



Metacognition in schizophrenia: The relationship of mastery to coping, insight, self-esteem, social anxiety, and various facets of neurocognition

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Objectives. Deficits in metacognition, or the ability to think about thinking, are common in schizophrenia and associated with functional impairment. Unknown are what elements of function are affected by what aspects of metacognition.

Design. This study explored whether participants with differing capacities for Mastery, a domain of metacognition that reflects the ability to use knowledge about mental states to respond to psychological challenges, had difficulties in different elements of daily function.

Methods. Participants were 98 adults with schizophrenia or schizoaffective disorder in a non-acute phase, classified into three groups on the basis of ratings of their capacity for metacognitive Mastery using the Metacognitive Assessment Scale: low Mastery (those unable to plausibly represent psychological challenges), Intermediate Mastery (those able to plausibly represent psychological problems but cope primarily through passive measures or avoidance), and high Mastery (those able to cope with plausible problems through cognitive means). Participants completed assessments of coping preference, insight, self-esteem, and anxiety.

Results. Multivariate Analysis of Variance (MANOVA) and Analysis of Variance (ANOVA) revealed that the high-Mastery group had a greater preference for coping with stressors by thinking and talking about them, and greater insight than all other groups, and higher levels of feeling accepted by peers than the intermediate-Mastery group. The intermediate-Mastery group reported higher levels of resignation when facing stressors and more social phobia than the other two groups. These findings of Mastery group differences in self-esteem and anxiety persisted when neurocognition was controlled for in an Analysis of Covariance (ANCOVA).

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Conclusions. Mastery appears linked to coping preference, insight, self-esteem, and anxiety in a generally non-linear manner.

Terms such as ‘Metacognition’, ‘Theory of Mind’, and ‘Mentalizing’ describe a general capacity to think about thinking (Dimaggio & Lysaker, 2010). These terms, often used interchangeably, refer to the ability to recognize and understand one’s own mental states as well as the mental states of others; individuals with high aptitude in this domain may be able to form, revise, and reform ideas about beliefs, feelings, fears, and dreams. These capacities allow persons to form a detailed picture of their own mental states, of the wishes and intentions of the others, and of the inner and social cues that trigger psychological pain, and thereby to cope with challenges and solve complex social problems such as negotiating between one’s wish and the demands of the relevant others. In the larger frame they make it possible for persons to make sense of their dilemmas, to find meaning in life, and to ultimately adapt to a changing environment. In this paper, we have selected the term ‘metacognition’ to refer to this general set of phenomena because of its potential to describe a wide range of internal and socially driven cognitive acts that contain primarily reflexive qualities (e.g., Semerari *et al.*, 2003).

For almost two decades metacognitive dysfunction has been recognized as a feature of schizophrenia (Frith, 1992). For instance, many people with schizophrenia have difficulty forming ideas about what other people are thinking and feeling on the basis of visual or verbal cues, developing a coherent account of their own mental states and personal narrative, and recognizing themselves as the source of their own thoughts and actions (Brüne, 2005; Harrington, Seiger, & McClure, 2005; Lafargue & Franck, 2009; Langdon, Coltheart, Ward, & Catts, 2002; Lysaker *et al.*, 2005; Lysaker & Lysaker, 2008; Saavedra, Cubero, & Crawford, 2009; Stratta *et al.*, 2007). These deficits appear to be relatively stable over time and, while correlated with severity of psychopathology, cannot be explained simply as a reflection of symptoms or other features of schizophrenia (Abdel-Hamid *et al.*, 2009; Bora, Yücel, & Pantelis, 2009; Langdon, Coltheart, Ward, & Catts, 2001; Roncone *et al.*, 2002). Of note, though metacognition appears to be trait-like in schizophrenia, the effectiveness of metacognition can be influenced by the intensity of emotions and beliefs across different situations (Dimaggio, Semerari, Carcione, Nicolò, & Procacci, 2007; Semerari *et al.*, 2003).

