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Examining the relationship between cognitive factors and insight in panic disorder before and during treatment

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ABSTRACT

Individuals with Panic Disorder (PD) often have impaired insight, which can impede their willingness to seek treatment. Cognitive processes, including metacognitive beliefs, cognitive flexibility, and jumping to conclusions (JTC) may influence the degree of insight. By understanding the relationship between insight and these cognitive factors in PD, we can better identify individuals with such vulnerabilities to improve their insight. The aim of this study is to examine the relationships between metacognition, cognitive flexibility, and JTC with clinical and cognitive insight at pretreatment. We investigate the association among those factors’ changes and changes in insight over treatment. Eighty-three patients diagnosed with PD received internet-based cognitive behavior therapy. Analyses revealed that metacognition was related to both clinical and cognitive insight, and cognitive flexibility was related to clinical insight at pre-treatment. Greater changes in metacognition were correlated with greater changes in clinical insight. Also, greater changes in cognitive flexibility were related to greater changes in cognitive insight. The current study extends previous studies suggesting potential relationships among insight, metacognition, and cognitive flexibility in PD. Determining the role of cognitive concepts in relation to insight may lead to new avenues for improving insight and can have implications for engagement and treatment-seeking behaviors.

Panic disorder (PD) is characterized by recurrent and unexpected panic attacks. These attacks are sudden episodes of fear or anxiety, accompanied by physical symptoms such as rapid heartbeat, sweating, shaking, and difficulty breathing. Panic attacks can be triggered by various factors, including stress or a traumatic event, and can also lead to intense worry and fear about having another panic attack, which can greatly impact an individual’s functioning (Huppert, 2022).

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Clinically, some patients with PD fail to present for psychological or psychiatric treatment because they believe that something is physically wrong with them (medical service utilization; Horenstein & Heimberg, 2020). Indeed, some data suggest that the average patient with panic disorder will seek help from multiple medical specialists prior to seeking mental health care (Huppert, 2022). One question that arises from this is how many individuals continue to seek medical care or avoid seeking mental health treatment because they believe that their panic attacks are a physical problem or that nothing is wrong with them. In the psychiatric literature, this is typically referred to as poor clinical insight (defined as acknowledgment of illness and a need for treatment; Amador & David, 2004; David, 1990).

Other individuals who suffer from PD may present with overvalued beliefs that panic attacks are dangerous, even if they are a mental health issue. Many of these individuals are certain that they will die, go crazy, lose control, be embarrassed, or humiliated if they experience a full-blown panic attack. They do not seek alternative understanding and are often insistent that panic attacks are harmful, leading them to avoid seeking treatment. For example, they are likely to believe they really could die, faint, or lose control as a result of a panic attack. In the psychiatric literature, this is often referred to as poor cognitive insight (defined as confidence in one’s beliefs and lack of openness to other perspectives; Beck et al., 2004). Clinically distinguishing between the two types of insight and studying each can help clinicians and researchers better understand the awareness of disorder and thoughts in PD, as well as its association with phenomenology.

Metacognition is the process of assessing, monitoring, and regulating cognition (Wells, 2000). PD is characterized by dysfunctional metacognitive beliefs (i.e. negative beliefs about worry and need to control cognitions; Oguz et al., 2019) and by beliefs about unexpected bodily sensations. In many cases, catastrophic misinterpretations and the physical symptoms themselves cause impairment in functioning. This can make individual with PD focus on their mental state, trying to understand their thoughts and sensations. They may question whether their bodily sensations are signs of a psychological condition (clinical insight) and/or they may question whether they really will die from a panic attack (cognitive insight). We propose that individuals with PD who deny having a problem (low clinical insight) are more likely to be unaware of their dysfunctional metacognitive beliefs because they tend to reflect less on their mental state. Alternatively, individuals with PD who are less willing to consider different perspectives (low cognitive insight) will be more likely to have dysfunctional beliefs related to anxiety. Other cognitive factors, such as cognitive flexibility (e.g. thinking about different ideas) and jumping to conclusions (JTC; the tendency to make decisions based on little evidence) are related to metacognitive processes in that these cognitive processes likely feed into meta-awareness. We propose that cognitive flexibility and JTC also relate to insight because they involve evaluating and reflecting on thoughts and experiences. Therefore, it is important to explore how metacognition, cognitive flexibility, and JTC affect awareness of having a disorder and thoughts in PD.

