

Changes in Perspective-Taking During Cognitive Behavioral Therapy in a Partial Hospital Setting

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Abstract

Objective: Perspective-taking deficits are thought to perpetuate interpersonal dysfunction across different forms of mental illness. Although psychotherapeutic treatments are thought to target perspective-taking deficits, there is a dearth of research supporting this claim. In the current naturalistic study, we investigated whether perspective-taking frequency changed over the course of a two-week cognitive behavioral therapy (CBT) partial hospital treatment program.

Method: Participants were 421 adults with severe and complex mental illness that included mood, anxiety, and psychotic-spectrum disorders. Perspective-taking was assessed at admission and discharge using the 7-item Interpersonal Reactivity Index subscale.

Results: Results indicated improvements in perspective-taking from admission to discharge that did not vary as a function of participants diagnostic status or symptom severity. More severe autism spectrum disorder and borderline personality disorder symptoms were associated with less frequent perspective-taking across both time points.

Conclusions: These findings provide preliminary evidence to suggest that CBT may promote perspective-taking. Future research is needed to determine whether changes in perspective-taking are causally related to CBT, and if so, whether perspective-taking is a mechanism of change in psychotherapy.

Keywords: perspective-taking, social cognition; transdiagnostic, CBT, partial hospitalization.

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Setting

Social relationships are crucial to human health and wellbeing (e.g., Holt-Lunstad et al., 2010). Difficulties forming and maintaining such relationships are implicated across most forms of mental illness (American Psychiatric Association, 2013), and are thought to be a cause and contributing factor to psychopathology (Conway et al., 2012; Leary, 1957; Sullivan, 1953). As such, identifying and remediating the basic mechanisms underlying social functioning may alter the course of mental illness.

Over the past two decades, social cognition has emerged as a promising mechanism underlying social functioning in psychopathology (Gur & Gur, 2015). Although the taxonomy and factor structure of social cognition is poorly understood, experts agree that the tendency to adopt the mental perspective of another person (referred to as ‘perspective-taking’) is an important aspect of social cognition (e.g., Apperly; 2012; Happé, Cook, & Bird, 2017). Numerous psychiatric populations have been found to engage in perspective-taking less frequently than individuals without mental illness, including those with major depressive disorder (e.g., Cusi et al., 2011; Ekinici & Ekinici, 2016; Schreiter et al., 2013), anxiety disorders (e.g., Hendriks et al., 2016; Janssen et al., 2014), obsessive-compulsive disorder (e.g., Kang et al., 2012; Kim et al., 2018), bipolar disorder (e.g., Cusi et al., 2010; Derntl et al., 2012), autism spectrum disorder (e.g., Rogers et al., 2007; Rueda et al., 2015), and borderline personality disorder¹ (e.g., Dinsdale & Crespi, 2013; Grzegorzewski et al., 2019). Further, less frequent

¹ Individuals with borderline personality disorder have also been theorized to “hypermentalize”, defined as the tendency to overattribute extreme mental states to other (Sharp & Vanwoerden, 2015). Further, hypermentalization has recently been proposed as a transdiagnostic feature of psychopathology (McLaren et al., 2022). Importantly, individuals can have both a reduced tendency to engage in perspective-taking *and* demonstrate a pattern of hypermentalization when they engage in perspective-taking.

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perspective-taking has been associated with worse course of illness (Cusi et al., 2011; Montag et al., 2007) and poorer interpersonal functioning (Schenkel et al., 2014). Taken together, this research suggests that perspective-taking may facilitate numerous domains of functioning, including from social, occupational, and academic. As such, perspective-taking is an important treatment target that, if remediated, could help to mitigate impairment associated with mental illness.

