, including psychodynamic treatments such as transference-focused therapy (TFP; Yeomans et al., 2015) and mentalization-based treatment (MBT; Bateman & Fonagy, 2004), are thought to engage the attachment insecurity that underscores antagonism in BPD (Agrawal et al., 2004). Of note, although the AMPD conception of BPD (APA, 2013) includes disinhibition as a component of BPD, existing treatments for this condition do not *directly* address this trait. Relegating impulsive behaviors to emotional and interpersonal contexts fails to account for mounting evidence that impulsivity in BPD results from specific impairments in response inhibition that are relatively independent from, but transact with, emotion-generating systems and early childhood experiences (Crowell et al., 2009; van Zutphen et al., 2015). Thus, a comprehensive BPD treatment must include strategies to address negative affectivity, antagonism, *and* disinhibition.

Moreover, each of the above approaches for treating BPD are relatively intensive and long-term. BPD, however, is a heterogenous condition that can result from 256 possible symptom combinations (APA, 2013), many of which are relatively less severe (Trull et al., 1997). Epidemiological estimates suggest that up to 97% of people with BPD are not acutely suicidal (i.e., did not attempt suicide in the past year; Grilo & Udo, 2021). Further, extant treatments for BPD typically require extensive training for therapists and, as a result, access to specialist providers with the expertise in providing these more intensive, evidence-based

treatments for BPD is limited (Iliakis et al., 2019). Thus, less intensive treatments may be

appropriate and more accessible for many people with BPD, and, in fact, shorter courses of care

that can be easily applied in generalist mental health settings are efficacious for this population

(e.g., Black et al., 2004; Gunderson et al., 2018; Laporte et al., 2018; Zanarini et al., 2017),

including for individuals who endorse acute suicide risk (McMain et al., 2018; 2022).

BPD Compass

In response to these limitations, we developed a treatment package for BPD that was

designed to be comprehensive, yet relatively brief. BPD Compass, which loosely stands for

Cognitive-behavioral Modules for Personality Symptoms, (1) includes elements designed to

engage the three higher-order personality dimensions relevant to BPD described in the AMPD

(i.e., negative affectivity, antagonism, and disinhibition) and (2) is delivered across 18 or fewer

individual sessions. BPD Compass consists of four skill domains (i.e., values identification,

cognitive flexibility, behavioral skills [i.e., alternative actions, exposure], and mindfulness)

applied to the core personality-based dimensions described above.

Negative affectivity is addressed by countering the aversive, avoidant reactions to

emotions that exacerbate these experiences over time (e.g., Barlow et al., 2014). By targeting

emotional avoidance, rebound affective experiences are reduced, which over time can result in

sustained decreases in neuroticism (Sauer-Zavala et al., 2021). Lower levels of agreeableness are

associated with attachment insecurity, which can manifest as behaviors that function to protect a

person in interpersonal contexts perceived as threatening (Young et al., 2006) and represents an

actionable functional mechanism to address antagonism. Finally, theoretical accounts have

suggested that changing expectancies about one's ability to follow through on tasks predicts

increased conscientious behaviors (Magidson et al., 2014). High reward orientation (i.e.,

continuing to pursue rewards despite negative consequences) has also been implicated in maintaining disinhibition (Carver & White 1994; Gray, 1987). Sauer-Zavala et al (2022) detail how the skills in BPD Compass target these mechanisms.

We included cognitive-behavioral strategies because CBT is the primary theoretical orientation by most providers in typical mental health service settings (Wolitzky-Taylor et al., 2019) and most training programs for clinical psychology focus on developing student competencies in delivering CBT (Heatherington et al., 2012). We also developed patient workbook and therapist session checklists (akin to other manualized CBT protocols) so that providers with a basic CBT background could use BPD Compass without specialized training.

Present Study

In the present study, we conducted a randomized controlled trial (RCT) to evaluate the efficacy of BPD Compass. People with BPD were randomized to receive 18 sessions of BPD Compass or an 18-week waiting period (waitlist condition [WLC]). Our primary hypothesis was that participants in the BPD Compass condition would demonstrate significantly larger reductions in and lower levels of BPD symptoms post-treatment relative to those assigned to WLC. As a secondary question, we examined differences negative affectivity, antagonism, and disinhibition as a function of treatment condition. We also sought to characterize within-treatment effects in BPD symptoms in the BPD Compass condition. We hypothesized that these patients would demonstrate significant improvements across treatment. Finally, given that this was the first trial of BPD Compass, we sought to investigate patients' satisfaction with treatment and explore qualitative feedback about the treatment approach.

Method

Participants

A sample of treatment-seeking adults was recruited across the state of Kentucky. Given that our primary outcome was BPD symptom improvement, people were included if they met DSM-5 criteria for BPD (assessed via the Structured Clinical Interview for DSM-5 Personality Disorders; First et al., 2015), refrained from concurrent behavioral treatment, and agreed to remain on a stable dose of psychotropic medication throughout the study period. Exclusion criteria were based on the well-being of participants and included difficulties that would warrant the prioritization of alternative care: uncontrolled bipolar I disorder or psychotic/delusional symptoms (i.e., a manic episode or delusions/hallucinations in the past 12 months), acute suicidal intent requiring immediate hospitalization, or an untreated substance use disorder that would be better addressed with supervised detoxification and/or medication management.

A total of 81 people consented to participate and completed an eligibility assessment (Figure 1). Of these, 30 were withdrawn for meeting one or more of the exclusion criteria above. The remaining 51 participants were randomized (1:1 ratio) to treatment condition: 26 (50.9%) were assigned to the BPD Compass condition and 25 (49.1%) were assigned to WLC (Figure 1). Demographic data are reported for $n = 48$ and baseline clinician-rated diagnostic data is reported for $n = 50$ because two patients dropped out after completing the clinician-rated assessment, but before providing baseline self-report data, and one patient was removed from all analyses due to a protocol deviation (Figure 1). Participants were 28.38 ($SD = 9.57$) years old on average and the majority of the sample identified as female ($n = 40$; 83.3%), white ($n = 45$; 93.8%), and as a sexual minority ($n = 26$; 54.2%). On average, participants met criteria for three concurrent diagnoses at baseline. The most common comorbid diagnoses were generalized anxiety disorder ($n = 22$; 45.8%) and social anxiety disorder ($n = 22$; 45.8%), followed by major depressive disorder ($n = 16$; 33.3%), persistent depressive disorder ($n = 15$; 31.3%), and posttraumatic stress

disorder (n = 15; 31.3%). See Table 1 for complete demographic and diagnostic information.