As far as we know, there have been no examinations of the relevant factors associated with both types of insight (clinical and cognitive) in patients diagnosed with PD with or without agoraphobia in treatment. Some researchers have investigated metacognitive beliefs and cognitive flexibility in PD (Oguz et al., 2019) but only in relation to symptom severity and outcomes, and not to insight. To expand on previous studies, the current
study examines metacognition, cognitive flexibility, and JTC in relation to clinical and cognitive insight and changes in insight during treatment in PD patients. Characterizing the factors’ underlying insight will assist in determining whether awareness of having a disorder and awareness of thoughts is relevant to cognitive abilities in PD. If cognitive factors are related to insight in PD, it could help identify and target individuals with such vulnerabilities to improve their degree of insight.

To the best of our knowledge, there is only one study examined the relationship between cognitive factors and insight in anxiety. Halaj and Huppert (2021) examined cognitive factors and their relationship to cognitive and clinical insight in an internet-based sample of participants (n = 175) with high levels of trait anxiety. The results suggest that individuals with impaired clinical insight are less likely to have dysfunctional metacognitive beliefs. Also, anxious individuals with good cognitive insight were more likely to endorse more dysfunctional metacognitive beliefs. Other factors, such as JTC and cognitive flexibility, were not found to be related to either type of insight. However, Halaj and Huppert (2021) examined the association between factors and insight without examining the relation to change in insight during treatment and used a sample with no formal diagnosis. To overcome this limitation, the current study included participants with confirmed clinical diagnoses of PD and examines changes in insight over internet-based cognitive behavior therapy (iCBT).

Considering that only one study examined insight in pathological anxiety and its relationship to cognitive factors and none in PD (see above), we review the research concerning these cognitive factors in relation to insight in obsessive-compulsive disorder (OCD) and psychosis, which is well developed. Recent studies on OCD have reported a positive association between cognitive insight and metacognition; higher cognitive insight was found to be associated with higher cognitive confidence and cognitive self-consciousness (Ekinci & Ekinci, 2016; Hood et al., 2019). Other research in OCD similarly suggests that higher level of cognitive insight in OCD was associated with higher levels of dysfunctional metacognitions (Önen et al., 2013). In contrast, Visser et al. (2017) found that patients with impaired cognitive insight in OCD had higher levels of maladaptive metacognitive beliefs. Most of the literature examining metacognition and insight in OCD examined cognitive insight and not clinical insight and found that good cognitive insight is related to less dysfunctional metacognition. Metacognition has been examined in relation to clinical insight predominantly in psychosis. For example, one study indicated that individuals with delusions were more likely to have higher levels of dysfunctional metacognitive beliefs (Morrison & Wells, 2003). Additionally, research in schizophrenia has found that poorer metacognitive performance is uniquely predictive of clinical insight in schizophrenia (e.g. Koren et al., 2004). Similarly, recent studies suggest that higher clinical insight is associated with higher metacognitive ability (Wright et al., 2021)

Studies have suggested cognitive inflexibility and impaired set shifting are related to impaired insight in OCD (Kitis et al., 2007), suggesting a common factor to poor insight because the performance of individuals with OCD and poor insight was similar to that of patients with schizophrenia (Tumkaya et al., 2009). Indeed, research on psychosis suggests that poorer cognitive insight is associated with lower cognitive flexibility (Ohmuro et al., 2018).
JTC is typically measured by the beads task (Huq et al., 1988; Phillips & Edwards, 1966). Research suggests that in psychosis, delusions have been associated with a tendency to jump to conclusions (Dudley et al., 2016; Moritz & Woodward, 2005; So et al., 2016). Researchers have also proposed that gathering more information in psychosis is more likely to lead to better clinical insight (Kuokkanen et al., 2016). Despite many studies examining JTC in OCD (cf. Strauss et al., 2020), very few have examined JTC and its relation to insight in OCD. One study suggested a marginal, negative correlation between JTC and cognitive insight (Reese et al., 2011).