To date, it is unclear whether existing psychotherapeutic treatments remediate perspective-taking impairments. A notable exception is mentalization-based therapy (MBT), which was specifically developed to promote perspective-taking skills through the differentiation of one's own emotions and cognitions from others (Allen & Fonagy, 2008). Changes in perspective-taking (also referred to as mentalizing), is an important mechanism of change in MBT (Volkert, Hauschild, & Taubner, 2019). Yet, the developers of MBT acknowledge that perspective-taking is not unique to MBT, and they propose that all clinical practice requires patients to engage in continual perspective-taking (Allen & Fonagy, 2008). Indeed, many other theorists and expert clinicians alike have proposed that perspective-taking deficits may be targeted across a wide range of therapeutic approaches (Björgvinsson & Hart, 2006; Block-Lerner et al., 2007; Day et al., 2008; Garber et al., 2016; Goodman et al., 2016; Montgomery-Graham, 2015; Mennin et al., 2013).

In the current manuscript, we focus on the role of perspective-taking in the most empirically supported collection of psychotherapeutic treatments—cognitive behavioral therapies (CBTs). CBTs may promote perspective-taking through several different mechanisms. For example, CBT therapists directly encourage patients to reflect on thoughts and feelings using the “CBT triangle” (Beck, 2011). In addition, modern adaptations of traditional CBT often

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include practices of mindfulness, which involves present-moment and non-judgemental awareness of mental states (Kabat-Zinn, 2003). Although these techniques involve reflecting on one's own mental states, such practices may enable patients to view mental states as proximal causes of all human behaviour, thus encouraging perspective-taking (see Block-Lerner et al., 2007; Gerace et al., 2017). Finally, and of direct relevance to our current study, CBT encourages patients to think about others' points of view through cognitive restructuring (Clark, 2013). Taken together, there are several mechanisms by which CBT may facilitate perspective-taking. Nevertheless, there is a dearth of research examining the impact of CBT on perspective-taking. Such knowledge is crucial to determine whether CBT adequately remediates perspective-taking or whether modifications are necessary to target perspective-taking deficits, thereby refining treatments to the basic mechanisms underlying mental illness.

To date, only three studies have investigated the impact of CBT on perspective-taking. Two studies investigated the effects of an 8-session group mindfulness based-CBT program for chronic pain in patients with high rates of psychiatric comorbidity. These studies employed a naturalistic design without a control group. One study found significant increases in self-reported perspective-taking frequency (Song et al., 2018) while the other found no effect of treatment on perspective-taking frequency (Lim et al., 2018). A potential explanation for Lim and colleagues (2018) null findings is that perspective-taking change may depend on the clinical effectiveness of the treatment. In this study, there was no clinical improvement in chronic pain, depression, anxiety, or quality of life, suggesting that improvements in perspective-taking frequency may be correlated with other clinical indicators of improvement. In a third naturalistic study without a control group, Yu and colleagues (2017) evaluated the effect of a 16-session acceptance and commitment therapy (ACT) group for patients with chronic pain. ACT is a third wave CBT that

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integrates acceptance-based approaches to enhance psychological flexibility, the ability to hold thoughts and emotions lightly in each context (Hayes, 2004; Hayes, 2019). Perspective-taking significantly increased pre- to post-treatment and these gains were retained at a 9-month follow-up. Taken together, preliminary research suggests that CBT may enhance perspective-taking; however, such research is limited to patients with chronic pain.

In the current study, we investigated changes in perspective-taking over the course of a two-week CBT-based partial hospital program (PHP) for patients with severe and acute mental illness (e.g., mood, anxiety, personality, and psychotic-spectrum disorder). This study was pre-registered on the Open Science Framework (OSF; https://osf.io/h38yp/?view_only=5d1a311d53a7474eafa71deace40bd14). We hypothesized that perspective-taking frequency would increase over the course of their PHP treatment. Our secondary aim was to examine *for whom* perspective-taking changes. We examined whether changes in perspective-taking varied based on diagnostic and symptom severity moderators. This aim was exploratory, and thus, no a priori hypotheses were made.

Method

Participants

Participants were 421 adults aged 18 to 77 seeking transdiagnostic psychiatric treatment at a virtual behavioral health PHP in the Northeastern United States from January 2021 to March 2022. Demographic characteristics are listed in Table 1, and clinical characteristics are listed in Table 2. The majority of participants were referred to the PHP by outpatient providers (64.4%), followed by inpatient treatment providers (32.5%), and residential or partial hospital treatment providers (2.7%). One participant was self-referred (0.24%). A large portion of the sample

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(42.1%) were hospitalized for psychiatric problems in the 6 months preceding admission to the PHP.