Eleven participants in the BPD Compass condition (42.3%) did not complete all 18 treatment sessions due to the time burden related to attending regular therapy sessions (n = 8; 72.7%) and worsening depressive symptoms that interfered with treatment motivation (n = 3, 27.2%). Additionally, data from one patient was removed from all analyses as their therapist did not meet the required adherence/competence threshold, and one patient (who completed all 18 sessions) was lost to contact before they completed the post-treatment assessment. In WLC, six participants did not complete study procedures: four participants (66.7%) withdrew immediately after learning they had been assigned to WLC, two of whom did not provide baseline self-report data following their clinician-rated assessment after learning of their condition, one participant (16.7%) found the baseline assessment aversive and did not wish to complete the post-waitlist assessment, and one participant (16.7%) was lost to contact. Thus, complete data is available for 32 patients. There were no baseline differences between those who completed all study procedures and those who dropped out in terms of age, gender, sexual orientation, income, neuroticism, agreeableness, or conscientiousness, ps > .05, ds < .23. By contrast, study completers were more likely to identify as white (vs. other demographic groups), $\chi^2(1, 48)$ = 5.33, p = .02; married (vs. other relationship statuses), $\chi^2(5, 48)$ = 13.52, p = .02; more highly educated, U = 169, z = –2.31, p = .02; and report fewer BPD symptoms, $t(46)$ = 2.59, p = .01, 95% CI [1.19, 9.54], d = .77.

Procedures

All study procedures were approved by the University of Kentucky Institutional Review

Board; study procedures were registered at clinicaltrials.gov: NCT04587518.[1] Study advertisements were posted on various online platforms, including social media, participant recruitment sites, and university listservs. Those interested completed an initial telephone screening that included the McLean Screening Instrument for BPD (MSI-BPD; Zanarini et al., 2003), along with supplemental questions to assess exclusion criteria.

Those deemed likely eligible completed a baseline semi-structured diagnostic assessment via telehealth and self-report measures. Patients who met study inclusion criteria were randomly assigned (1:1) to the BPD Compass condition or WLC. Those assigned to the BPD Compass condition completed 18 therapy sessions within a seven-month treatment window. Although the goal was to hold sessions weekly, a treatment window allows for scheduling flexibility for both patients and therapists (e.g., vacations, illness). Patients completed brief questionnaires before and after each therapy session and, after their final session, they completed a post-treatment semi-structured diagnostic assessment and self-report measures.

Participants assigned to WLC completed a brief self-report battery at weeks 4, 8, 12, and 16 during their 18-week waiting period. We used these measures to monitor for clinical deterioration (e.g., worsening depression, increased suicidal thoughts, and behavioral urges) and ensure that participants were adhering to study inclusion criteria (i.e., refraining from concurrent psychological treatment or changing their medications). Although procedures were in place to withdraw any deteriorating WLC patients from the study and refer them to immediate care, these contingencies did not need to be implemented. Following the 18-week wait, participants in WLC completed a post-waitlist semi-structured diagnostic assessments and self-report measures. They were then offered BPD Compass.

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[1] Primary outcomes (i.e., ZAN-BPD-CR and ZAN-BPD-SR) were preregistered, although the model specifications used to compare changes in these outcomes between conditions was not preregistered.

Treatment

BPD Compass is an 18-session cognitive-behavioral intervention designed to engage the three AMPD personality dimensions relevant for BPD. The initial session is focused on psychoeducation about BPD and provides an overview of treatment content. Next, patients spend two sessions identifying their values and considering the extent to which they are currently living in accordance with them. Then, four sessions are dedicated to cognitive skills designed to help patients practice flexible thinking around emotion-provoking situations, maladaptive schemas about relationships, and beliefs about their ability to resist impulsive urges. The next six sessions incorporate common principles of behavior change by encouraging patients to identify unhelpful emotional, relationship, and impulsive actions and then to practice behaviors that bring patients closer to their values. Four more sessions involve mindfulness training to cultivate present-focused, non-judgmental attention in response to the thoughts, sensations, and behavioral urges that arise from emotion-provoking situations, interpersonal conflicts, and triggers for impulsive actions. A final session is dedicated to relapse prevention. A detailed description of BPD Compass skills can be found in Sauer-Zavala, Southward, Hood, et al. (2022).

BPD Compass sessions were delivered in weekly, individual, 45 - 60-minute sessions. All sessions were provided via a HIPAA-compliant telehealth platform (i.e., Zoom). Nine study therapists with 0-17 years of therapy experience provided the treatment: one licensed clinical psychologist (treatment developer SSZ) and six advanced clinical psychology graduate students. All therapists had a CBT background. Specific BPD Compass training for student therapists included reading the patient workbook prior to taking study cases and weekly supervision with treatment developers in which review of the prior session and planning for the upcoming session occurred. Treatment developers (SSZ, MWS, COH) certified each student therapist in the

provision of BPD Compass by reviewing all sessions of their first case using a fidelity checklist developed for this study. All sessions were video-recorded, and 20% were randomly selected to be rated for competence by the treatment developers on a 5-point scale. Average adherence (i.e., fidelity to the protocol) was high (97.32%, $SD = 11.42$) and average competence, which captured therapeutic skill (e.g., time management, empathy) was adequate to good ($M = 3.61$, $SD = .99$).

Assessment

Clinician-rated diagnostic and severity assessments were administered by advanced doctoral students trained to reliability and masked to treatment condition. Self-report measures were collected via Research Electronic Data Capture (REDCap) links sent by assessors after each assessment or by therapists prior to each session.