The current study examines the relationship between cognitive factors (i.e. metacognition, cognitive flexibility, and JTC) and clinical and cognitive insight at pre-treatment. In addition, we explore the improvement in cognitive variables via treatment, as well as the relationship between the factors’ changes and changes in insight over treatment. We hypothesized that 1) Higher clinical insight (i.e. individuals who are aware that they have a problem) will be associated with more dysfunctional metacognitive beliefs, whereas higher cognitive insight (i.e. individuals who consider different alternatives) will be associated with fewer dysfunctional metacognitive beliefs at pretreatment. 2) Higher self-reported cognitive flexibility will be associated with higher clinical and cognitive insight at pretreatment. In particular, we predicted that higher cognitive flexibility will be related to the ability of an individual to perceive different explanations for behaviors and generating alternative thoughts. 3) Based on previous research showing that individuals with delusions produce few alternative explanations and have difficulty changing beliefs, we expected that individuals with low cognitive and clinical insight use less data (fewer beads) to reach a decision (decide which jar the beads are drawn from) at pretreatment. 4) In order to test the correlation between changes of insight and metacognition/cognitive flexibility changes, we assessed whether these factors improve with treatment and then examined the relationship between the changes. We predicted that metacognition and cognitive flexibility will improve during treatment and that 5) greater changes in metacognition and cognitive flexibility will relate to greater changes in both clinical and cognitive insight.

**Method**

*Participants and recruitment*

We recruited participants for a treatment study using online and public advertisements as well as referrals. We directed participants to the study website to register. Prospective participants who registered were asked to sign an online informed consent form and complete a series of online questionnaires, including the Panic Disorder Severity Scale—Self-Report Version (Houck et al., 2002) and the Anxiety Sensitivity Index (Taylor et al., 2007). Participants were screened over the phone and if found to be eligible, they were invited to a clinical interview. Before the interview, participants provided informed consent and were then interviewed using the Mini International Neuropsychiatric Interview (Sheehan, 2015) for DSM-5 Axis I disorders as well as the Panic Disorder Severity Scale—Interviewer version (Shear et al., 2001).

The sample consisted of 83 patients (56 women (67%)), aged between 21 and 74 years (38.86, SD = 11.28). It was well educated with an average of 14.63 years of education (SD = 2.46); 51 (61%) patients reported that they were employed and 33 (39%) reported
The current use of medications when enrolling in the study. Regarding languages, most of the sample (90%) their native language was Hebrew, 5% native Russian, 4% Native English language, and 1% Romanian language. The rate of attrition in the sample was 46%. The study was conducted at The Laboratory for The Study and Treatment of Mental Health and Well-being at the Hebrew University of Jerusalem, and it was approved by the university’s Research Ethics Committee.

**Inclusion and exclusion criteria**

In order to be included in the study, participants needed to meet the following criteria: (a) DSM-5 diagnosis of PD with or without agoraphobia; (b) age 18 years or older; (c) PD duration of at least 2 months; (d) no substance abuse, dependence, or active suicide risk within the last 6 months; (e) an absence of any current or history of psychosis or uncontrolled bipolar I disorder; (f) no current psychotherapy for treating PD or history of a complete course of CBT for PD; (g) stable medication dosage for 3 months; (h) no reporting of significant general medical illness; and (i) willingness and ability to use the internet and read and write in Hebrew.

**Treatment and therapists**

The treatment provided was ICBT based on Craske and Barlow’s treatment protocol and is consistent with updates from Craske et al. (2022). The treatment was oriented to take approximately 16 weeks with a specific time frame for each module with flexibility. Patient adherence to treatment was monitored throughout the process. The therapists were master’s or doctoral-level students who had received extensive training in CBT for PD. During treatment, therapists met weekly with a licensed clinical psychologist for group supervision. Therapists were generally aware of the study’s aim (i.e. that insight in PD was being examined) but did not know of the specific hypotheses regarding which factors may be related to insight. For details regarding treatment and therapists’ role see Strauss et al. (2022).

**Measures and tasks**

All measures were translated into Hebrew and then translated back to English to ensure validity of translation.