Patients met the following inclusion criteria for admission to the PHP: (1) 18 years of age or older, (2) ability to understand English, and (3) agreement to abstain from substance use for the duration of the program. To be included in the current study, participants must have completed the perspective-taking self-report questionnaire administered as part of routine clinical care at both admission and discharge. Those included in the current study did not differ from those excluded in terms of age, gender, or symptom severity ($p < .11$).

Measures

Interpersonal Reactivity Index Perspective Taking Subscale (IRI-PT)

The IRI-PT (Davis, 1980; Davis, 1983) is a 7-item self-report measure assessing an individual's tendency to shift to another person's perspective or psychological point of view (e.g., "I try to look at everybody's side of the disagreement before I make a decision"). IRI-PT items are rated on a 5-point Likert-type scale ranging from 0 (*Does not describe me well*) to 4 (*Describes me very well*). The IRI-PT is scored from 0-35 where higher scores indicate greater propensity to consider others' perspectives. The IRI-PT has demonstrated satisfactory internal consistency and test-retest reliability (Davis, 1980). In the current sample, the IRI-PT demonstrated good internal consistency at admission ($\alpha = .83$) and discharge ($\alpha = .84$).

Mini International Neuropsychiatric Interview (MINI)

The MINI (Sheehan et al., 1998) is a structured diagnostic assessment used to assess the most prevalent psychiatric diagnoses in the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 2013). The MINI has demonstrated good

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psychometric properties, along with excellent interrater reliability for mood and anxiety disorders (Lecrubier et al., 1997; Sheehan et al., 1998).

Autism Spectrum Quotient (AQ-10)

The AQ-10 (Allison et al., 2012) is a 10-item self-report measure assessing autism spectrum disorder symptoms (e.g., “I find it difficult to work out people’s intentions”). The AQ-10 items are rated on a 4-point Likert-type scale ranging from 0 (*Definitely Agree*) to 4 (*Definitely Disagree*); higher scores on the AQ-10 indicates more autism spectrum disorder symptoms. The AQ-10 has demonstrated good specificity, sensitivity, and positive predictive value (Allison et al., 2012). In the current sample, the AQ-10 demonstrated adequate internal consistency ($\alpha = .65$).

McLean Screening Instrument for Borderline Personality Disorder (MSI-BPD)

The MSI-BPD (Zanarini et al., 2003) is a 10-item self-report screener for borderline personality disorder with items assessing affective dysregulation, impulsivity, interpersonal disturbances, and self-identity disturbances. The MSI-BPD items are answered on a dichotomous yes/no scale. The MSI-BPD has shown good sensitivity and specificity as a screener (Zanarini et al., 2003) and demonstrated adequate internal consistency in the current sample ($\alpha = .78$).

Patient Health Questionnaire (PHQ-9)

The PHQ-9 (Kroenke et al., 2001) is 9-item self-report questionnaire that assesses depression symptom severity. Participants rate how frequently they experience each symptom of depression (e.g., “Feeling tired or having little energy”) on a 4-point Likert-type scale ranging from 0 (*Not at all*) to 3 (*Nearly every day*). Total scores range from 0 to 27, with higher scores indicating greater symptom severity. The PHQ-9 has been previously validated in this clinical

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setting as a depression severity measure (Beard et al., 2016b). In the current sample, the PHQ-9 demonstrated good internal consistency ($\alpha = .86$).

Generalised Anxiety Disorder Assessment (GAD-7)

The GAD-7 (Spitzer et al., 2006) is a 7-item self-report questionnaire that assesses anxiety symptom severity. Participants rate how frequently they experience symptoms of anxiety (e.g., “Not being able to stop or control worrying”) on a 4-point Likert-type scale ranging from 0 (*Not at all*) to 3 (*Nearly every day*). The GAD-7 has demonstrated good construct validity (Kertz et al., 2013). In the current sample, the GAD-7 demonstrated good internal consistency ($\alpha = .89$).

