# The assessment of decision-making competence in patients with depression using the MacArthur Competence Assessment Tools: A systematic review

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**DISCLOSURE STATEMENT**

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**ABSTRACT**

*PURPOSE:* This is a systematic review of the usefulness of the MacArthur Competence Assessment Tools (MacCAT) in assessing the decision-making competence in patients with depression.

*DESIGN AND METHODS:* A systematic literature search was performed.

*FINDINGS:* Eleven studies met the search criteria. The decision-making capacity was impaired in 9%-31% of patients with depression. There was inconsistency regarding the differences of MacCAT scores between patients with depression and controls, while relatively large effect sizes were found on the Appreciation and Reasoning MacCAT subscales.

*PRACTICE IMPLICATIONS:* The MacCAT appears to be a useful tool for measuring decision-making capacity in patients with depression, but the association between depression and competence is not consistent. The mechanisms mediating such association are likely to be complex and multifactorial.

**Key words:** Decision-making capacity, depression, MacArthur Competence Assessment Tools, systematic review

**INTRODUCTION**

The assessment of competence is important in judging patients' capacity to give consent to clinical care or participate in research. According to contemporary understanding on informed consent (Dunn et al., 2006; Lamont, Jeon, & Chiarella, 2013; Sturman, 2005; Vellinga, Smit, van Leeuwen, van Tilburg, & Jonker, 2004), patients should have adequate understanding of the choices and have the capacity to give consent which

must be given entirely voluntarily. Several psychiatric disorders, such as depression, psychoses or dementia, could impair decision-making capacity (Hindmarch, Hotopf, & Owen, 2013). Given the high prevalence of depression worldwide, it is important to examine its impact on decision-making capacity (Meynen, 2011),.

Over the past decades, several reliable and valid assessment tools for competence related to functional abilities have been developed including the various versions of the MacArthur Competence Assessment Tool (MacCAT) (Appelbaum & Grisso, 1995; Appelbaum & Roth, 1982; Grisso & Appelbaum, 1995; Grisso, Appelbaum, Mulvey, & Fletcher, 1995). These versions include the MacArthur Competence Assessment Tool for Treatment (MacCAT-T), the MacArthur Competence Assessment Tool for Clinical Research (MacCAT-CR) and the MacArthur Competence Assessment Tool for Criminal Adjudication (MacCAT-CA) (Poythress, Bonnie, Monahan, Otto, & Hoge, 2002). All these versions have been widely used in psychiatry. These are semi-structured interviews with four subscales assessing four components of decision-making capacity: Understanding, Appreciation, Reasoning, and Expression of a Choice. However, there is no consensus

regarding the cut-off points of the MacCATs to categorise the levels of competence impairment.

   The basic MacCAT measures decision-making capacity in psychiatric patients in the following aspects: Understanding Treatment Disclosure (UTD), Perception of Disorder (POD), and Thinking Rationally about Treatment (TRAT). The basic MacCAT takes around 60-90 minutes to administer, but it is not recommended for clinical use because it is time-consuming (Grisso & Appelbaum, 1995). The newly developed versions are far shorter; for example, the MacCAT-T designed for clinical settings requires about 15-20 minutes to complete (Grisso, Appelbaum, & Hill-Fotouhi, 1997). The MacCAT-CR, derived from the MacCAT-T, has 21 structured items and takes 20-25 minutes to measure the same domains as the MacCAT-T: Understanding (13 items), Appreciation (3 items), Reasoning (4 items), and Expression of a Choice (1 item) (Appelbaum & Grisso, 2001; Grisso & Appelbaum, 1998). The MacCAT-CA is a 22-item structured interview for the pretrial assessment of adjudicative competence, which assesses only Understanding, Reasoning and Appreciation (Poythress et al., 2002). The MacCATs have been shown to

have acceptable psychometric properties for assessing competence (Grisso et al., 1995).