Diagnostic Measures. To confirm study inclusion/exclusion criteria, participants completed a semi-structured diagnostic assessment prior to randomization. First, the BPD module of the SCID-II (First et al., 2015) was administered to ensure participants met criteria for BPD. The SCID-II is a semi-structured diagnostic interview used to determine the presence of personality disorders. It has demonstrated good psychometric properties and adequate convergent, discriminant, and predictive validity (Ryder et al., 2007). Additionally, modules from the Diagnostic Interview for Anxiety, Mood, and Obsessive-Compulsive and Related Neuropsychiatric Disorders (DIAMOND; Tolin et al., 2018), a semi-structured diagnostic interview for DSM-5 disorders, were used to assess exclusion criteria. All diagnostic interviews were audio recorded and 20% of the tapes were rated by an assessor masked to the original ratings and randomization condition. Agreement regarding study eligibly (yes/no) was Krippendorff's $\alpha = 1.00$.[2]

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[2] Krippendorff's αs ≥ .80 indicate reliable variables; αs between .67 and .80 indicate tentative reliability (Krippendorff, 2004)

Assessors also used the DIAMOND to assign comorbid DSM-5 diagnoses at baseline. Each disorder was rated for subjective distress and/or degree of functional impairment using a seven-point (1-7) clinical severity rating (CSR) scale with scores ≥ 3 indicating the presence of a disorder. Assessors demonstrated Krippendorff's $\alpha = 1.00$ on categorical ratings of clinically significant diagnoses and Krippendorff's $\alpha = .89$, 95% CI [.68, .99], of dimensional severity ratings (CSRs) of each disorder.

BPD Symptom Severity. BPD symptom severity was assessed at baseline and post-treatment/WL with the clinician-rated version of the Zanarini Rating Scale for BPD (ZAN-BPD-CR; Zanarini, 2003), a continuous measure designed to capture change in BPD symptom severity over time. Assessors rate the degree to which each of the nine DSM-5 criteria for BPD apply to participants during the previous week, using a five-point scale with unique anchors for each item indicating no symptoms (0) to severe symptoms (4). Assessors demonstrated Krippendorff's $\alpha = .99$, 95% CI [.97, 1.00], on ZAN-BPD dimensional severity ratings.

 The self-report version of the ZAN-BPD (ZAN-BPD-SR; Zanarini et al., 2015) was also administered at baseline and post-treatment/WL assessments, and weekly for those in the BPD Compass condition. ZAN-BPD-SR items demonstrated McDonald's ωs: .84-.88 at baseline and post-treatment/WL and $\bar{\omega} = .78$, range: .59-.89, on average across all 18 sessions among those randomized to BPD Compass.

Personality Dimensions. The Big Five Inventory-2 (BFI-2; Soto & John, 2017) is a 60-item self-report measure designed to assess individual differences in the Big Five dimensions of personality. We administered the neuroticism (BFI-N), agreeableness (BFI-A), and conscientiousness (BFI-C) subscales, each of which includes 12 items. Ratings on each item range from 1 (*disagree strongly*) to 5 (*agree strongly*) and are averaged to create a total score for

each subscale. Participants completed the BFI-2 at baseline and post-treatment/WL. The internal

consistency of BFI-2 items at baseline and post-treatment/WL for each subscale were ωs_{BFI-N}:

.83-.89, ωs_{BFI-A}: .80-.87, and ωs_{BFI-C}: .84-.88.

Treatment Satisfaction. In the post-session battery following the 18th session,

participants reported their satisfaction with the treatment and how acceptable they found the

treatment content and length. Satisfaction was rated on a 5-point Likert-type scale from 1 (*not at*

all satisfied) to 5 (*extremely satisfied*) in response to the prompt, "Overall, how satisfied were

you with the treatment?" Acceptability of treatment content was rated on a 5-point Likert-type

scale from 1 (*not at all acceptable*) to 5 (*extremely acceptable*) in response to the prompt,

"Overall, how acceptable was the treatment content to you?" Acceptability of treatment length

was rated on a 5-point Likert-type scale from 1 (*not long enough*) to 5 (*much too long*) in

response to the prompt, "Overall, how acceptable was the treatment length to you? In other

words, did you think that the length of the treatment you received was not enough, just right, or

too much?" In addition to these Likert-type ratings, patients were asked to provide open-ended

responses to several questions: (1) "What was the most important thing you learned in

treatment?" (2) "In what ways did this treatment address the difficulties for which you sought

help?" (3) "Were there difficulties you experience that this treatment did not address as well as

you would have liked?" and (4) "What changes would you recommend to this treatment?"

Planned Analyses[3]

Preliminary Analyses

We first evaluated participants' response validity on the ZAN-BPD-SR and BFI-2 by

examining the variability in item responses and the person-total correlations on both measures

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[3] Code for study analyses is available at https://osf.io/rxh63/?view_only=375113063a9a4ed89be7e7ae351b0d7b

(Curran, 2016). We then tested whether the demographic characteristics of patients assigned to

the BPD Compass Condition differed from participants assigned to WLC. We tested for

between-group differences in age using an independent samples *t*-test; between-group

differences in gender identity, sexual orientation, racial/ethnic background, and marital status

using chi-squared goodness of fit tests, applying Fisher's exact test to address small cell sizes;

and between-group differences in education and family income using Wilcoxon-Mann-Whitney

U tests. We also used independent samples *t*-tests to determine whether participants in each

condition differed on our clinical variables of interest at pre-treatment.

Treatment Efficacy

To assess the effect of treatment condition on outcomes, we conducted a series of

regressions using SPSS Version 27 (IBM Corp., 2020). For each study outcome (i.e., ZAN-BPD-

CRV, ZAN-BPD-SRV, BFI-N, BFI-A, BFI-C), we regressed post-treatment scores onto a

dummy coded variable representing treatment condition (WLC = 0, BPD Compass = 1), the

corresponding pre-treatment score, and an effect coded variable indicating whether the scores

from a participant were (+0.5) or were not (–0.5) their last observation carried forward (LOCF).

We used the LOCF for participants who did not complete all assessments. Because participants

in the BPD Compass condition completed self-report measures of all variables of interest

weekly, we used the LOCF from the final available session. Because the LOCF for WLC

participants who did not complete their week 18 assessment was their baseline assessment, we

used listwise deletion instead. Similarly, because the LOCF for the ZAN-BPD-CR was the

baseline assessment, we used listwise deletion for this measure as well. We calculated between-

group effect sizes using Hedges' *g*, which includes a correction for small sample sizes.

Given that treatments for BPD have demonstrated large effects on BPD-related outcomes

relative to waitlist conditions (Gratz et al., 2014; Kamalabadi et al., 2012), a total sample size of 50, assuming a one-tailed test with $\alpha = .05$, and a 1:1 allocation ratio between conditions gave us 80% power to detect between-condition differences of $d \geq .72$ (Faul et al., 2009).