Deficits in metacognition have been intuited to play a role in the widespread dysfunction that characterizes schizophrenia. For one, a limited awareness of one’s own mental processes would seem naturally to incline a person to be unaware of their mental illness and need for treatment. Not understanding another’s perspective might render it difficult to gauge why someone has reacted negatively to what someone has said or done, while not being able to plausibly represent psychological problems may lead to a failure to engage in problem-solving strategies. Consistent with these speculations are studies suggesting that deficits in metacognition are linked with concurrent and prospective deficits in functioning (Brüne, Abdel-Hamid, Lehmkämpfer, & Sonntag, 2007; Bora, Eryavuz, Kayahan, Sungu, & Veznedaroglu, 2006; Horton & Silverstein, 2008; Lysaker, Dimaggio, Carcione *et al.*, 2010) and may mediate the impact of other clinical phenomena (e.g., neurocognition) on social and vocational outcome (Bell, Tsang, Greig, & Bryson, 2009; Lysaker, Shea *et al.*, 2010; McGlade *et al.*, 2008).

While there is emerging consensus that metacognition is generally linked with outcome, less is known about which aspects of metacognition are most closely associated with specific aspects of function. For instance, are certain kinds of metacognitive

impairment related to specific forms of coping, levels of self-esteem, or anxiety? To explore this issue, we have chosen to focus on one facet of metacognition (Mastery) as it relates to various aspects of daily function. Mastery, in the context of metacognition, refers to the ability to utilize knowledge of mental states to cope with psychological challenges (Carcione *et al.*, 2010; Semerari *et al.*, 2003). It is not a measure of general problem-solving ability, but rather of the ability to use an understanding of one's thoughts and feelings and the thoughts and feelings of others to cope with a number of subjectively distressing and challenging psychological experiences.

As adapted by Lysaker and colleagues (2005) from the rubric proposed by Semerari and colleagues (2003), Mastery in persons with schizophrenia has been operationalized as a dimensional construct. Specifically, persons can vary in terms of their capacity to perform increasingly complex acts of metacognitive mastery. Some, not capable of even the least complex forms of metacognitive mastery, are unable to plausibly describe psychological problems. Persons only capable of mastery in the intermediate range of complexity can plausibly describe psychological problems but cope with these problems through avoidance and non-cognitive strategies (e.g., sleeping, drinking, seeking comfort from others, or physically withdrawing from conflict). Persons capable of the highest levels of mastery are those who can plausibly describe psychological problems and respond to those by modifying their own thought patterns or by utilizing knowledge about their own mental states and the mental states of others. Evidence that mastery is linked to functioning in general can be found in studies correlating it with quality of life (Lysaker *et al.*, 2005), the complexity of social scheme (Lysaker, Dimaggio, Daroyanni *et al.*, 2010), and in structural equation models supporting its role as a mediator of the impact of neurocognition on quality and quantity of social functioning (Lysaker, Dimaggio, Daroyanni *et al.*, 2010).

To study the links between Mastery and function, we divided a sample of adult schizophrenia patients into three groups based on their capacity for Mastery: low Mastery (not able to plausibly describe psychological problems), intermediate Mastery (able to plausibly describe psychological problems but only able to respond through avoidant or behavioral strategies), and high Mastery (able to plausibly describe psychological problems and respond using cognitive strategies); these three groups were then compared on measures of insight, coping, self-esteem, and anxiety. Regarding insight, we predicted that the group with the lowest capacity for mastery would also have the poorest insight, since an inability to plausibly describe psychological problems should be associated with an inability to represent their mental illness as a problem. We predicted that those with the highest level of Mastery would have the best insight, since the ability to respond to psychological problems flexibly by using knowledge about one's own mental state and the mental states of others should be related to an ability to manage the painful consequences of mental illness. These patients should therefore be less likely to deny the existence of their mental illness.

With regard to coping, we predicted that the group with the highest capacity for Mastery would report more active, cognitive-based coping strategies such as thinking about problems and actively discussing these problems with others, since these coping strategies are similar to the definition of higher order Mastery. Furthermore, we predicted that the groups with intermediate level Mastery would report the highest levels of avoidant coping (ignoring or giving up in the face of problems) as this is similar to the operational definition of intermediate level Mastery.

With regard to self-esteem and anxiety, we predicted that persons with the highest levels of Mastery would have the highest levels of self-esteem and the lowest levels of

anxiety since they may be better able to cope with complex problems. We also predicted that the group with intermediate level Mastery would have the poorest self-esteem and the highest levels of anxiety. Here, we reasoned that members of this group would find themselves in the most helpless position of the three. This group could be one who could recognize their problems but with few ways to respond to them could create a negative feedback loop in which negative views of the self-reinforce avoidance coping, leading to social phobia and lower self-esteem.