Procedure

Participants were attending a virtual PHP designed to help individuals develop skills that improve their mental health and ability to function. PHPs offer a critical level of care between inpatient hospitalization and traditional outpatient treatment for people who were unable to sufficiently benefit from traditional outpatient therapy, as an alternative to inpatient hospitalization, or as a step down from inpatient hospitalization to help patients transition back to outpatient care (Beard et al., 2016a). Patients who attend ITPs generally have more severe medical, employment, legal, and psychiatric problems (McLellan et al., 1997; Mochrie et al., 2020) and present with high risk for worsening or relapse of acute symptoms (Forgeard et al., 2018) compared to patients in outpatient treatment.

The program operated Monday to Friday from 8am to 3pm. All meetings took place on a HIPAA-compliant version of Zoom. On average, participants attended the PHP for 2 weeks ($M_{\text{days}} = 11.52$, $SD = 2.69$). Main treatment content included group therapy (three groups per day), individual therapy (three sessions per week), and medication management (as needed). Additionally, patients met with a case manager three time per week to discuss progress in the

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program and aftercare planning. Patients could also attend optional vocational counseling meetings, family meetings, and/or a weekly peer social lunch with other PHP patients. Individual and group therapy was based in CBT (Beck, 2011) and third-wave CBT approaches (e.g., dialectical behavioral therapy [Linehan, 2015] and ACT [Hayes et al., 2012]). Group leaders were staff psychologists, post-doctoral fellows, pre-doctoral interns, advanced doctoral practicum students, and bachelor's level mental health counselors. Groups are checked for treatment protocol adherence and fidelity biannually by research assistants with detailed checklists; group leaders delivered 93.31% of each groups' protocol components. Individual therapists were staff psychologists, post-doctoral fellows, pre-doctoral interns, and advanced doctoral practicum students. Additional details on the full treatment protocol and program effectiveness have been described elsewhere Hom et al., 2020; Hudson et al., 2023.

As part of routine clinical care, participants completed self-report questionnaires daily using Research Electronic Data Capture (REDCap). REDCap is a secure web-based platform for managing and storing online databases and surveys (Harris et al., 2009). The IRI-PT, MSI-BPD, PHQ-9, and GAD-7 were collected at admission, and AQ-10 was collected on patients' second day at the PHP. On the second day of the program, participants also completed the MINI with their individual therapist. The IRI-PT was re-administered at discharge. A de-identified dataset was obtained for the current study. This study was reviewed and approved by the Mass General Brigham Institutional Review Board.

Data Analysis

Due to the within-person nature of perspective-taking scores, we conducted multilevel models using the lme4 package for R (Bates et al., 2015) to examine whether perspective-taking skills changed over time in Mplus version 8.8 (Muthén & Muthén, 2017). We reasoned that an

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MLM approach would be more appropriate than a repeated measures analysis of variance because participants differed in the amount of time they spent in the program, and MLM analyses can account for unequal time intervals across participants (e.g., Kwok et al., 2008). Time was measured by the number of days participants attended the treatment program. Because the first measurement time point was coded as day '0', time was centered on its natural metric. Each participant had two timepoints: admission (coded as '0' for all participants) and discharge (ranged from '4' to '21' based on the length of stay). We modeled random intercepts because participants varied in their perspective-taking scores at admission.

We first specified the unconditional means model (or intercept-only model), which does not include predictors and establishes whether there is systematic variation in the outcomes worth exploring. The intraclass correlation coefficient (ICC) was calculated by dividing the between-person variance by the total variance to determine the proportion of variance explained by between-person differences. We then specified an unconditional growth model, which includes our level-one within-person predictor (i.e., time) to assess how much of the within-person variability can be attributed to systematic changes over time.