Characterizing Within-Condition Effects

We characterized change in our outcomes of interest within each condition, again using the full intent-to-treat sample with LOCF. We used paired-samples *t*-tests to evaluate the difference between pre- and post-treatment scores on each clinical outcome for participants in the BPD Compass condition and the difference between Week 0 and Week 18 scores on each clinical outcome for those in WLC. We calculated within-group effect sizes using Hedges' *g*.

Because ZAN-BPD-SRV scores were collected weekly prior to each BPD Compass sessions, we were able to model change in this outcome across 18 sessions. Given the nested structure of the data (i.e., sessions within patients), we used hierarchical linear modeling (HLM) as implemented in the *nlme* package (Version 3.1-149; Pinheiro et al., 2020) in R (Version 4.0.3; R Core Team, 2020). We regressed ZAN-BPD-SRV scores on session number. We also modeled random intercepts, included a lag-1 autoregressive residual covariance structure, and used restricted maximum likelihood estimation.

Treatment Satisfaction, Acceptability, and Feedback

Finally, we explored participants' ratings of satisfaction with the treatment, as well as the acceptability of the content and length. We then summarized participants' qualitative feedback in response to the directed and open-ended questions above.

Results

Preliminary Analyses

All participants demonstrated variability > 0 in their baseline responses. Although three

participants demonstrated negative person-total correlations on the ZAN-BPD-SR, all

participants demonstrated positive person-total correlations on the BFI-2. Thus, we did not

exclude any participants for questionable response validity. Participants in the BPD Compass

and WL conditions did not significantly differ in age, gender identity, sexual orientation,

education level, marital status, or family income at baseline, $ps > .05$, $d < .30$. Similarly, no

significant differences between conditions were found at pre-treatment on any personality or

personality disorder variables ($ps > .70$, $ds < .16$), except neuroticism, $M_{\text{difference}} = .33$, $SD_{\text{difference}}$

$= .13$, $t(47) = 2.53$, $p = .02$, 95% CI [.07, .59], $d = .70$, for which WLC exhibited higher values.

Aim 1: BPD Compass Efficacy Relative to WLC

Examination of pre- and post-treatment means for all study outcomes revealed that

change was in the expected direction (i.e., improvement) for patients in the BPD Compass

condition, whereas change was relatively minimal in WLC (Table 2). Next, we examined the

effect of condition on post-treatment outcomes, adjusting for the corresponding pre-treatment

scores (Table S1, Supplemental Online Materials).[4] BPD Compass produced significantly larger

reductions compared to WLC in both assessor-rated (ZAN-BPD-CRV; $B = -7.37$, $SE = 2.58$,

$p = .01$, 95% CI [–12.65, –2.08], $\beta = -.47$) and self-reported (ZAN-BPD-SRV; $B = -9.87$, $SE =$

2.25, $p < .01$, 95% CI [–14.43, –5.32], $\beta = -.71$) BPD symptoms. Significant between-condition

effects were also demonstrated for neuroticism (BFI-N; $B = -.81$, $SE = .27$, $p = .01$, 95% CI [–

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[4] The results from completer sample led to substantively similar conclusions as the intent-to-treat sample. Relative to WLC, BPD Compass led to significantly larger reductions in self-reported BPD symptoms (ZAN-BPD-SRV; $B = -9.65$, $SE = 2.36$, $p < .01$, 95% CI [–14.52, –4.78], $\beta = -.62$) and neuroticism (BFI-N; $B = -.60$, $SE = .23$, $p = .02$, 95% CI [–1.07, –.12], $\beta = -.37$). Residualized change on agreeableness (BFI-A; $B = .11$, $SE = .16$, $p = .49$, 95% CI [–.22, .45], $\beta = .08$) nor conscientiousness (BFI-C; $B = .15$, $SE = .18$, $p = .42$, 95% CI [–.23, .53], $\beta = .10$) as a function of condition was not significant. The between-conditions comparisons after 18 weeks were also substantively unchanged. Compared to WLC, patients in BPD Compass reported large and significant differences in ZAN-BPD-SRV, $t(25) = -4.99$, $p < .01$, 95% CI [–13.66, –5.76], $g = -1.56$, 95% CI [–2.43, –.676]]; and BFI-N scores $t(25) = -3.62$, $p < .01$, 95% CI [–1.46, –.40], $g = -1.43$, 95% CI [–2.29, –.55]; and very small non-significant differences in BFI-A, $t(25) = -.50$, $p = .63$, 95% CI [–.77, .47], $g = -.20$, 95% CI [–.97, .58]; and BFI-C scores, $t(25) = .63$, $p = .53$, 95% CI [–.44, .83], $g = .25$, 95% CI [–.53, 1.03].

1.36, –.26], β = –.55). After 18 weeks of treatment or waitlist, the differences between conditions

on these outcomes were large in magnitude: ZAN-BPD-CRV scores, $t(29) = -2.84$, $p = .01$, 95%

CI [–12.51, –2.04], Hedges' $g = -1.01$, 95% CI [–1.74, –.26]; ZAN-BPD-SRV scores, $t(41) = -$

2.71, $p = .01$, 95% CI [–9.44, –1.38], $g = -.82$, 95% CI [–1.44, –.20] and BFI-N scores, $t(41) = -$

2.58, $p = .02$, 95% CI [–.97, –.11], $g = -.78$, 95% CI [–1.40, –.16].

 Contrary to expectations, neither agreeableness (BFI-A; $B = .10$, $SE = .17$, $p = .56$, 95%

CI [–.24, .44], β = .07) nor conscientiousness (BFI-C; $B = .15$, $SE = .20$, $p = .44$, 95% CI [–.25,

.56], β = .11) demonstrated significantly different residualized change between conditions.

Consistent with these findings, differences between conditions after 18 weeks of treatment or

waitlist were small for both agreeableness, $t(41) = -.50$, $p = .62$, 95% CI [–.54, .33], $g = -.15$,

95% CI [–.75, .45]; and conscientiousness, $t(41) = -.17$, $p = .87$, 95% CI [–.49, .42], $g = -.05$,

95% CI [–.65, .54].

 Given that not all patients with BPD exhibit elevations in each BPD-relevant personality

dimension, we explored the extent to which our sample was characterized by clinically

significant deficits in agreeableness and conscientiousness and clinically significant elevations in

neuroticism. We defined clinically significant deficits as T-scores ≤ 35 and clinically significant

elevations as T-scores ≥ 65 based on a large, representative sample (Soto & John, 2017).