Of note, in the current study, we are re-analyzing data from a previous study, which found significant correlations between mastery and a composite score reflective of neurocognitive function (Lysaker, Shea *et al.*, 2010). We have, therefore, used the scores on the individual tests that made up the composite score and planned to use them as covariates in this study.

Methods

Participants

Participants were 83 adult men and 15 adult women with SCID-confirmed diagnoses of schizophrenia ($n = 65$) or schizoaffective disorder ($n = 33$). These participants completed a battery of self-report measures of coping, self-esteem, and anxiety as part of a study on the effects of cognitive behavior therapy on work outcomes in schizophrenia. Data from these participants have been reported in a previous study by our group (Lysaker, Shea *et al.*, 2010); this study found significant correlations between Mastery and neurocognitive ability, so we have used the scores from the neurocognitive battery as covariates in the present study. All participants were in a post acute phase of illness defined by no changes in medication, hospitalization, or housing within the last 30 days. Other exclusion criteria were active substance dependence or a chart diagnosis of mental retardation. All were recruited from either a local VA Medical Center ($n = 67$, 68%) or Community Mental Health Center ($n = 31$, 32%). The mean years of age and education were 46.03 ($SD = 9.53$) and 12.60 ($SD = 2.25$), respectively. The median number of lifetime hospitalizations was four, with the first hospitalization occurring at the median age of 24. Fifty-eight of the participants (59%) were African American, 39 (40%) were Caucasian, and one was Latino (1%).

Instruments

Indiana psychiatric illness interview (IPI; Lysaker, Clements, Plascak-Hallberg, Knipscheer, & Wright, 2002)

The IPI is a semi-structured interview developed to assess how persons understand their experience with mental illness and describe their life narrative. Trained research assistants conducted the interview that typically lasted between 30 and 60 min. Responses were audio taped and later transcribed. The interview is conceptually divided into five sections. First, rapport is established and participants are asked to tell the story of their lives, beginning with their earliest memory. Second, participants are asked if they think they have a mental illness and, if so, what this mental illness means to them. This is followed by questions about how they perceive their condition, and whether or not this condition has affected their interpersonal and psychological life. Third, participants are asked if and how their condition 'controls' their life and, alternately, how they 'control' their condition. Fourth, they are asked how their condition affects, and is affected by, others. Finally, participants are asked what it is about their condition that they expect

to remain the same and what will be different for them in the future. The IPII differs from other psychiatric interviews in that only minimal content is introduced for the participant to comment on and thus results in a self-report that can be analyzed in terms of the metacognitive capacities that appear spontaneously. In other words, explicit metacognitive tasks are not posed for the participant to solve. Instead, an opportunity for metacognition naturally arises when participants talk about their lives.

The metacognition assessment scale (MAS; Semerari et al., 2003)

The MAS is a rating scale that assesses metacognitive abilities as manifest in an individual's verbalizations. It was originally designed to detect growth within psychotherapy transcripts and, in consultation with the authors, has been abbreviated and adapted for the study of IPII transcripts (Lysaker *et al.*, 2005). The MAS differs from other more structured assessments of metacognition in that it focuses on metacognitive functions that arise spontaneously, rather than as cued in a task or referenced in a questionnaire and filtered by self-report. For the purposes of this study, we were interested in one MAS subscale: *Mastery*. Mastery represents the ability to utilize knowledge of mental states to intentionally manage conflicts and subjective distress. Scores range from 0 to 9 with higher scores reflecting the capacity to perform increasingly complex metacognitive acts. Lower scores (0–2) on this scale reflect difficulties in plausibly describing psychological challenges. Intermediate range scores (3–5) indicate plausible descriptions of psychological problems, and the response to these problems comes in the form of strategies (e.g., responding in an avoidant manner, and by inhibiting or imposing certain behaviors to cope) that do not rely on knowledge of mental states to reduce distress. Higher scores (6–9) reflect an ability to respond to psychological challenges purposefully and effectively on the basis of psychological knowledge. Good inter-rater reliability was found in this study (intra-class correlation = 0.82).