Studies examining the usefulness of MacCATs in assessing the decision-making capacity in patients with depression have yielded conflicting results. In earlier studies, patients with depression showed poorer decision-making capacity compared to healthy controls (Cohen, McGarvey, Pinkerton, & Kryzhanivska, 2004; Grisso & Appelbaum, 1995), but more recent studies did not confirm this finding (Appelbaum, Grisso, Frank, O'Donnell, & Kupfer, 1999; Christopher et al., 2011; Maxmin, Cooper, Potter, & Livingston, 2009; Owen et al., 2009).

One review examined decision-making capacity in depression (Hindmarch et al., 2013), however, several studies (Christopher et al., 2011; Fisher et al., 2012; Maxmin et al., 2009; Redding, 1997) using the MacCAT were not included in this review. In addition, the rates of impaired decision-making capacity in depression and the quantitative analyses, such as effect size of impaired decision-making capacity between patients with depression and controls, have not been adequately examined.

This is hence a systematic review of the usefulness of the MacArthur Competence Assessment Tools (MacCAT) in assessing the decision-making competence in patients with depression in different settings.

**METHOD**

**Search strategies**

The following terms "MacCAT", "decision making", "capacity', "competence", "depression" and "depressive disorder" were searched independently by two reviewers (YYW and SBW) using both English (the Medline, EMBASE, PsycINFO, Cochrane Library) and Chinese databases (WANFANG, and Chinese National Knowledge Infrastructure) from January 1995 (when MacCAT was first published) to May 2016. The reference lists of the relevant papers were also searched and first/correspondence authors were contacted for missing information if necessary.

**Study selection**

All original quantitative studies that (1) used the MacCAT to assess the decision-making capacities in depression, and (2) provided MacCAT scores were included. Case studies or interviews were excluded. Two reviewers (SBW and YYW) checked the titles and abstracts of the initial search results

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independently. Any inconsistencies or disagreements during these procedures were checked and resolved by a third reviewer (YTX). Then the full texts of the studies that met the selection criteria were obtained for data extraction.

**Data extraction**

Data was independently extracted by two reviewers (YYW and SBW) and was checked by a third reviewer (YTX). The following information were extracted and tabulated: sample size, study setting and age of the participants, recruitment method, the MacCAT version, psychometric properties of the MacCAT, and correlations of depression with the scores of MacCAT subscales. Psychometric properties of the MacCAT included inter-rater agreement measured by the interclass correlation coefficient, kappa, test-retest correlation measured by the Kendall's tau, and inter-item or with the overall capacity judgment association. Where possible, effect sizes were computed in terms of Cohen's *d* as benchmarks for assessing the magnitude of differences between patients and controls on MacCAT scores.

**RESULTS**

There were 233 publications initially retrieved from the databases but only 15 publications met the selection criteria. Of the 15 studies, only data from

11 studies were included because 4 publications used the same dataset (Figure 1). All 11 included studies were published in English-language journals. Table 1 displays the studies that met the selection criteria and provides an overview of their characteristics. Due to the heterogeneity of the selected studies in terms of study design, quality assessment measures were not used, and data analysis and synthesis could not be conducted.

Six studies used the MacCAT-T including the MacCAT original version, 4 studies applied the MacCAT-CR, and 1 study employed the MacCAT-CA. A total of 433 patients with depression (mean sample size per study was 39) were covered in the 11 studies.

Five studies reported reliability figures of the MacCAT showing high levels of agreement with the kappa or interclass correlation coefficient being higher than 0.80 (Appelbaum et al., 1999; Appelbaum & Redlich, 2006; Cairns et al., 2005; Maxmin et al., 2009; Vollmann, Bauer, Danker-Hopfe, & Helmchen, 2003) although the component items and scoring rules varied between the MacCAT versions.

Rates of between 9% (Maxmin et al., 2009) and 31% (Owen et al., 2008) of patients with depression were classified as having impaired

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competence capacity based on different criteria. Using the MacCAT-T in three studies (Appelbaum & Redlich, 2006; Lapid et al., 2003; Maxmin et al., 2009), the pooled scores of Understanding, Appreciation, Reasoning and Expression of a Choice in depression were estimated as 5.12 (SE=0.28), 3.87 (SE=0.07), 6.03 (SE=0.19) and 1.80 (SE=0.12), respectively (data are not shown in the Table). The pooled score using MacCAT-CR could not be calculated due to the inconsistency of scoring rules between studies and missing data.