Collapsed across treatment conditions, 8 patients (15.7%; $n = 5$ in the BPD Compass condition, n

= 3 in WLC) demonstrated low levels of agreeableness at pre-treatment and 20 patients (39.2%;

$n = 10$ in BPD Compass, $n = 10$ in WLC) demonstrated low levels of conscientiousness. By

contrast, 26 patients (51.0%; $n = 10$ in BPD Compass, $n = 16$ in WLC) exhibited high levels of

neuroticism at pre-treatment. At post-treatment, 8 patients demonstrated clinically low

agreeableness (15.7% $n = 6$ in BPD Compass, $n = 2$ in WLC), 15 patients demonstrated

clinically low conscientiousness (29.4%, $n = 9$ in BPD Compass, $n = 6$ in WLC), and 18 patients

exhibited clinically high neuroticism (35.3%, $n = 8$ in BPD Compass, $n = 10$ in WLC).

Aim 2: Characterizing Change in BPD Symptoms Across Conditions

We then examined the magnitude of improvement from pre- to post-treatment within

both conditions. Patients in BPD Compass demonstrated medium to large improvements in

assessor-rated BPD symptoms, $t(12) = -4.20$, $p < .01$, 95% CI [–12.03, –3.81], $g = -1.13$, 95%

CI [–1.81, –.43]; self-reported BPD symptoms, $t(24) = -5.89$, $p < .01$, 95% CI [–12.69, –6.10], g

$= -1.16$, 95% CI [–1.66, –.65]; neuroticism, $t(24) = -2.39$, $p < .01$, 95% CI [–.74, –.05], $g = -.47$,

95% CI [–.87, –.06]; and conscientiousness, , $t(24) = 2.27$, $p = .03$, 95% CI [.02, .44], $g = .45$,

95% CI [.04, .85] (Table 2). By contrast, increases in agreeableness (BFI-A; $t(24) = .08$, $p = .94$,

95% CI [–.19, .21], $g = .02$, 95% CI [–.37, .40]) were small in magnitude and not statistically

significant. Patients in WLC exhibited small and non-significant improvements from Week 0 to

Week 18 on all outcomes.[5]

For individuals in the BPD Compass condition, descriptive statistics for ZAN-BPD-SRV

at each session are reported in Table S2 and visually depicted in Figure 2. Results from our HLM

(see Table S3) revealed BPD Compass was associated with significant decreases in BPD

symptoms across the 18 treatment sessions, $B = -.36$, $SE = .05$, $p < .01$, 95% CI [–.46, –.26].[6]

Aim 3: Characterizing Patient Satisfaction

Our third aim was to characterize patient satisfaction with BPD Compass. Data was

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[5] Repeating these analyses in the completer sample rendered similar results. BPD Compass led to large improvements in ZAN-BPD-SRV scores, $t(8) = -4.36$, $p < .01$, 95% CI [–17.84, –5.49], $g = -1.38$, 95% CI; BFI-N scores, $t(8) = -3.40$, $p = .01$, 95% CI [–1.14, –.22], $g = -1.08$, 95% CI [–1.87, –.25]; and BFI-C scores, $t(8) = 2.55$, $p = .03$, 95% CI [.03, .50], $g = .81$, 95% CI [.06, 1.53]and very small improvements in BFI-A scores, $g = .27$, 95% CI [–.34, .88]. Changes in WLC were small and nonsignificant for all outcomes.
[6] Because nine therapists provided treatment, we also included therapist as a fixed effect in our HLM as parameter estimates may be less biased when including factors with relatively few levels as fixed effects rather than random effects (McNeish & Stapleton, 2016). The effect of therapist was non-significant, $B = .61$, $SE = .40$, $p = .14$, 95% CI [–.22, 1.44], so we report the more parsimonious model in the main text.

available for 12 patients. On average, patients were highly satisfied with BPD Compass ($M =$ 4.50, $SD = .69$) and found the content highly acceptable ($M = 4.41$, $SD = .67$). Given that BPD Compass is short-term relative to gold-standard treatments for BPD, we also evaluated patient impressions of the treatment's length. Seven out of 12 participants rated the treatment length as "just right." Three patients rated the treatment as "slightly too short" or "not long enough" and two patients rated the treatment as "slightly too long."

Given that this study was the first evaluation of BPD Compass, we also collected qualitive feedback from patients who completed the treatment (Table S4). We first asked patients to reflect on the most important element they learned in treatment. Four patients identified cognitive flexibility, three described mindfulness, acceptance, or tolerance of emotions, and three cited the ability to control impulsive or avoidant behaviors. When asked to describe how BPD Compass addressed their difficulties, several patients cited having new tools or coping skills to address stressors, whereas others emphasized the importance of sitting with strong emotions and waiting to react. Although most patients did not identify remaining difficulties that were not addressed by BPD Compass, two indicated that they would have liked more attention to addressing identity disturbance and detachment/derealization. Similarly, most patients did not recommend any changes be made to the treatment protocol, though two recommended making the reading material and worksheets more user-friendly, one requested more information about BPD symptom criteria, and one indicated that they would have liked treatment to be longer.

Discussion

This is the first randomized controlled trial of BPD Compass, a modular, personality-based, cognitive-behavioral treatment for BPD. BPD Compass led to significantly larger reductions in assessor-rated and self-reported BPD symptoms compared to waitlist. These

reductions were generally linear, with some variability by module. BPD Compass led to medium-to-large reductions in neuroticism but very small increases in agreeableness and conscientiousness relative to waitlist. Patients were highly satisfied with BPD Compass and generally perceived it to be an appropriate length.

BPD Compass led to large reductions in our primary outcome, BPD symptoms, compared to waitlist, with effect sizes between –1.56 and –.82. Few researchers have compared treatments for BPD to waitlist (Cristea et al., 2017). Of those who have, effects on BPD outcomes are in line with the current results (ds: –.80 - –1.20; Gratz et al., 2014; Kamalabadi et al., 2012). Similarly, the within-condition effect sizes of BPD Compass on BPD symptoms (gs: –1.38 - –1.13) were in line with those reported by several researchers testing a variety of treatments for BPD ($\bar{d} = –1.28$, range: –3.25-.06; see Cristea et al., 2017). Together, these results suggest BPD Compass is similarly efficacious in reducing BPD symptoms as other interventions for BPD.