Scale to assess awareness of mental disorders (SUMD; Amador et al., 1993)

The SUMD is a semi-structured interview designed to assess participants' level of insight into their mental illness. Participants are asked a variety of questions about their symptoms, including whether they believe they currently have symptoms of mental illness, whether they believe they have had symptoms of mental illness in the past, and what they believe caused their mental illness. Trained raters with at least a bachelor's degree assigned a score from 1 to 5, with higher scores indicating reduced insight. This semi-structured interview demonstrates good reliability (Amador *et al.*, 1993) and validity (Jovanovski, Zakzanis, Atia, Campbell, & Young, 2007; Young, Campbell, Zakzanis, & Weinstein, 2003) for use in patients with schizophrenia. For the purposes of this study, we utilized an overall score derived from the sum of ratings of awareness of illness, awareness of treatment need, and awareness of consequences of illness.

The multidimensional self-esteem inventory (MSEI; O'Brien & Epstein, 1998)

The MSEI is a 116-item self-report measure that assesses individuals' self-perception of their overall social value. Respondents rate items on a five-point Likert scale according to the degree or frequency with which each item applies to them. The MSEI offers *t* scores based on a community sample. We chose this instrument because its wide variety of items may result in a better estimate of self-esteem. Studies of persons with psychosis from a previous sample have revealed a significant degree of internal consistency for the total score: coefficient alpha = .82; $p < .001$ (Lysaker, Ringer, & Davis, 2008).

Multidimensional anxiety questionnaire (MAQ; Reynolds, 1999)

The MAQ is a 40-item self-report questionnaire designed to tap multiple domains of the experience of anxiety. We initially selected this instrument because its wide range of items provides a good estimate of anxiety that is distinct from self-esteem. For the purposes of this study, we were interested in two of the four subscales: 'Social Phobia', which assesses worries about social embarrassment and social avoidance, and 'Negative Affectivity', which assesses anxious states such as irritability and general distress. Reynolds (1999) presents evidence of acceptable internal consistency and test-retest reliability from both a general psychiatric and community sample and factorial validity from a combined psychiatric and community sample.

The ways of coping questionnaire (WCQ; Folkman & Lazarus, 1988)

The WCQ is a self-report instrument that assesses participants' coping style. Specifically, it asks participants to recall a recent stressor and then rate how often they used 66 different behaviors to cope with that stressor. While this instrument has been established as a measure of coping in healthy community participants, the factor structure of the scale may not accurately reflect coping behaviors used by individuals with serious mental illness (Wineman, Durand, & McCulloch, 1994). In this study, we therefore utilized a rational scoring system that we developed in order to be sensitive to coping deficits unique to severe mental illness (Lysaker *et al.*, 2004). For the purposes of this study, we were interested in three of the six subscales: (a) 'Considering', which refers to thinking or talking with others about what to do, (b) 'Ignoring', which refers to putting the stressor out of one's mind, and (c) 'Resigning', which refers to a choice to not act because it is perceived that there is nothing to be done.

Neurocognitive assessments

The Digit Symbol Subtest (DSS; Wechsler, 1997a) is a timed subtest of the Wechsler Adult Intelligence Scale-III (WAIS III) that assesses participants' visuomotor processing speed by asking participants to copy symbols beneath a series of numbers according to a key code.

The Vocabulary subtest (Wechsler, 1997a) is a subtest of the WAIS III that assesses participants' global verbal intellectual function.

The Visual Reproduction (Wechsler, 1997b) is a subtest of the WMS III that asks participants to reproduce four drawings after a brief period of visual exposure and is thought to be closely associated with visual spatial memory.

The Hopkins Verbal Learning Test (HVLT; Brandt, 1991) is an auditory verbal memory test. Participants are presented with a list of 12 words and, after each trial, are asked to repeat as many words as they can remember. For this study, we utilized the total number correctly identified after a 20-min delay.

The Wisconsin Card Sorting Test (WCST; Heaton, 1981) is a neuropsychological test that is sensitive to impairments in executive function. Participants sort cards that vary according to an unarticulated matching principle that changes periodically. The current study utilized the total number of categories correct score.