Comparisons between patients with depression and controls however showed inconsistency between studies: four studies found that depression impaired decision-making competency (Cohen et al., 2004; Grisso & Appelbaum, 1995; Owen et al., 2009), but three studies could not replicate this finding (Appelbaum et al., 1999; Christopher et al., 2011; Maxmin et al., 2009). Relatively large effect sizes of the difference between patients and controls were found on the Appreciation (-0.69 in Cohen et al.'s study (Cohen et al., 2004)) and Reasoning component subscales (-0.85 in Cohen et al.'s study (Cohen et al., 2004) and -0.49 in the Grisso and Appelbaum's study (Grisso & Appelbaum, 1998), but the effect size was small on the Understanding component subscale (-0.02 in Cohen et al.'s study (Cohen et

al., 2004) and -0.04 in the Grisso and Appelbaum's study (Grisso & Appelbaum, 1998). Furthermore, medium to large effect sizes were found on the Understanding, Appreciation and Reasoning subscales in comparisons between patients with depression, schizophrenia and dementia (Table 1).

**DISCUSSION**

This review of 11 studies found considerable variability in study settings (inpatients or outpatients), sample sizes, age range of the participants, nature of interventions, and control groups ranging from non-psychiatric community volunteers to inpatients with neuropsychiatric diagnoses. Dementia and schizophrenia patients were also included in some samples to explore the difference of their decisional capacity with patients with depression. Due to the sample heterogeneity, it was difficult to conduct complex analyses and be conclusive on the general impact of depression on MacCAT score. However, a summary provided on the relationships between depression and MacCAT scores can assist further studies on the association between the severity of depression and MacCAT scores.

Apart from the depressive illness itself, decision-making capacity could be affected by other variables. The lack of capacity could be associated with

increasing age, impaired insight and cognitive functions (Raymont et al., 2004). In younger adults, lack of decision-making capacity is usually associated with poor insight and psychosis, rather than cognitive impairment. However, in older psychiatric inpatients, intact capacity was related to higher levels of insight and cognition (Maxmin et al., 2009). There is a strong negative relationship between depressive mood and decision-making capacity, and a weak negative relationship between poor insight and decision-making competence in non-psychotic disorders (Owen et al., 2009).

In general, depression appears to have less impact on the decision-capacity than other severe psychiatric or neurological disorders, such as schizophrenia or dementia (Cohen et al., 2004; Palmer et al., 2005; Vollmann et al., 2003). Educational interventions could improve decisional capacity; geriatric patients with depression could helped to attain adequate decisional capacity to consent to electroconvulsive therapy (ECT) (Lapid, Rummans, Pankratz, & Appelbaum, 2004). Similar results were also reported in patients with schizophrenia (Naughton et al., 2012; Wang et al., 2016). Willingness to participate in studies was also associated with higher MacCAT-CR scores on the Understanding and Expression of a Choice

subscales (Candilis, Geppert, Fletcher, Lidz, & Appelbaum, 2006). Emotional withdrawal in depression affects the willingness to participate in studies on competence, which, in turn, could worsen decision-making capacity (Redding, 1997).

Finally, the limitation of this review is the heterogeneous collection of studies with different purpose, subject cohorts and versions of the MacCAT. However, all versions assess decision-making competence in similar domains. Further, it should be noted that several studies included in this review had small samples although none of the case studies were included.

In conclusion, the mechanisms mediating the association between depression and decision-making capacity are likely to be complex and multi-factorial. Future research should ascertain the independent association between depression and decision-making capacity. In addition, the reliability and validity of the MacCATs used in different populations and contexts should be further tested to ascertain the usefulness of these instruments.

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Figure 1. PRISMA flow diagram Table 1. Studies Measuring Decisional Capacity by MacCAT. Comparisons between Participants with Depression, Non-psychiatric Controls or Other Psychiatric Disorders Participants.