**Insight measures**

**The Brown Assessment of Beliefs Scale (BABS; Eisen, 1998)**

The BABS is a semi-structured interview that assesses cognitive insight. Patients were asked to characterize their panic beliefs and fears related to the consequences of an attack. The scale has good psychometric properties (Eisen et al., 1998). Insight was additionally assessed by adding two questions (i.e. items 8 and 9) to the end of the BABS. To explore the similarities and differences in thinking versus feeling about beliefs, item number 8 was as follows: “How much do you feel that your ideas or beliefs are accurate?” The additional item number 9 asked participants to anticipate what other people who deal with the same problem think about their beliefs. In order to facilitate
interpretation of different measures, scores were reversed to indicate that a higher composite score indicates good cognitive insight. In the present sample, Cronbach’s alphas for the BABS were $\alpha = .78$, .79 at pre- and post-intervention, respectively.

**The Scale for the Assessment of Insight (SAI; David, 1990)**
The SAI assesses clinical insight. We adapted the SAI to be relevant to PD and was administered by an interviewer. It included three items: (a) “Do you think you have an illness? Do you think there is something wrong with you?”; (b) “Do you think you have a mental/psychiatric illness?”; and (c) “How do you explain your illness?” We believed that many individuals with PD may admit to having a mental disorder rather than a mental illness. Thus, we added an additional question to the end of the measure in which the interviewer read the DSM-5 definition of mental disorder and then asked if they think they have a mental disorder. A higher composite score indicates good clinical insight. In the present sample, Cronbach’s alphas for the SAI were $\alpha = .49$, .47 at pre- and post-intervention, respectively.

**The Self-Appraisal of Illness Questionnaire (SAIQ; Marks et al., 2000)**
The SAIQ is a self-report measure of clinical insight. It includes 17 items that assess the recognition of an illness, need for treatment, and worries about the illness and related issues. In order to facilitate interpretation of different measures, scores were reversed to indicate that a higher composite score indicates good clinical insight, lower denial of the presence of symptoms, and the need for treatment. In the present sample, Cronbach’s alphas for the SAIQ were adequate $\alpha = .71$, .75 at pre- and post-intervention, respectively.

**The Beck Cognitive Insight Scale (BCIS; Beck et al., 2004)**
The BCIS is a 15-item self-report measure that assesses cognitive insight and includes two subscales: self-reflectiveness (e.g. ability to acknowledge different points of view and alternatives when making a decision) and self-certainty (e.g. certainty in beliefs) (Beck et al., 2004). The total composite score is calculated by subtracting the self-reflectiveness subscale from the self-certainty subscale. High composite scores indicate high cognitive insight. The measure is reported to have acceptable internal consistency for both subscales (Riggs et al., 2012; Shimshoni et al., 2011). In the present sample, Cronbach’s alphas for the self-reflectiveness subscale were $\alpha = .71$, $\alpha = .78$, and for the self-certainty subscale $\alpha = .65$, $\alpha = .54$ at pre- and post-intervention, respectively.

**Predictors of insight**

**The Cognitive Flexibility Inventory (CFI; Dennis & Vander Wal, 2010)**
The CFI is a 20-item self-report questionnaire that assesses cognitive flexibility. A high total score indicates higher cognitive flexibility. The scale has demonstrated excellent psychometric properties (Dennis & Vander Wal, 2010). In the present sample, Cronbach’s alphas for the CFI were $\alpha = .83$, .85 at pre- and post-intervention.
The Metacognition Questionnaire—30-item version (MCQ-30; Wells & Cartwright-Hatton, 2004)
The MCQ is a 30-item scale that assesses metacognition. The scale has demonstrated good psychometric properties in both clinical and nonclinical samples (Solem et al., 2009; Spada et al., 2008). Higher scores indicate more pathological or dysfunctional metacognitive beliefs. In the present sample, Cronbach’s alphas for the MCQ were α = .88, .92 at pre- and post-intervention.

Beads task (Huq et al., 1988; Phillip & Edward, 1966)
This task involves a series of two jars presented on a screen, each containing 100 colored yellow or blue beads. Participants were told that beads are taken randomly from one of the jars and were asked to decide from which jar the beads had been taken. We used a modified version of the task that entailed using different numbers of beads for each jar and trial (with subsequent sets containing 75/65/55 and 25/35/45 beads, respectively). The task includes 16 trials and the dependent variable for the task was the average number of beads requested before making a decision across all versions of the task. The beads task was administered only at pretreatment because we did not believe that it would change over the short time of the treatment.