Procedures

All procedures were approved by the research review committees of Indiana University and the Roudebush VA Medical Center. Following informed consent, diagnoses were determined using the Structured Clinical Interview for DSM-IV (SCID; Spitzer, Williams,

Table 1. Background characteristics of groups varying on the level of metacognitive mastery ($n = 98$)

	Group 1 low mastery ($n = 33$)	Group 2 intermediate mastery ($n = 52$)	Group 3 high mastery ($n = 13$)	<i>F</i>
Gender (M/F)*	30/3	43/9	10/3	–
Diagnosis (SZ/SZ-affective)**	28/5	28/24	8/5	–
Age	45.33 (10.84)	46.67 (9.35)	45.23 (6.74)	0.24
Education	12.36 (1.98)	12.63 (2.29)	12.73 (1.55)	0.51
Parents highest Level of education	12.20 (2.65)	12.82 (2.37)	13.08 (2.25)	1.41
Lifetime psychiatric hospitalizations	5.36 (5.16)	7.79 (10.67)	9.77 (7.03)	3.06
Age of first hospitalization	28.14 (10.04)	26.56 (10.02)	25.85 (7.93)	0.33

Note. SZ = schizophrenia, SZ-affective = schizoaffective.

* $\chi^2 = 1.75$, n.s.; ** $\chi^2 = 8.14$, $p < .05$.

Gibbon, & First, 1994) conducted by a clinical psychologist. Following the SCID, participants were administered the IPII, MSEI, MAQ, WCQ, and the five neurocognitive tests described above. A research assistant was available to assist participants if there were difficulties reading or understanding the questionnaires. Mastery was rated on the basis of the IPII, and raters were blind to the patients' neurocognitive test performance and scores on the MSEI, MAQ, and WCQ.

Analysis

Data analyses were conducted in five phases. First, we classified participants in terms of their mastery: minimal (Mastery scores ranging from 0 to 2), intermediate (Mastery scores ranging from 3 to 5), and high Mastery (Mastery scores ranging from 6 to 9). In the second stage of analyses, we compared the demographics of the participants in each of the three Mastery groups using a MANOVA. Third, we compared the three Mastery groups on coping preferences, insight, self-esteem, and anxiety levels using a MANOVA and ANOVA. Fourth, we compared groups on neurocognitive test performance using a MANOVA and ANOVA. Finally, we repeated step four, this time covarying for any neurocognitive test scores upon which the groups were significantly different.

Results

As indicated in Table 1, 33 participants were classified as having minimal Mastery, 52 as having intermediate Mastery, and 13 as having high Mastery. The three groups did not significantly differ on any of the reported background demographics (see Table 1).¹

¹The groups appeared to differ in number of lifetime hospitalizations; however, this observation remained at the trend level ($p = .052$). The low-mastery group had the fewest number of lifetime hospitalizations, while the high-mastery group had the most hospitalizations. This ostensibly counter-intuitive finding might be due to individuals with higher mastery being more likely to seek out help during periods of symptom exacerbation than those with low Mastery. Alternatively, yet unknown symptoms associated with low Mastery may be less likely to warrant psychiatric hospitalization. These are potentially interesting avenues of exploration; however, the lack of significant differences between the groups precludes drawing any firm conclusions at this time.

Table 2. Comparisons of coping, anxiety, and self-esteem measures among groups varying on the level of metacognitive mastery ($n = 98$)

	Group 1 low mastery ($n = 33$)	Group 2 intermediate mastery ($n = 52$)	Group 3 high mastery ($n = 13$)	F	Post hoc comparisons $P < .05$
SUMD	8.76 (2.73)	7.00 (2.45)	5.54 (2.5)	8.70**	3 < 1, 2
WCQ					
Considering	1.17 (0.35)	1.14 (0.38)	1.43 (0.35)	3.35*	3 > 1, 2
Ignoring	0.88 (0.27)	0.88 (0.28)	0.79 (0.28)	0.62	
Resigning	0.91 (0.24)	1.07 (0.32)	0.77 (0.37)	5.72**	2 > 1, 3
MAQ					
Social phobia	62.00 (14.53)	69.35 (15.76)	60.00 (12.76)	3.48*	2 > 1, 3
Negative affectivity	56.39 (11.06)	60.44 (10.96)	59.62 (11.06)	1.35	
MSEI					
Likability	44.21 (4.10)	39.19 (12.08)	49.15 (12.81)	4.65*	2 < 3
Competence	46.35 (9.06)	42.29 (10.83)	48.15 (8.90)	2.70	

Note. SUMD = Scale to assess Unawareness of Mental Disorders, WCQ = Ways of Coping Questionnaire, MAQ = Multidimensional Anxiety Questionnaire, MSEI = Multidimensional Self-Esteem Inventory.