Moderator Analyses

We assessed the impact of diagnostic and symptom severity moderator variables on overall perspective-taking and rate of perspective-taking change. Diagnostic moderators included the following diagnoses: lifetime bipolar disorder, current major depressive disorder, a current anxiety disorder, and a current obsessive-compulsive disorder. Symptom severity moderators included symptoms of autism spectrum disorder, borderline personality disorder, depression, and generalized anxiety. Moderators were selected based on available patient data. Diagnostic moderators were dummy coded (0 = diagnosis absent; 1 = diagnosis present) and symptom

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severity moderators were standardized. For each moderator variable, we specified two additional models. First, we added the moderator variable to the unconditional growth model to assess the main effect of the moderator variable on perspective-taking. Second, we added the interaction of the moderator variable by time to assess whether changes in perspective-taking differed as a function of the moderator variable. Because data was collected from a naturalistic treatment setting, there is substantial missing data for moderator variables. As such, we modeled each moderator variable separately in independent models. List wise deletion was used for missing data. Because we conducted six separate moderator analyses, p-values for these analyses were corrected using the False Discovery Rate correction for multiple comparisons (Benjamini & Hochberg, 1995). Further, results with all moderator variables modelled simultaneously as predictors in the same model are available on our OSF website; the pattern of results are consistent with the results presented below.

Results

Results of each of the multilevel models predicting perspective-taking frequency are presented in Table 3. Based on the intercept only model, the ICC for perspective-taking scores was .7046, suggesting that 70.46% of the variance in perspective-taking scores was explained by between-person differences. The unconditional growth model had significantly better model fit than the intercept only model, $\chi^2(1) = 15.55, p < .001$. As seen in Table 3, participants reported significantly higher perspective-taking scores over the course of treatment (pre-treatment: $M = 17.99, SD = 5.47$; post-treatment: $M = 18.87, SD = 4.97; d = .23$).

Diagnostic Moderators

The fixed effects of models with diagnostic status included as a predictor and moderator are presented in Table 4. The main effects of bipolar disorder, major depressive disorder, anxiety

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disorder, and obsessive-compulsive disorder diagnoses on perspective-taking frequency were not significant. In other words, frequency of perspective-taking did not vary based on participants' diagnoses. Further, bipolar disorder, major depressive disorder, anxiety disorder, and obsessive-compulsive disorder diagnoses did not interact with time to predict perspective-taking frequency, suggesting that rate of perspective-taking change over the course of CBT was similar regardless of diagnostic status.

Symptom Severity Moderators

The fixed effects of models with symptom severity included as a predictor and moderator variable are presented in Table 5. The main effect of autism spectrum disorder symptoms on overall perspective-taking frequency was significant, such that greater autism spectrum disorder symptoms predicted less frequent perspective-taking across time points. The model with autism spectrum disorder symptoms included had significantly better model fit than the unconditional growth model, $\chi^2(1) = 26.09, p < .001$. Similarly, the main effect of borderline personality disorder symptoms on perspective-taking frequency was significant; greater borderline personality disorder symptoms predicted less frequent perspective-taking across time points. Again, the model with borderline personality disorder symptoms included had significantly better model fit than the unconditional growth model, $\chi^2(1) = 25.82, p < .001$. Neither autism spectrum disorder symptoms nor borderline personality disorder symptoms interacted with time to predict perspective-taking frequency, suggesting that rate of perspective-taking change over the course of CBT did not vary as a function of autism spectrum disorder or borderline personality disorder symptoms.

Because the effect of autism spectrum disorder and borderline personality disorder symptoms on perspective-taking could be attributed to overall severity of mental illness, we

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deviated from our pre-registered data analysis plan to examine the effect of baseline depressive and anxiety symptoms on perspective-taking scores. As can be seen in Table 5, neither depressive nor anxiety symptoms were significant predictors of perspective-taking after correcting for multiple comparisons. Further, neither depressive nor anxiety symptoms interacted with time to predict perspective-taking frequency, suggesting that rate of perspective-taking change over the course of CBT did not vary as a function of baseline depressive or anxiety symptoms.

Discussion

Consistent with our hypothesis, participants reported significantly more frequent perspective-taking after attending a two-week CBT-based PHP program relative to their self-reported perspective-taking at baseline. These findings provide initial evidence that CBT may promote perspective-taking frequency among patients with severe and acute mental illness.