Procedure
We interviewed participants using the BABS and SAI. We then asked participants to complete the beads task and a series of online questionnaires, including the BCIS, SAIQ and CFI. Questionnaires were randomized and presented to each participant in a different order. After completing pretreatment questionnaires, patients started treatment. After treatment, we invited patients for posttreatment interviews, and all interviews and questionnaires were completed as they were during the pretreatment interview.

Data analytic approach
The design and data analyses were preregistered on ClinicalTrials.gov (NCT04659577).
To determine the relationship between insight measures of the different factors, we calculated correlations among pretreatment insight measures (i.e. BABS, SAI, BCIS, and SAIQ) and pretreatment self-reported measures and tasks (i.e. MCQ, CFI, and JTC).
To examine whether these factors improve over the course of treatment, we used t-tests to compare changes in cognitive factors scores (i.e. CFI and MCQ) from pretreatment to posttreatment.
To examine whether the change in insight is related to changes in the examined factors, we calculated Spearman zero-order correlations among the changes in each insight construct (i.e. BABS, SAI, BCIS, and SAIQ) and changes in metacognition and cognitive flexibility (i.e. CFI and MCQ).
We conducted multiple comparisons for each hypothesis (n = 4) with an original alpha level of 0.05. A Bonferroni correction was applied to adjust for multiple comparisons, resulting in a corrected alpha level of 0.0125 (0.05/4). All p-values reported are corrected and considered statistically significant if they are less than 0.0125.
Results

**Insight and cognitive factors at pretreatment**

Means and standard deviations for all insight and factor measures are presented in Table 1 and correlations among factor scores at pretreatment are presented in the Appendix.

Supporting our hypothesis concerning the relationship between clinical insight and metacognition at pretreatment, the self-report measure of clinical insight (SAIQ) was significantly, negatively associated with MCQ self-report measure at pretreatment ($r(71) = -0.48, p = 0.001852$). However, in contrast to our hypothesis, the self-report of cognitive insight (i.e. BCIS) was significantly, positively associated with dysfunctional metacognition (i.e. MCQ) at pre-treatment ($r(76) = 0.31, p = 0.006552$).

Concerning our second hypothesis and the relationship between insight and cognitive flexibility at pretreatment, in contrast to our hypothesis, the clinical insight interview (SAI) was significantly, negatively associated with cognitive flexibility self-report measure at pretreatment ($r(67) = -0.33, p = 0.005107$). Also, contrary to our predictions, cognitive flexibility was not significantly associated with BCIS nor the BABS (see Table 2).

**Table 1.** Mean and standard deviation for pre- and post-treatment scores of insight and cognitive measures.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pre Treatment</th>
<th>Post Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>m</td>
</tr>
<tr>
<td>BABS</td>
<td>83</td>
<td>6.08*</td>
</tr>
<tr>
<td>SAI</td>
<td>70</td>
<td>4.02</td>
</tr>
<tr>
<td>BCIS</td>
<td>78</td>
<td>5.17*</td>
</tr>
<tr>
<td>SAIQ</td>
<td>73</td>
<td>11.41*</td>
</tr>
<tr>
<td>CFI</td>
<td>78</td>
<td>95.00</td>
</tr>
<tr>
<td>MCQ</td>
<td>78</td>
<td>68.50*</td>
</tr>
</tbody>
</table>

BABS = Brown Assessment of Beliefs Scale: lowers score indicates better insight; SAI = The Scale for the Assessment of Insight: higher scores indicates better insight; BCIS = Beck Cognitive Insight Scale: higher scores indicates better insight; SAIQ = The Self-Appraisal of Illness Questionnaire: lower scores indicates better insight; CFI = Cognitive Flexibility Inventory: higher scores indicates greater cognitive flexibility; MCQ = Metacognition Questionnaire: lower scores indicates lower levels of unhelpful cognitions.

*difference from pre to post.