Comparisons between the three Mastery groups on insight, coping, self-esteem, and anxiety revealed a significant overall group effect in a MANOVA (Pillai's Trace (16,178) = 2.88; $p < .0001$). As indicated in Table 2, ANOVA and Fisher's least squared difference (LSD) tests revealed that the high-Mastery group had better insight indicated by significantly higher scores on the SUMD and a greater preference for 'Considering' as a method for coping than either of the other two groups and reported significantly better likability on the MSEI than the intermediate-Mastery group. The intermediate-Mastery group reported more social phobia on the MAQ and a greater preference for 'Resigning' as a coping strategy on the WCQ compared to the high- and low-Mastery groups. As presented in Table 3, an ANCOVA comparing the groups on neurocognitive test performance, covarying for age and education, revealed that the high-Mastery group performed better than the intermediate- and low-Mastery groups on the WAIS III Vocabulary subtest and DSS while the high- and intermediate-Mastery groups performed better on the WCST than the low-Mastery groups.

Finally, a Multivariate Analysis of Covariance (MANCOVA) was conducted comparing groups on assessments of Insight, Likability, Social phobia, and Considering and Resigning (variables found to differ between groups in ANOVA reported above) covarying for performance on the WCST and WAIS III Vocabulary subtest and DSS using a MANCOVA. Even after factoring in the neurocognitive covariates, the significant differences between the three Mastery groups were maintained (Pillai's Trace (10,178) = 2.92; $p = .002$). Individual ANCOVA next revealed significant group differences for Resigning ($F(2,92) = 5.08$; $p = .008$), Insight ($F(2,92) = 5.45$; $p = .006$), Social Anxiety ($F(2,92) = 3.69$; $p = .029$), and Likability ($F(2,92) = 6.10$; $p = .003$). As with the previous analysis, the intermediate-Mastery group reported more social phobia than the high- and low-Mastery groups and less Likability than the high-Mastery group. In terms of the coping style of 'Resigning', the intermediate-Mastery group differed from the high- and low-Mastery groups only at the level of a trend ($p < .10$).

Table 3. Comparisons of neurocognitive function among groups varying in the level of metacognitive mastery covarying for age and education

	Group 1 low mastery (n = 33)	Group 2 intermediate mastery (n = 52)	Group 3 high mastery (n = 13)	F	Post hoc comparisons P < .05
WCST					
Perseverative errors	38.58 (26.56)	25.90 (19.06)	23.15 (12.26)	4.27*	1 > 2, 3
HVLT					
Total correct	20.00 (5.29)	20.54 (5.62)	21.23 (4.99)	0.96	
WAIS III					
Vocabulary	25.33 (11.14)	30.40 (13.33)	38.38 (12.87)	4.75*	1, 2 < 3
Digit symbol	44.97 (18.24)	44.78 (10.83)	57.92 (9.43)	3.83*	1, 2 < 3
WMS III					
Visual reproduction	60.39 (19.22)	65.90 (19.27)	71.77 (17.62)	1.85	

Note. WCST = Wisconsin Card Sorting Test, HVLT = Hopkins Verbal Learning Test, WAIS III = Wechsler Adult Intelligence Scale-III, WMS = Wechsler Memory Scale.

* $p < .05$.

Discussion

In the current study, we tested whether persons with schizophrenia who possessed differing capacities of one aspect of metacognition, namely Mastery, also exhibited different kinds of difficulties in terms of coping preference, insight, self-esteem, and anxiety. Results were mostly consistent with our expectations: participants at the highest level of Mastery, that is, those that were able to plausibly represent psychological problems and cope with them by utilizing metacognitive knowledge of their own cognitive and emotional states, also reported a greater preference for thinking about different ways to respond to stress and had better insight regarding their mental illness than participants at the lowest level of Mastery. Participants with high Mastery also reported perceiving themselves as more likable by peers than participants with intermediate levels of Mastery. Intermediate Mastery participants reported higher levels of social phobia and a greater preference for giving up in response to stressors than participants in either the low- or high-Mastery group.