Of note, there was substantial variability in the magnitude of perspective-taking change across participants. Although the majority (52.73%) of participants endorsed more frequent perspective-taking at discharge relative to admission, a large proportion endorsed less frequent perspective-taking (36.10%) or no changes in perspective-taking (11.16%) over the course of treatment. We investigated several diagnostic and symptom moderators that could account for these within-person differences but failed to find evidence that rate of perspective-taking change was dependent on patient diagnosis or symptom severity. As such, why perspective-taking improves from pre- to post-CBT for some individuals, but not others, remains an open question.

There are several potential moderators that may influence CBT's efficacy for promoting perspective-taking frequency that were not assessed in the current study. We provide speculation on three possibilities. First, CBT includes a wide range of different therapeutic skills, some of

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which may encourage perspective-taking more than others. For example, although all patients attended cognitively and behaviorally oriented groups, there was variability in the focus of patients' individual therapy sessions. Patients that engaged in more cognitively oriented individual treatment may have been encouraged to consider perspective-taking more explicitly compared to patients who were engaged in a more behaviorally oriented treatment. Second, therapists may differ in the extent to which their therapeutic approach elicits perspective-taking. A therapist that takes a curious, empathetic stance with their patients may be more likely to foster perspective-taking compared to a therapist who is more directive. Finally, individual differences in patients' engagement with other patients may have also influenced changes in perspective-taking. Although the program was offered virtually, patients could elect to attend optional social lunches and exchange contact information with other group members. Those that connected more with other patients may have experienced the largest improvements in perspective-taking over the course of the program. Each of these potential mechanisms warrant future study.

Although we had no a priori hypotheses about main effects, our results indicated that more severe autism spectrum disorder and borderline personality disorder symptoms were associated with less frequent perspective-taking. At first glance, this finding may not seem particularly noteworthy, because there is robust evidence that perspective-taking is impaired in these populations (Dinsdale & Crespi, 2013; Grzegorzewski et al., 2019; Rogers et al., 2007; Rueda et al., 2015). However, these studies typically compare those with autism spectrum disorder or borderline personality disorder to those without mental illness. Indeed, nearly all patient populations have demonstrated impairments in perspective-taking relative to samples without mental illness (see Cotter et al., 2018 for a review). Our study is the first to find that

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autism spectrum disorder and borderline personality disorder traits are associated with perspective-taking impairments *relative to other patients with severe and acute psychopathology*. Such findings suggest that perspective-taking impairment may be a particularly important treatment target in these populations.

The results of this study should be interpreted in light of the following limitations. First, like much of psychological science, our sample is relatively limited in terms of sociodemographic diversity (Henrich et al., 2010), and as such, it is unclear if the results will generalize to more diverse populations. Second, this was a naturalistic treatment study without a control condition. This design ensures that our participants are clinically representative but limits our ability to draw causal inferences. As such, we cannot conclude that perspective-taking improvement are caused by CBT, as such improvements may instead be an artifact of natural fluctuations over time or other aspects of the treatment program (e.g., frequent engagement with an interdisciplinary team). Third, our methodology relied on self-reported perspective-taking that has traditionally been used to assess perspective-taking as a trait-like construct (Davis et al., 1983). Some researchers have speculated that self-reported cognitive processes may be a better measure of real-world capacity, whereas task-based performance assess maximal capabilities under ideal circumstances (Carigan & Barkus, 2016). As such, our measures may not capture fluctuations in perspective-taking capacity. Nevertheless, self-reported perspective-taking is robustly associated with psychosocial outcomes (e.g., Hall et al., 2021), supporting the validity of this measurement tool. Lastly, although our results were statistically significant, it is not clear whether this change is clinically meaningful as the mean difference effect size was small. Future research is needed to determine required magnitude of perspective-taking change to achieve a clinically meaningful outcome.