**Table 2.** Spearman correlations between pre-treatment scores of insight and cognitive measures.

<table>
<thead>
<tr>
<th>Variables</th>
<th>CFI</th>
<th>MCQ</th>
<th>JTC</th>
</tr>
</thead>
<tbody>
<tr>
<td>BABS</td>
<td>.18</td>
<td>-.062</td>
<td>-.061</td>
</tr>
<tr>
<td>SAI</td>
<td>-.33*</td>
<td>.24</td>
<td>-.045</td>
</tr>
<tr>
<td>BCIS</td>
<td>-.052</td>
<td>-.31*</td>
<td>.20</td>
</tr>
<tr>
<td>SAIQ</td>
<td>-.21</td>
<td>.48*</td>
<td>-.062</td>
</tr>
</tbody>
</table>

For clarity sake, positive correlations indicate better insight is related to more functional cognition, and negative correlations indicate relationships in opposite directions.

BABS = Brown Assessment of Beliefs Scale; SAI = The Scale for the Assessment of Insight; BCIS = Beck Cognitive Insight Scale; SAIQ = The Self-Appraisal of Illness Questionnaire; CFI = Cognitive Flexibility Inventory; MCQ = Metacognition Questionnaire; JTC= Jumping to conclusions.

* significantly different from zero at the $p < 0.01$ level.
Contrary to our hypothesis about the association between insight and JTC at pretreatment, neither clinical insight nor cognitive insight were associated with JTC (see Table 2).

**Change of factors over treatment**

Means and standard deviations for factor measures are presented in Table 1.

Similar to our hypothesis concerning the changes in metacognition and cognitive flexibility over treatment, a paired sample t-test revealed significant improvement in MCQ scores with mean difference of ($M = 5.86$) ($t(49) = 4.19, p = 0.000113$), but contrary to our prediction no improvement in CFI scores from pre- to post-treatment ($t’s < -.1.1, p’$’s > .06).

**The association between changes in insight and changes in the factors**

In terms of our hypothesis regarding the change in clinical insight and in contrast to it, greater change in SAIQ was associated with less change in MCQ ($r(47) = -0.47, p = 0.000745$). The change in SAIQ was not related to changes in CFI ($p > .01$, see Table 3). Changes in SAI were also not correlated with any of the predictors ($p > .01$, see Table 3).

Partially supporting our prediction about the change in cognitive insight, greater change in BABS was associated with greater change in CFI ($r(43) = .41, p = 0.00537$), but not with MCQ. Changes in BCIS were not significantly related to MCQ or CFI (see Table 3).

**Discussion**

This study examined cognitive correlates of clinical and cognitive insight in PD patients receiving ICBT. Both clinical and cognitive insight were associated with metacognition at pre-treatment partially our first hypothesis. With reference to our second hypothesis

| Table 3. Spearman correlations between changes in scores of insight and cognitive measures. |
|----------------------------------|----------------|----------------|
| Variables | $\Delta$ CFI | $\Delta$ MCQ |
| $\Delta$ BABS | .41* | 0.12 |
| $\Delta$ SAI | 0.22 | .05 |
| $\Delta$ BCIS | 0.05 | 0.59 |
| $\Delta$ SAIQ | 0.05 | 0.47* |

*For clarity sake, positive correlations indicate better insight is related to more functional cognition, and negative correlations indicate relationships in opposite directions.*

SAIQ = The Self-Appraisal of Illness Questionnaire; SAI = The Scale for the Assessment of Insight; BCIS = Beck Cognitive Insight Scale; BABS = Brown Assessment of Beliefs Scale; CFI = Cognitive Flexibility Inventory; MCQ = Metacognition Questionnaire; JTC = Jumping to conclusions.

*significantly different from zero at the $p < 0.01$ level.
about the association between insight and cognitive flexibility, partially supporting our hypothesis, only clinical insight was associated with cognitive flexibility at pretreatment. Surprisingly and in contrast to our third hypothesis, neither clinical nor cognitive insight was associated with JTC at pretreatment. For our fourth hypothesis about the improvement of factors over treatment, in contrast to our predictions, only metacognition improved with treatment. Overall, for our last hypothesis concerning the relationship between changes in insight and changes in cognitive factors, greater changes in metacognition were associated with greater changes in clinical insight, and greater changes in cognitive flexibility were related to greater changes in cognitive insight.