215 Articles identified through database search

50 Additional articles identified through other sources

233 Articles identified after duplicates were removed

88 Articles excluded (title and/or abstract were not relevant for the end point of the study)

145 Full-text articles considered for possible inclusion

128 Articles excluded due to lack of data on MacCAT for depression

15 Full-text articles assessed for eligibility

11 studies included in qualitative synthesis (4 articles reported on the same study population)

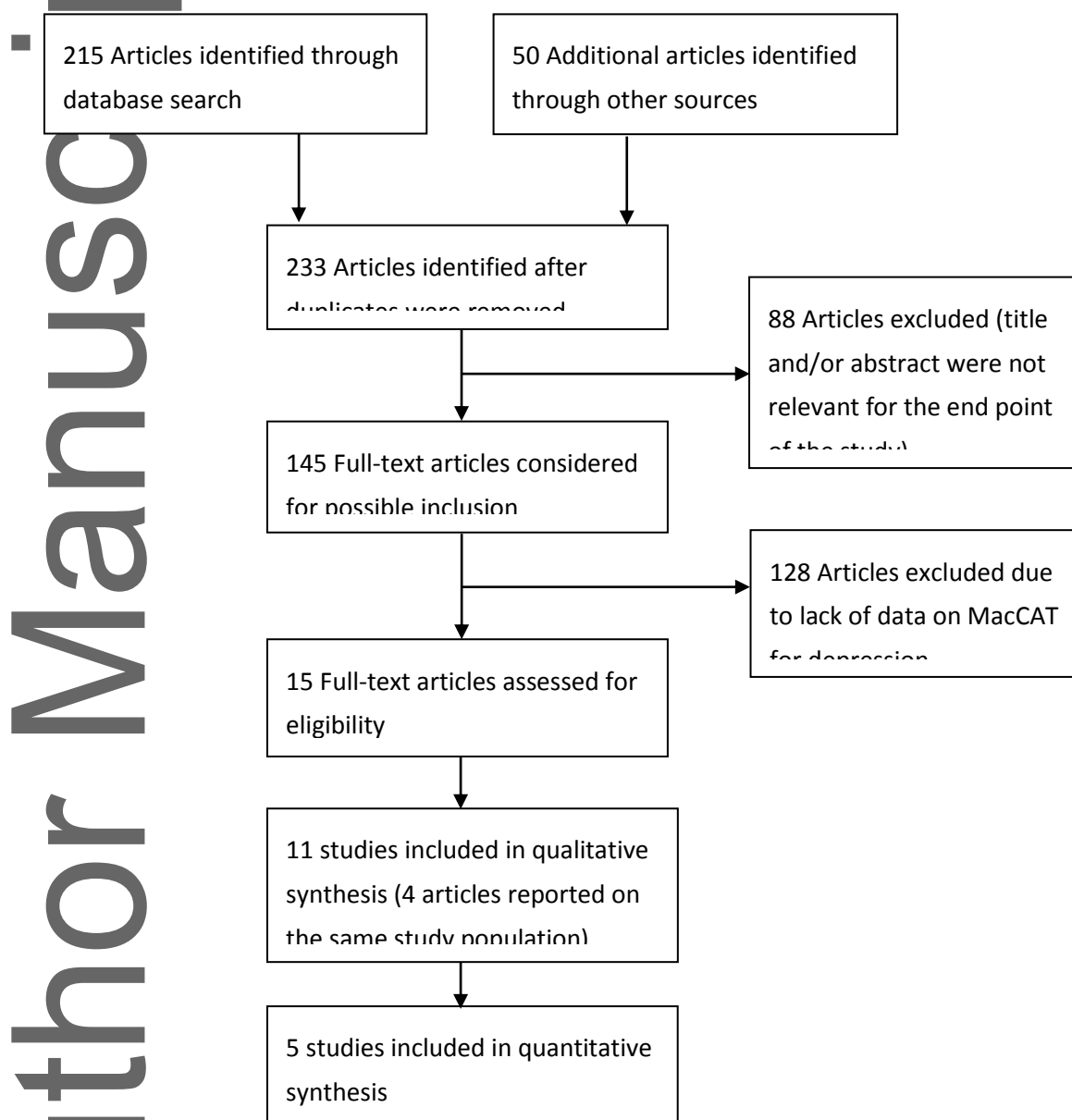5 studies included in quantitative synthesis