BPD Compass led to relatively linear reductions on average in BPD symptoms. However, this linear trend masks potentially informative patterns of change within treatment. For instance, the steepest slopes tended to occur during the first three sessions targeting values identification and the last sessions targeting mindfulness and relapse prevention, which may indicate the greater potency of these sessions or common patterns of change when beginning or ending treatment (Niileksela et al., 2021). The cognitive skills module led to relatively small but consistent reductions in BPD symptoms. This pattern of results partially supports Keefe et al.'s (2016) findings that early cognitive work predicted reductions in personality disorder features for patients with comorbid cluster C personality disorders and major depressive disorder.

By contrast, both the behavioral and mindfulness modules involved increases in BPD symptoms followed by larger decreases in BPD symptoms than the cognitive module. These

increases in symptoms may reflect initial engagement with experiences that activate BPD

symptoms (e.g., avoided situations or thoughts) followed by habituation to and/or mastery of

these experiences leading to symptom reduction. These results extend naturalistic findings that

people with BPD report momentary increases in negative affect when using mindfulness

(Chapman et al., 2009, 2017; Southward et al., 2020) and extend results on the average pattern of

change in BPD symptoms in response to behavioral skills training (Sauer-Zavala et al., 2020).

Characterizing these trajectories of change in response to specific components may facilitate a

more comprehensive understanding of how change unfolds in treatment for patients with BPD to

better optimize and personalize interventions for this population.

Of course, each of the skill modules in BPD Compass is designed to target neuroticism,

low agreeableness, and low conscientiousness. Given the strong relation between BPD and

neuroticism (Samuel & Widiger, 2008), it was not surprising that BPD Compass led to larger

reductions in neuroticism than WLC and that patients in BPD Compass reported large reductions

in neuroticism. These results suggest that BPD Compass leads to robust reductions in the

frequency and intensity of negative emotions that may be at the higher end of meta-analytic

estimates of personality change in treatment compared to control conditions ($d = .69$, 95% CI

[.45, .93]) and from pre- to post-treatment ($d = .57$, 95% CI [.52, .62]; Roberts et al., 2017).

By contrast, BPD Compass did not lead to significantly larger improvements in

agreeableness or conscientiousness than WLC, with between-condition effect sizes in similar

ranges as other treatments ($d_{agreeableness} = .23$, 95% CI [.08, .38]; $d_{conscientiousness} = .06$, 95% CI [−

.05, .16]; Roberts et al., 2017). Although patients in BPD Compass reported large and significant

improvements in conscientiousness over the course of treatment that were at the higher end of

meta-analytic estimates ($d = .19$, 95% CI [.14, .23]; Roberts et al., 2017), these results should be

interpreted with caution given the lack of between-condition differences. The difference between

changes in neuroticism and changes in agreeableness and conscientiousness may reflect several

factors. First, over 50% of patients reported substantial elevations in neuroticism, whereas fewer

than half reported deficits in agreeableness and conscientiousness, which may have contributed

to ceiling effects. Although we observed that most immediate treatment participants with

elevations in each domain at baseline were still elevated at *post*-treatment, most of these

individuals did not complete the study (i.e., their data was LOCF). Future researchers may be

encouraged to test BPD Compass with participants explicitly recruited to have substantial

deficits in these dimensions and build in engagement strategies to reduce dropout. Alternatively,

the skills taught in BPD Compass may target neuroticism or its functional mechanisms more

directly than agreeableness or conscientiousness (Sauer-Zavala, Southward, & Semcho, 2022).

Other skills (e.g., cooperation or goal regulation skills; Soto et al., 202) may need to be

incorporated to more directly target these dimensions and mechanisms. It is also possible that our

measures of these personality dimensions are not as sensitive to weekly changes or do not

capture the difficulties treatment-seeking patients may be experiencing. Finally, it is possible that

BPD is most strongly associated with neuroticism and BPD Compass exerts the majority of its

effects through this mechanism.

Given the novelty of the treatment, we also assessed participants' satisfaction and

feedback. Participants were very satisfied with the treatment and found the skills and personality

focus highly acceptable. Importantly, most participants rated the length as "just right,"

suggesting that an 18-session protocol may be appropriate for a substantial proportion of

treatment-seeking patients and offer a complementary alternative to longer interventions.

These results should be considered in light of the study's limitations. The sample was

relatively small and only powered to detect large between-condition effects of interest. Patients assigned to BPD Compass did drop out at a relatively high rate compared to RCTs of BPD-focused treatments in general (Iliakis et al., 2021), although the dropout rate in the current study was comparable to other studies of BPD treatments with graduate student therapists (Cheavens et al., 2022; Rizvi et al., 2017). Given that the majority of dropout was reportedly due to the time burden associated with attending therapy sessions, this rate likely reflects logistical limitations of treatment in general rather than unique limitations of BPD Compass. These effects reflect adequate to good levels of therapist competence. These scores were relatively lower primarily because two therapists were treating their first patients in their clinical training as part of this study. Thus, these results may not be limited to expert therapists and instead may generalize to very novice therapists or providers with relatively less experience. Finally, we relied on self-report measures of personality but future researchers may be encouraged to complement these with informant and interview ratings of personality.

In this first RCT of BPD Compass, we found that the treatment led to large reductions in assessor-rated and self-reported BPD symptoms as well as neuroticism compared to a waitlist control condition. Although BPD Compass did not lead to significantly larger improvements in conscientiousness or agreeableness than waitlist, participants in the treatment condition did report large improvements in conscientiousness. Overall, patients reported high levels of satisfaction and acceptability after participating in BPD Compass, even when delivered by relatively novice therapists, suggesting it may be an accessible and useful complement to more specialty or intensive treatments for BPD.