While these observations are largely consistent with our hypotheses, there were also some unexpected findings. No group differences were found for preference for the 'Ignoring' coping style, for self-report of negative affectivity, or subjective appraisal of competence. This may suggest that while low Mastery is linked to social experiences such as feeling less likeable and being more vulnerable to embarrassment, it is not linked to more general experiences of emotion and competence, which might be linked to variables instead such as stigma. Furthermore, participants with high and low levels of Mastery had equivalent levels of self-esteem and anxiety. This could suggest that an unawareness of psychological problems neutralizes pain that might come with psychosocial compromise. Such a possibility is consistent with findings that unawareness of illness is linked to lower levels of depression (Drake *et al.*, 2004). It is also possible that persons could end up with a relatively low capacity for Mastery for different reasons leading to equivocal findings. For instance, some persons may possess relatively little capacity to recognize their own thoughts and feelings and so generate unsophisticated responses to problems but experience little discomfort. On the other hand, others may

be fully aware of their internal states but experience those states in a purely negative light. When this second group reflects about the self as coping with social problems, their biased negative self-image might result in their seeing themselves as socially inept and remain paralyzed. Future research is thus needed exploring the role that deficits in self-reflectivity play for persons who express lesser capacities for mastery.

While the correlational nature of this study precludes making inferences about causality, results suggest several possibilities that could form the basis for future research. For example, a longitudinal examination of these variables may reveal whether changes in level of mastery can be detected prior to changes in coping style. One might expect that as Mastery level first moves from high to moderate, the ability to cope worsens as a result of a decreased ability to respond to psychological distress. On the other hand, one might predict that assessments of mastery and coping style reflect two aspects of the same construct, and should thus expect these scores to change together over time. If it can be demonstrated that mastery level affects coping style, however, it can be hypothesized that the attainment of only the lowest levels of metacognitive Mastery are primarily troublesome to persons with schizophrenia because they inhibit awareness of mental illness and make thinking about psychological problems more difficult. Alternatively, having only intermediate levels of Mastery may be a risk factor for unawareness of illness as well as significant distress related to social situations. One speculation is that members of this group who are aware of their mental illness may be at the greatest risk for suicide. Another possibility is that social anxiety and negative self-esteem may hinder persons' metacognitive skills. In the face of social threat-based interpretations of events (Gilbert, 2001) some may be unable to think about thinking while for others high self-esteem may preserve the allocation of high-order cognitive resources to reason about mental states and to use this wealth of information to find solution to problems. It is also possible that more psychologically minded people experience greater levels of self-efficacy and this protects their self-esteem even under socially demanding conditions, thus helping them to cope with a problem using their knowledge of mental states.

There are limitations and considerations in this study that limit generalizability. Participants were mostly male, middle aged, and generally many years had passed since the onset of their illness. In addition, all were in some form of active treatment and were seeking rehabilitation. Replication is, therefore, needed with more diverse groups including women, persons in an earlier phase of illness, and those refusing treatment. It would be interesting to know, for instance, whether deficits in metacognition among persons who have just become ill or are in prodromal stages are also linked to insight, coping strategies, and social dysfunction in the same manner. Our assessment of coping also overlaps with the construct of mastery and thus more study is needed with other ways of assessing coping in order to determine that we are offering more than evidence of construct validity in that regard. Finally, this was a cross-sectional study, and we used only one instrument to assess one aspect of metacognitive capacity and an abbreviated battery of instruments assessing cognitive function. Future longitudinal research is needed which employs multiple measures of different aspects of metacognition, neurocognition, and social function. For instance, it may be hypothesized that mastery is largely dependent on aspects of cognition not assessed in the present study, such as working memory and emotion recognition. A future study may further explicate the relationship between mastery and these and other facets of neurocognition.

The results presented here are largely consistent with emerging models that deficits in metacognition play a role in the development of psychosocial dysfunction in schizophrenia. Following replication of these observations, there may be important

implications for treatment. In particular, paralleling the field of the study of treating personality disorders (Bateman & Fonagy, 2001; Dimaggio *et al.*, 2007) it may be that treatment has to move between working to promote metacognitive awareness that may make persons more able to cope with distress, and working on negative self-esteem and related feelings of anxiety, in order to promote a more balanced self-image. This could in turn help some with limited mastery to gain access to psychological resources in order to face the challenges that naturally arise in an active social life. As suggested in a number of preliminary case studies, psychotherapy could potentially be tailored or modified to help persons with schizophrenia to develop metacognitive capacity (Buck & Lysaker, 2009; Lysaker, Buck, & Ringer, 2007) with an end goal of enhancing outcomes related to daily function.

Acknowledgement

Research was sponsored by the Veterans Affairs Rehabilitation Research and Development Service.

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Received 18 March 2010; revised version received 16 September 2010