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In light of these findings and limitations, a crucial next step for the field is to determine whether changes in perspective-taking are causally related to CBT, and if so, whether perspective-taking is a mechanism of change for other common treatment outcomes assessed in CBT (i.e., symptom severity, well-being, functioning). If so, it will be important to delineate which aspect(s) of CBT promotes perspective-taking, which would allow for tailoring of treatments to the basic mechanisms of psychopathology. Carefully controlled longitudinal designs with measurement tools sensitive to change will be required to answer each of these questions. Such research will be important to determine whether change to clinical practice is warranted.

In conclusion, our results are the first to demonstrate patients with severe and acute mental illness report more frequent perspective-taking after a two-weeks of CBT delivered in a PHP setting. Our results also suggest that perspective-taking impairments are uniquely associated with autism spectrum disorder and borderline personality disorder traits relative to other symptoms of mental illness. Such findings suggest that CBT could be leveraged to promote the social cognitive functioning of psychiatric patients, and this potential mechanism of change may be most beneficial to patients with autism spectrum disorder and borderline personality traits. Ultimately, this work highlights a potential mechanism of change in CBT. Such knowledge may help to reduce the theory-practice gap and improve the implementation of evidence-based psychological treatments.

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Table 1.

Descriptive Statistics of Demographic Characteristics ($n = 421$)

Demographic Characteristic	$M (SD) / n (%)$
Age $M (SD)$	35.90 (13.6)
Gender $n (%)$	
Female	235 (55.8)
Male	176 (41.8)
Trans/Non-Binary	8 (1.9)
Ethnoracial Identity $n (%)$	
Non-Hispanic White	347 (82.4)
Asian	17 (4.0)
Hispanic/Latinx	17 (4.0)
Multi-racial	15 (3.6)
Black	11 (2.6)
Did not know	7 (1.7)
Did not disclose	3 (0.7)
Sexual Orientation $n (%)$	
Heterosexual/Straight	317 (75.9)
Bisexual	58 (14.0)
Gay/Lesbian	22 (5.3)
Queer	18 (4.3)
Education $n (%)$	
Post-college education	151 (36.1)
Four year college grad	138 (33.0)
Some college	96 (23.0)
High school graduate/GED	33 (7.9)

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Table 2.

Baseline Clinical Characteristics

Diagnoses	<i>n</i> (%)
Bipolar I Disorder	64 (32.8)
Bipolar II Disorder	2 (1.5)
Major Depressive Disorder	131 (47.6)
Panic Disorder	41 (14.6)
Agoraphobia	26 (9.6)
Social Anxiety Disorder	77 (28.2)
Generalized Anxiety Disorder	141 (56.6)
Obsessive-Compulsive Disorder	59 (21.3)
Excoriation Disorder	23 (10.1)
Trichotillomania	6 (2.6)
Symptom Severity	<i>M</i> (<i>SD</i>)
Autism spectrum (AQ-10)	3.9 (2.1)
Borderline personality (MSI-BPD)	4.4 (2.7)
Depressive symptoms (PHQ-9)	13.2 (6.4)
Generalized anxiety symptoms (GAD-7)	11.0 (5.5)

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Table 3.

Multilevel Models with Time Predicting Perspective-Taking

Fixed Effects	Model 1: Intercept Only					Model 2: Unconditional Growth Model				
	<i>b</i>	<i>SE</i>	<i>t</i>	<i>df</i>	<i>p</i>	<i>b</i>	<i>SE</i>	<i>t</i>	<i>df</i>	<i>p</i>
Intercept	0	.04	0	421	1	-.07	.05	1.46	548	.15
Time						.01	.003	3.98	430	< .001
Random Effects	Var	<i>SD</i>	Chi-Sq	<i>df</i>	<i>p</i>	Var	<i>SD</i>	Chi-Sq	<i>df</i>	<i>p</i>
Between-Person Variance	.70	.84	288	1	< .001	.71	.84	299	1	< .001
Residual	.30	.54				.29	.53			

Var = variance

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Table 4.