With regard to the cross-sectional relationship between clinical insight and metacognition, findings supported our hypothesis: impaired clinical insight was associated with fewer dysfunctional metacognitive beliefs at pretreatment. This may imply that individuals with PD who have greater denial of their symptoms or condition may be less preoccupied by dysfunctional metacognitive beliefs. One possibility is that these individuals may be more preoccupied with the content of their worry and less with their mental state (e.g. thoughts or the fact that they are worried) and, therefore, less likely to notice they have a problem (Wells, 2009). This might happen because they may be less focused on their internal experiences (e.g. thoughts) and more focused on the external world. These results replicate the findings of Halaj and Huppert (2021) who found similar results. However, these results are in contrast to findings indicating that delusions are related to more dysfunctional metacognitive beliefs (Morrison & Wells, 2003). Given that this finding has been found twice in anxiety, it appears that the relationship between clinical insight and metacognition is different in nonpsychotic patients as compared to psychotic patients. Future studies should examine behavioral measures of metacognition along with self-report measures to further examine this issue.

Surprisingly, our findings indicated that better cognitive insight was somewhat associated with a higher tendency to have dysfunctional metacognitions but not greater cognitive flexibility. This suggests that individuals with PD who are self-reflective might be more likely to think about the process and content of their cognitions because they are less confident about them, which may reinforce their negative beliefs. These results are in line with findings in anxiety and OCD, suggesting a positive association between cognitive insight and metacognition (Ekinci & Ekinci, 2016; Halaj & Huppert, 2021). These results can be explained by the metacognitive model (Wells, 2000, 2009) that proposes that individuals with anxiety have negative thoughts about their experiences (“anxiety is dangerous”). However, they also may have positive thoughts about worry, which could contribute to preserving their anxiety. The fact that they are self-reflective reflects the need to keep seeking reassurance that anxiety is not dangerous, which leads to worrying, ruminative thinking, and more ineffective thinking or dysfunctional metacognitive beliefs. The current result may imply that these individuals can benefit from cognitive work or treatments that focus on challenging beliefs. For example, these individuals may benefit from working on metacognitive changes to challenge their negative thoughts and focus less on worrying, which will make them more confident about their beliefs and help them realize it is beneficial to stop worrying about anxiety. Targeting their awareness to their thoughts may result in more beneficial treatment or, perhaps, better decision-making and reactions in stressful situations.
However, these results are in contrast with results in OCD and schizophrenia, suggesting a negative association between cognitive insight and metacognition (Lysaker et al., 2008; Visser et al., 2017). It might be that obsessions in OCD are similar to the notion of self-certainty; greater confidence about being right and more resistance may lead to less thought distancing. This type of certainty may differ regarding the consequences of panic attacks in PD due to feedback from medical professionals informing that panic attacks are not dangerous.

Concerning the relationship between clinical insight and cognitive flexibility, better clinical insight was somewhat associated with lower cognitive flexibility, in contrast to our hypothesis. This finding suggests that higher cognitive flexibility is somewhat related to denial of having a disorder. One interpretation is that the more individuals with PD are able to replace worrying thoughts with adaptable thinking and perceive anxious situations as controllable, the more they are unaware of their problem. Overall, this finding is counter-intuitive and requires replication and further examination. Indeed, these results are in contrast with the findings of Halaj and Huppert (2021) suggesting that self-reported flexibility was unrelated to clinical insight. More research is needed to determine whether using cognitive flexibility behavioral tasks will obtain the same results in nonpsychotic disorders.

The nonsignificant results of cognitive insight and cognitive flexibility are surprising because of the prediction that poor cognitive insight would be associated with deficits in cognitive flexibility. It could be that assessing cognitive flexibility by self-report was confounded by the impact of social desirability as well as by poor meta-cognitive awareness about flexibility. That is, some individuals might have poor “insight” into their lack of flexibility. The nonsignificant results in this study are in contrast with findings in psychosis and OCD suggesting that cognitive inflexibility is related to impaired insight (see review Aleman et al., 2006; Kitis et al., 2007). It might be that inflexibility or rigidity in OCD and psychosis may be more related to these disorders than beliefs about panic attacks in PD. Specifically, in OCD, the rigidity in considering alternatives is similar to compulsions, and in psychosis, the rigidity may appear as delusional conviction.