TABLE 1 Studies measuring decisional capacity by MacCAT. comparisons between participants with depression, non-psychiatric controls or other psychiatric disorders participants

| Study | Sample Characteristics | MacCAT Version and its Reliability | Proposed Study or Intervention | Effect Size/Findings | Comments |
|---|---|---|---|---|---|
| Grisso et al. (1995); Grisso and Appelbaum (1995) | DP group: *N*=92; Inpatients; Mean (SD) age=35.0 (9.5). Angina group: *N*=82; Inpatients; Mean (SD) age=55.3 (10.4). SC group: *N*=75; Inpatients; Mean (SD) age=34.8 (7.5). | MacCAT original version; Reliability (ICC): Understanding Treatment Disclosures=0.91; Thinking Rationally About Treatment=0.91 | NA | Understanding (Uninterrupted): DP vs. NPC=-0.04, DP vs. Angina=-0.03 (NS), DP vs SC=0.64; Reasoning (range 0-19): DP vs. NPC=-0.49, DP vs. Angina=-0.45, DP vs SC=0.74. | DP group and SC manifested poorer understanding of treatment disclosure, poorer reasoning in decision making regarding treatment, and a greater likelihood of failing to appreciate their illness or the potential benefit of treatment. |

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| Appelbaum et al. (1999) | DP patients: *N*=26; Inpatients and outpatients; Mean (SD) age=39 (10.45) years | MacCAT-CR; Reliability (8- to 10-week follow-up Test-retest correlation Kendall's tau): Understanding=0.26, P=0.08; Appreciation=0.36, P=0.01; Reasoning=-0.15, P=0.97. | Interpersonal psychotherapy | No effect sizes were calculable. The outpatient group with depression showed less impairments in their decision-making capacities related to research. | The MacCAT-CR was easily adapted for use in depression. |
| Vollmann et al. (2003) | DP group: *N*=35; Mean (SD) age=52.9 (13.3). Dementia group: *N*=31; Mean (SD) age=69.7 (9.3). SC group: *N*=43; Mean (SD) age=34.4 (11.9) | MacCAT-T; Reliability: All standards together showed moderate agreement (Fleiss' k=0.41, P<0.001). | NA | Understanding: DP vs. Dementia=1.25, DP vs. SC=0.29; Reasoning: DP vs. Dementia=0.66, DP vs. SC=0.60; Appreciation of disorder: DP vs. Dementia=0.58, DP vs. SC=1.12; Appreciation of treatment benefit: DP vs. | Patients with dementia and SC showed more often and severe impaired performance than depression patients. |

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| | | | | Dementia=1.13, DP vs. SC=0.14. | |
| Lapid et al. (2003); Lapid et al. (2004) | DP patients: *N*=40; Inpatients; Standard intervention group: *N*=20, mean (SD) age=60.20 (19.76); Experimental intervention group: *N*=20, mean (SD) age=53.85 (16.78) | MacCAT-T | ECT for severely depressed patients and educational interventions to improve their decisional capacity | Understanding (Experimental intervention group): Final vs. Initial=0.21. Reasoning (Experimental intervention group): Final vs. Initial=0.35. Appreciation (Experimental intervention group): Final vs. Initial=0.25. Choice (Experimental intervention group): Final vs. Initial=0.52. | Most patients with severe depression requiring ECT appeared to have decisional capacity to give informed consent to treatment. Education further improved decisional capacity. The geriatric group showed greater improvement in decisional capacity with education. |
| Cohen et al. (2004) | DP group: *N*=20; Inpatients; Mean (SD) age=34.1 (6.9). SC group: *N*=6; Inpatients; | MacCAT-CR | Drug study and Ketamine study | Understanding: DP vs. NPC=-0.02 (NS), DP vs SC=1.10; | DP group, while having a greater degree of impairment than the NPC |