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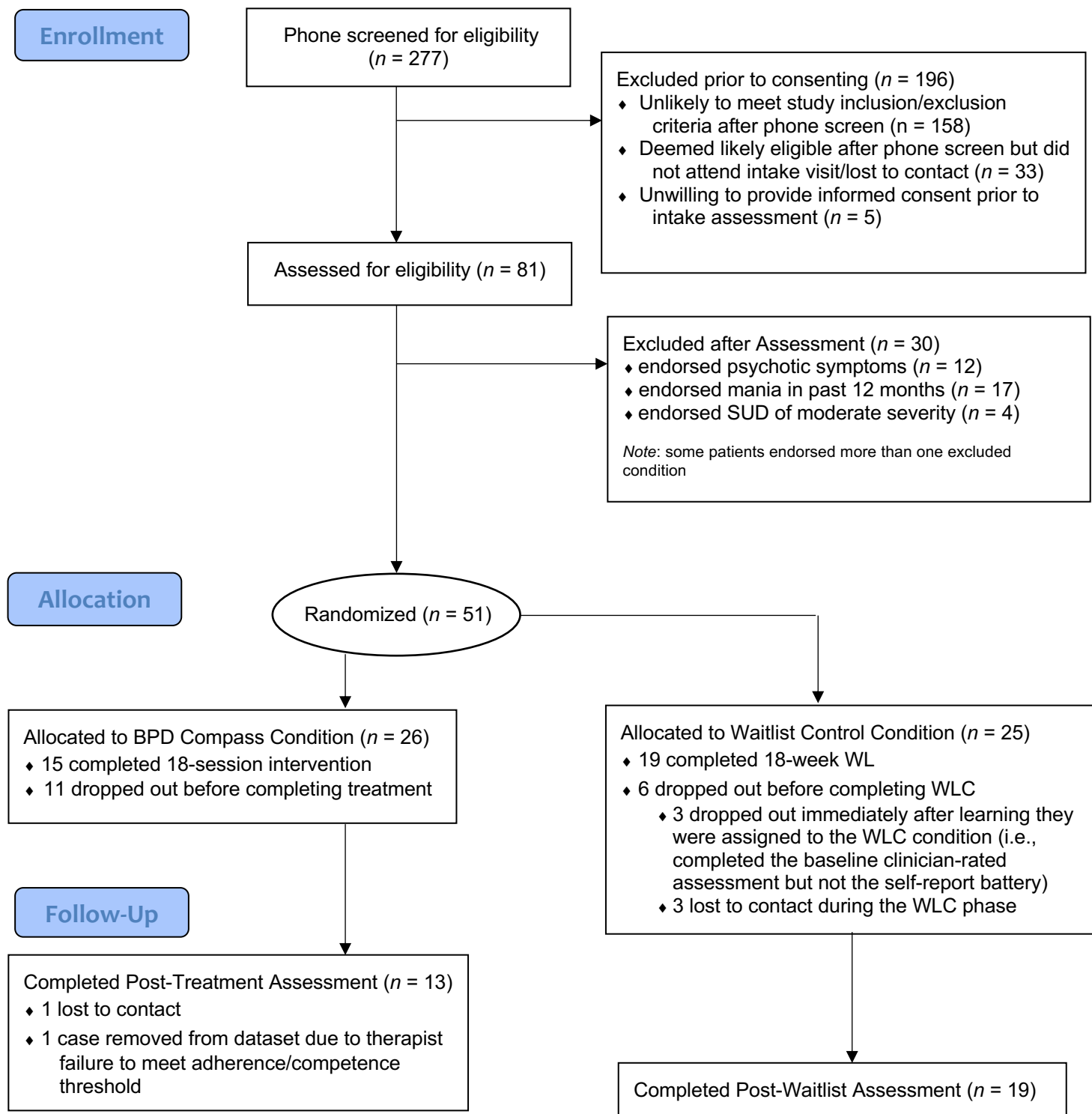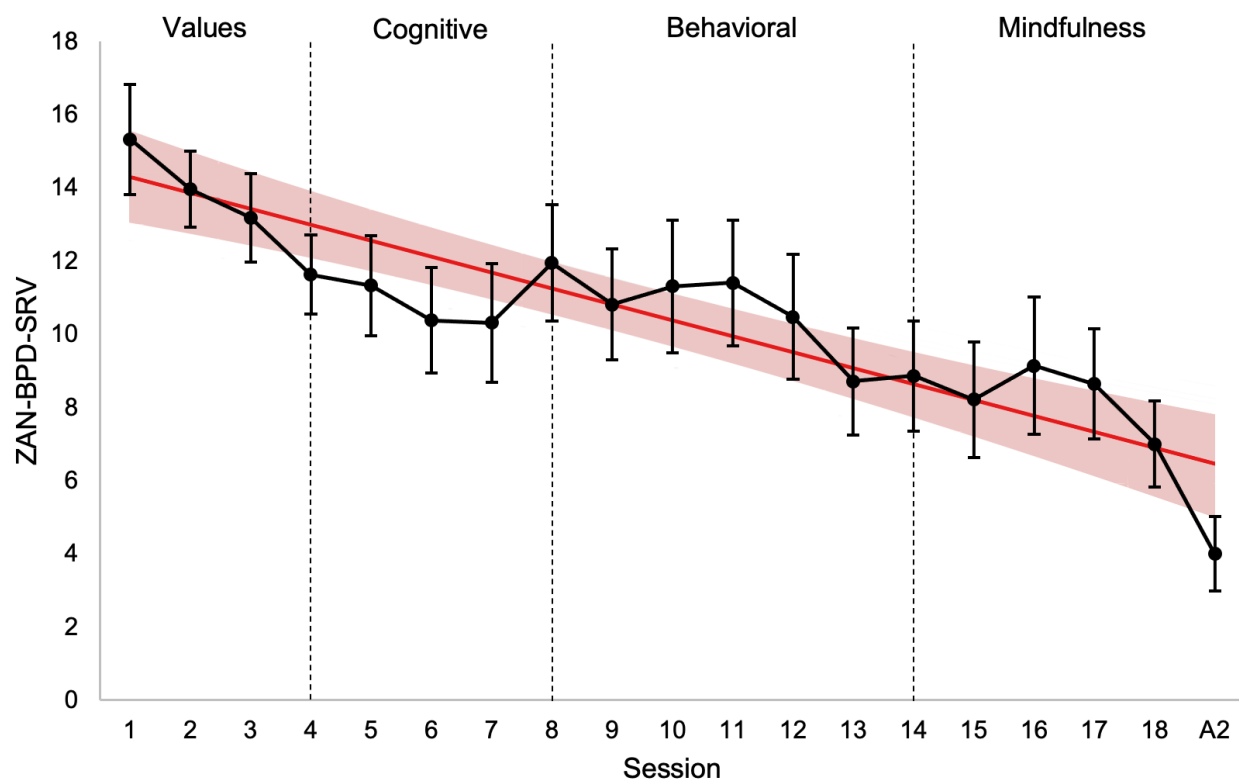**Figure 1**

Recruitment Flow Diagram

Figure 2

Average Self-Reported BPD Severity Prior to Each BPD Compass Session

Note. BPD Severity = Zanarini Rating Scale for BPD – Self-Report version. Error bars represent standard errors of the mean. A2 indicates the post-treatment assessment. Dotted lines separate modules indicated by the titles above each section. All available data at each timepoint for individuals in the BPD Compass condition (*N*s ranged from 26 to 13).