There was no association between either type of insight and JTC, suggesting that gathering information to make a decision is not related to awareness of the problem or self-reflectiveness. These findings are in contrast to findings in psychosis and OCD suggesting a negative correlation between JTC and cognitive insight (Freeman et al., 2008; Reese et al., 2011). It could be that JTC bias is related more to insight in OCD than PD because OCD individuals are more hesitant and indecisive in making decisions and require more information to make them. The nonsignificant result in this study is possibly a consequence of the small number of observations. Future researchers should further investigate this relationship using a greater number of trials on the task or with alternative tasks.

Similar to our hypothesis, metacognition improved throughout treatment. The improvement in metacognition suggests that the tendency to have fewer dysfunctional metacognitive thoughts improved over ICBT. These results are supported by research suggesting that metacognition improved in OCD patients when treated with exposure therapy (Solem et al., 2009). Taken together, these studies suggest an important direction for understanding the effects of exposure-based therapy for panic: in addition to
cognitive (Teachman et al., 2010), emotion regulation (Strauss et al., 2019), and behavioral processes (e.g. Halaj et al., 2019), improvements also occur in meta-cognitive processes. These results likely apply beyond treatment of panic to general processes that occur in exposure therapy and beyond. However, this study did not find any improvement in cognitive flexibility from pre- to post-treatment, which was contrary to the initial prediction. These results suggest that while treatment may lead to improvement in metacognition, it may not have a direct effect on cognitive flexibility. This could be further explored in future studies.

In contrast to our hypothesis, greater change (worsening) in clinical insight was associated with larger reductions of dysfunctional metacognitions, suggesting higher denial of symptoms, more changes in negative attitudes about thoughts. Given the previous similar findings (Halaj & Huppert, 2021), it is likely that these results reflect a similar phenomenon: when metacognitions (and therefore symptoms) improve, one may indeed no longer suffer from the disorder. Thus, this may not reflect worsening of clinical insight and increase in denial as much as reduction in experiencing of symptoms and therefore a lower likelihood of actually suffering from the disorder. Similar to our hypothesis, greater change in cognitive insight was somewhat associated with greater change in cognitive flexibility. This could indicate that as the individual’s conviction in their beliefs decreases, they are more likely to try to generate alternative thoughts.

This study has several limitations. First, the sample was homogenous; all patients had a primary diagnosis of PD and actively applied for treatment, which limits our ability to generalize our findings. Therefore, our findings need to be replicated with other samples. The absence of a control group limits the ability to determine whether the improvement in insight is due to treatment effects. Besides the beads task, all the other measures were self-report instruments. It would be important to use behavioral tasks and self-reports to determine whether cognitive flexibility using behavioral tasks is related to insight into PD. In addition, the dropout rate in this study was high (46%) (Strauss et al., 2022), which makes some of the measures less accurate because of the reduced sample size, and could make it harder to generalize the results. Another limitation is the absence of reliability ratings of the insight interviews and the low internal consistency of the SAI. Future studies need to include reliability data on clinical ratings. Finally, our findings are the first of their kind and require replication in similar samples to ensure their stability.

**Conclusion**

This study is the first to investigate the relation of both clinical and cognitive insight to cognitive factors in patients diagnosed with PD receiving treatment. The results suggest that metacognition is related to both cognitive and clinical insight, whereas cognitive flexibility was to some degree related to both types of insight at pretreatment. However, JTC was unrelated to any type of insight at pretreatment. Metacognition improved in ICBT for PD and was associated with change in both clinical and cognitive insight. Our findings suggest that there is a need to better understand the factors that underlie insight and determine the factors differentially related to each construct as well as those factors related to both. This study contributes to understanding the phenomenology of insight in PD, an understudied topic. It specifically suggests that metacognitive beliefs are important for understanding awareness of symptoms and thoughts in PD. Future research
would benefit from further examination of the factors related to the constructs of insight and their relation to changes in various treatments across different anxiety disorders.

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**References**


Oguz, G., Celikbas, Z., Batmaz, S., Cagli, S., & Sungur, M. Z. (2019). Comparison between obsessive compulsive disorder and panic disorder on metacognitive beliefs, emotional schemas,