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| | Mean (SD) age=40.0 (7.8). NPC group: $N$=20; Community subjects: Mean (SD) age=41.1 (10.3). | | | Appreciation: DP vs. NPC=-0.69, DP vs. SC=1.28; Reasoning: DP vs. NPC=-0.85, DP vs. SC=0.74. | group, still demonstrated relatively high decision-making capacity and was able to distinguish levels of risk between studies. Their pattern of preferences did not differ from that of the control subjects. However, they were more likely to refuse to participate in the research. |
| Cairns et al. (2005) | DP Group: $N$=25; Inpatients. Other psychotic disorder group: $N$=87; Inpatients. | MacCAT–T; Reliability (kappa)=0.82 | NA | Four (16.0%) DP patients, lack treatment-related decisional capacity. Lack of treatment-related decisional capacity is a common but by no means | England and Wales Draft Mental Incapacity Bill's definition of mental incapacity was used to reach a binary (yes/no) decision. |

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| | | | | inevitable correlate of admission to a psychiatric in-patient unit. | |
| Appelbaum et al. (2006) | DP Group: *N*=38; Outpatients. SC Group: *N*=63; Outpatients. BD Group: *N*=22; Outpatients. | MacCAT-T; Reliability (ICC): Understanding=0.98, Appreciation=0.94, Reasoning=0.90 | Use of leverage to encourage treatment adherence | Understanding: DP vs. SC=0.66, DP vs BP=0.27; Appreciation: DP vs. SC=0.19 (NS), DP vs. BP=0.15 (NS); Reasoning: DP vs. SC=0.12 (NS), DP vs. BP=0.42. | Education correlated significantly with Understanding, but only at one site (Pearson's r=.31, P<0.05) |
| Owen et al. (2008); Owen et al. (2009); Owen et al. (2011) | Total patient: *N*=350. DP group: *N*=71; Inpatients. | MacCAT-T | Principal decision on treatment concerned stabilization with drugs. | Prevalence of mental incapacity in depressive patients was 31% (95%CI: 20% to 44%). | Insight is a discriminator of capacity status in psychotic disorders, but gaining insight may not be a good indicator of regaining capacity in DP group |

| | | | | | compared with the SC and BP groups. Cognitive performance did not discriminate capacity status in patients with psychotic disorders. |
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| Maxmin et al. (2009) | Total participated patients: *N*=99; DP group: *N*=37. | MacCAT-T; Reliability: 100% agreement for assessment of capacity for treatment and admission for judgment of capacity. Significant associations were found between the scores on all four domains of the MacCAT-T and the overall capacity judgment. | NA | No effect sizes calculable. Three (9.1%) DP patients lack treatment-related decisional capacity. | Capacity was associated in patients with higher levels of insight and cognition. Patients with ementia were excluded. Those with depression were more likely to have capacity than those with psychosis. |
| Christoph er et al. (2011) | DP patients: *N*=28. | MacCAT-CR | Deep brain stimulation research for treatment-resist ant depression | No effect sizes were calculable. No correlation was found | Individuals made the decision to enroll in early-phase |

| | | | | | between performance on any of the three MacCAT-CR subscales and degree of depressive symptoms or demographic characteristics. | trials of deep brain stimulation based on a number of complex and sometimes idiosyncratic considerations. |

| Fisher et al. (2012) | DP patients: Site A: *N*=21; Inpatients; Mean (SD) age=42.7 (9.6). Site B. *N*=10; Inpatient; Mean (SD) age=44.4 (8.0) | MacCAT-CR | Deep brain stimulation research for depression | No effect sizes calculable | Subjects' performance on the MacCAT-CR was excellent, but therapeutic misconception was still apparent. A trend toward significance was found in the correlation between baseline depression ratings and total therapeutic misconception score. |

Responses to open-ended prompts revealed both reassuring and concerning statements related to expectations of risk, benefit, and individualization.

*Note:* BD=Bipolar Disorder; CI=Confidence Interval; DP=Depression; Electroconvulsive therapy=ECT; ICC=Interclass Correlation Coefficient; IQR=Interquartile range; MacCAT-CR=MacAthur Competence Assessment Tool for Clinical Research; MacCAT-T=MacArthur Competence Assessment Tool for Treatment; NA= Not Available; NPC=Non-psychiatric Comparison participants; NS=Non-significant; SD=Standard deviation.