Table 1

Baseline Demographic and Diagnostic Characteristics

Characteristic	Total (*N* = 48)	BPD Compass (*n* = 25)	WLC (*n* = 23)
Age (Mean, *SD*)	33.74 (12.64)	33.71 (13.96)	32.88 (12.85)
Gender			
Female	40 (83.3)	21 (84.0)	19 (82.6)
Male	5 (10.4)	2 (8.0)	3 (13.0)
Genderqueer/Non-binary	5 (10.4)	2 (8.0)	3 (13.0)
Transgender	4 (8.3)	2 (8.0)	2 (8.7)
Other	1 (2.1)	1 (4.0)	0 (0.0)
Racial/Ethnic Background[a]			
White	45 (93.8)	23 (92.0)	22 (95.7)
African-American	4 (8.3)	3 (12.0)	1 (4.3)
Indigenous/Native American	2 (4.2)	2 (8.0)	0 (0.0)
Latinx	4 (8.3)	3 (12.0)	1 (4.3)
Other	1 (2.1)	0 (0.0)	1 (4.3)
Heterosexual/Straight	22 (45.8)	13 (52.0)	9 (39.1)
Bachelor's Degree or Higher	14 (29.2)	5 (20.0)	9 (39.1)
Married	5 (10.4)	0 (0.0)	5 (21.8)
Current Psychotropic Medication	32 (66.7)	18 (72.0)	14 (60.9)
Comorbid Diagnoses			
Bipolar II Disorder	9 (18.8)	3 (12.0)	6 (26.1)
Obsessive-Compulsive Disorder	7 (14.6)	3 (12.0)	4 (17.4)
Social Anxiety Disorder	22 (45.8)	12 (48.0)	10 (43.5)
Generalized Anxiety Disorder	22 (45.8)	11 (44.0)	11 (47.8)
Panic Disorder	12 (25.0)	5 (20.0)	7 (30.4)
Agoraphobia	4 (8.3)	0 (0.0)	4 (17.4)
Major Depressive Disorder	16 (33.3)	8 (32.0)	8 (34.8)
Persistent Depressive Disorder	15 (31.3)	6 (24.0)	9 (39.1)
Premenstrual Dysphoric Disorder	8 (16.7)	3 (12.0)	5 (21.8)
Posttraumatic Stress Disorder	15 (31.3)	5 (20.0)	10 (43.5)
Anorexia Nervosa	0 (0.0)	0 (0.0)	0 (0.0)
Bulimia Nervosa	3 (6.3)	1 (4.0)	2 (8.0)
Binge Eating Disorder	8 (16.7)	5 (20.0)	3 (13.0)
Substance Use Disorder	9 (18.8)	7 (28.0)	2 (8.7)
Diagnoses Met (*M*, *SD*)	3.13 (2.03)	2.76 (1.42)	3.52 (2.50)

Note. Data are presented as number (percentage) of patients unless otherwise indicated. [a]Values may not sum to total in each column because participants could select multiple racial/ethnic backgrounds. [b]Values may not sum to total in each column because participants could be diagnosed with multiple clinically significant diagnoses.

Table 2

Pre- and Post-Treatment Means, Standard Deviations, and Within-Condition Effect Sizes for Personality and Personality Disorder Variables for the Intent-to-Treat Sample

Clinical Outcome	BPD Compass			Waitlist			Between-Condition Effects	
	Pre-treatment (n = 25) M (SD)	Post-treatment (n = 25) M (SD)	Hedges' g [95% CI]	Week 0 (n = 25)‡ M (SD)	Week 18 (n = 18) M (SD)	Hedges' g [95% CI]	Baseline Hedges' g [95% CI]	Post Hedges' g [95% CI]
ZAN-BPD-CRV	16.04 (6.46)	6.62(6.04) †	−1.12* [−1.66, −.65]	15.00 (6.10)	13.89 (7.65)	−.01 [−.46, .45]	.16 [−.39, .71]	−1.01* [−1.74, −.26]
ZAN-BPD-SRV	17.88 (7.97)	8.48 (6.24)	−1.16* [−1.66, −.65]	17.39 (6.82)	13.88 (6.73)	−.28 [−.74, .18]	.07 [−.49, .62]	−.82* [−1.44, −.20]
BFI-N	4.25 (.48)	3.84 (.77)	−.47* [−.87, −.06]	4.57 (.43)	4.39 (.51)	−.29 [−.81, .12]	−.68* [−1.25, −.11]	−.78* [−1.33, −.10]
BFI-A	3.34 (.71)	3.35 (.71)	.02 [−.36, .40]	3.37 (.56)	3.45 (.66)	.24 [−.36, .55]	−.04 [−.60, .52]	−.15 [−.75, .45]
BFI-C	2.48 (.71)	2.71 (.69)	.45* [.04, .85]	2.58 (.73)	2.75 (.78)	.09 [−.23, .69]	−.14 [−.69, .42]	.05 [−.65, .54]

Note. ZAN-BPD-SRV = Zanarini Rating Scale for Borderline Personality Disorder – Self-report Version; ZAN-BPD-CRV = Zanarini Rating Scale for Borderline Personality Disorder – Clinician-rated Version.; ZAN-BPD-SRV = Zanarini Rating Scale for Borderline Personality Disorder – Self-report Version. BFI-N = Big Five Inventory – Neuroticism Subscale.; BFI-A = Big Five Inventory – Agreeableness Subscale.; BFI-C = Big Five Inventory – Conscientiousness Subscale.; CI = Confidence Interval. Baseline = Pre-treatment for participants in the BPD Compass condition and Week 0 for participants in the Waitlist condition (WLC). Post = Post-treatment for participants in the BPD Compass condition and Week 18 for participants in WLC. Within-condition Hedges' gs calculated by subtracting Time 1 scores from Time 2 scores. For between-condition Hedges' gs, BPD Compass = 1 and WLC = 0.

* Nonoverlapping confidence intervals.

† n = 13 for ZAN-BPD-CRV at posttreatment.

‡ n = 23 for ZAN-BPD-SRV, BFI-N, BFI-A, and BFI-C.