Fixed Effects of Multilevel Models with Diagnostic Moderators and Time Predicting Perspective-Taking

	Main Effects Models					Moderator by Time Interaction Models				
	<i>b</i>	<i>SE</i>	<i>t</i>	<i>df</i>	<i>p</i>	<i>b</i>	<i>SE</i>	<i>t</i>	<i>df</i>	<i>p</i>
Bipolar (<i>n</i> = 290)										
Intercept	-.04	.06	0.62	360	.54	-.05	.06	0.70	381	.49
Time	.01	.004	3.38	296	< .001	.02	.01	3.18	296	.002
Bipolar	-.07	.12	0.58	290	.56	-.05	.13	0.35	381	.72
Bipolar*Time						-.01	.01	0.50	296	.62
MDD (<i>n</i> = 277)										
Intercept	0	.08	0.01	324	.99	.01	.08	0.10	367	.92
Time	.01	0	3.25	282	.001	.01	.01	2.10	282	.04
MDD	-.09	.11	0.81	277	.42	-.10	.12	0.87	367	.38
MDD*Time						.002	.01	0.32	282	.75
Anxiety (<i>n</i> = 263)										
Intercept	.04	.11	0.41	286	.68	.06	.11	0.55	343	.58
Time	.01	.004	2.76	268	.006	.01	.01	1.02	268	.31
Anxiety	.09	.12	0.75	263	.46	-.12	.13	0.88	343	.38
Anxiety*Time						.01	.01	0.52	268	.60
OCD (<i>n</i> = 241)										
Intercept	-.06	.07	0.80	292	.42	-.06	.08	0.79	312	.43
Time	.01	.004	2.94	246	.004	.01	.01	2.47	246	.01
OCD	.01	.13	0.11	241	.91	.02	.14	0.11	313	.91
OCD*Time						0	.01	0.02	246	.98

Note. MDD = Major Depressive Disorder, OCD = Obsessive-Compulsive Disorder. Sample size (*n*) indicates the number of participants for whom MINI modules were completed to determine the diagnostic status, regardless of whether they met criteria for the diagnosis.

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Table 5.

Fixed Effects of Multilevel Models with Symptom-Level Moderators and Time Predicting Perspective-Taking

	Main Effects Models					Moderator by Time Interaction Models				
	<i>b</i>	<i>SE</i>	<i>t</i>	<i>df</i>	<i>p</i>	<i>b</i>	<i>SE</i>	<i>t</i>	<i>df</i>	<i>p</i>
Autism (<i>n</i> = 256)										
Intercept	-.09	.06	1.50	337	.13	-.09	.06	1.51	336	.13
Time	.02	.004	3.57	261	< .001	.02	.004	3.59	261	< .001
Autism	-.29	.06	5.24	256	< .001	-.28	.06	4.67	337	< .001
Autism*Time						-.002	.004	0.51	261	.61
Borderline (<i>n</i> = 413)										
Intercept	-.07	.05	1.55	543	.12	-.07	.05	1.55	543	.12
Time	.01	.003	4.11	422	< .001	.01	.003	4.10	422	< .001
Borderline	-.23	.04	5.16	413	< .001	-.23	.05	4.81	544	< .001
Borderline*Time						0	.004	0.06	422	.95
Depression (<i>n</i> = 418)										
Intercept	-.07	.05	1.39	540	.17	-.07	.05	1.39	540	.17
Time	.01	.003	4.10	426	< .001	.01	.003	4.08	426	< .001
Depression	-.05	.05	1.08	418	.28	-.05	.05	1.08	540	.28
Depression*Time						.001	.003	0.18	427	.86
Anxiety (<i>n</i> = 414)										
Intercept	-.07	.05	1.48	536	.14	-.07	.05	1.48	536	.14
Time	.01	.003	4.25	422	< .001	.01	.003	4.25	422	< .001
Anxiety	-.09	.05	2.08	414	.04	-.09	.05	1.85	536	.07
Anxiety*Time						-.001	.003	0.25	422	.81

Note. MDD = Major Depressive Disorder, OCD = Obsessive-Compulsive Disorder. Sample size (*n*) indicates the number of participants for whom data was available on each symptom severity scale.