Metacognitive Deficits Predict Impaired Insight in Schizophrenia Across Symptom Profiles: A Latent Class Analysis

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The integrated model of insight in schizophrenia suggests that poor insight is the result of multiple factors which compromise persons' abilities to integrate streams of information into a personal awareness of psychiatric challenges, and make adaptive responses. This model hypothesizes that metacognitive deficits, or difficulties forming a complex and integrated understanding of the self and others, influence insight, regardless of other proximal causes including clinical profile. To explore this possibility, we performed a latent class analysis on 324 adults with schizophrenia or schizoaffective disorder. This analysis produced 4 groups on the basis of assessment of insight and Positive and Negative Syndrome Scale (PANSS) positive, negative, cognitive, and hostility symptoms. The resultant groups were characterized as: Good Insight/Low Symptoms (n = 71), Impaired Insight/High Negative Symptoms, (n = 43), Impaired Insight/High Positive Symptoms (n = 50) and Impaired Insight/Diffuse Symptoms (n = 160). When we compared metacognitive function as assessed with the Metacognition Assessment Scale - Abbreviated (MAS-A) across groups, we found that the good insight group had better overall metacognition as well as higher levels of self-reflectivity, awareness of the other and mastery as compared to all 3 groups with impaired insight. When controlling for total symptoms, all differences in metacognitive function between the good insight and the impaired insight groups remained significant. These results are consistent with the view that, independent of symptoms, impaired metacognition contributes to difficulties integrating information and hence impedes insight, or awareness of psychiatric challenges. Consistent with extant literature, results suggest that interventions focusing on metacognition as the target may lead to improved insight.

Many diagnosed with schizophrenia have been reported to lack clinical insight or to deny that they have symptoms of a mental illness or need treatment.[1] Among the first to explicitly define this, in 1882 Pick[2] described insight into psychiatric disorders as conscious reflection about "pathological aspect(s) of … mental processes," (p. 519), which could vary in its lucidity from an "illness-feeling," to an "illness-insight" (p. 530). As insight began to be broadly used to refer to multiple facets of self-knowledge, 50 years after Pick, Lewis[3] clarified that insight into psychiatric challenges refers to awareness of "morbid change" (p. 333).

In more recent years, variations in degree of insight have been found among adults with schizophrenia across cultures,[4,5] in both early and later phases of illness,[6–9] and during and following periods of acute disturbance.[10] Poor insight has been linked to noncompliance in participation in pharmacological treatment,[11–14] duration of untreated psychosis,[15,16] and low therapeutic alliance with mental health professionals.[17–20] It has also been associated with additional negative outcomes including more frequent relapses,[21] worsening symptoms,[22,23] and poorer interpersonal and community functioning.[24–27] On the other side of the coin, in what has been called the insight paradox,[28] good insight has been shown to lead to depression, hopelessness, low self-esteem, low quality of life, low sense of meaning in life, and suicidality, especially when coupled with acceptance of stigma.[29–34]

To make sense of this range of findings, contemporary research has sought to delineate the processes underlying

insight, or those which enable persons to form ideas about their experiences of what others perceive as psychiatric challenges. It has become apparent that insight is more than the acceptance of a singular fact and instead requires the integration of multiple streams of information. These include the piecing together of knowledge of changes in internal states, external circumstances, the views of others, and the trajectory of a life, along with reflections about the causes and consequences of these changes.[35–37]

Seeking to operationalize these processes, the integrated model of insight[35] suggests that metacognitive deficits are among the most proximal causes of poor insight. Metacognition refers to the ability to form an integrated sense of self and others and to use that knowledge to respond to emergent challenges in life.[38–41] According to this model, metacognitive deficits should limit insight when they interfere with abilities to form and connect ideas about: (1) changes in thoughts, emotions, and behaviors that have occurred as a result of mental illness; (2) what are the pertinent historical events related to those changes; and (3) how different historical and psychological events are and are not related. Indeed, without the capacity to hold an integrated sense of self and others it is difficult to imagine how anyone could name and understand the emergence of mental illness and formulate an adaptive response.[35] In this model, metacognition may also have a particularly unique connection to insight in that its influence may be independent of other potential causes including alterations in basic brain functions, symptoms, neurocognition, and social cognition. It may also moderate the effects of these phenomena, given the influence of metacognitive capacity on the extent to which information is integrated.[1,42,43] One important implication of this model is that it may help science understand how and why poor clinical insight emerges from the lived experience of the person diagnosed with schizophrenia; namely it is a simple expression of the experience of fragmentation which limits the construction of any larger sense of the challenges that life presents.

Supporting the link between insight and metacognitive capacity is evidence that metacognitive deficits commonly occur in schizophrenia[38,44] and that metacognitive deficits predict poor insight in both early and later phases of illness.[9,45–48] Lesser levels of constructs related to metacognition such as organizational skills pertaining to self-reflection and complexity of personal narratives have also been linked with poorer insight in schizophrenia.[49,50] Indirect evidence of the link between insight and metacognition can also be found in studies suggesting that treatments that target metacognition have a positive effect on insight.[51–53] Other evidence may be found in imaging studies that suggest impaired insight is associated with alterations in the activities of cortical regions and circuits that may support processes involved in metacognition,

including self-consciousness and the distinction between one's own experience and that of another.[54]

Importantly, one limitation of the existing research on insight and metacognition is that due to modest sample sizes, studies have yet to explore whether metacognitive deficits are ubiquitous among persons with impaired insight or whether they are linked to specific clinical features. In other words, are deficits in metacognition related to impaired insight beyond specific clinical profiles? One set of clinical features which appears to be differentially related to insight are the positive and negative symptoms which define the condition. Positive symptoms have been suggested to compromise insight when they present anomalous experiences which defy interpretation, while negative symptoms may compromise insight when they interfere with the detection and expression of emotional experience and social connection.[1] Several studies have suggested that higher levels of symptoms predict more stable deficits in insight over time in psychosis[55] and schizophrenia.[56] However, given that links between insight and positive and/or negative symptoms have been found in some studies, but not in others,[42,43,57–60] it is likely that there are subgroups of patients that may all demonstrate impaired insight but may have uniquely high levels of positive and/or negative symptoms. The likelihood that there are distinct groups with varying levels of insight and symptom profiles is supported by cluster analyses which found groups with schizophrenia that differed in terms of insight and depression.[61]

To address the associations between metacognition and insight among persons with distinct clinical profiles, the present study examined the relationships of metacognition, symptoms, and insight among a relatively larger independent sample of adults with schizophrenia, excluding participants included in our previous cluster analysis that addressed the relationship of metacognition, insight, and depression.[61] The first aim was to identify different configurations of symptoms and insight using latent class analysis (LCA). We chose this approach in order to use statistical rather than rational methods (eg, based on pre-determine cut scores) to avoid any pre-existing biases we might have had regarding the underlying symptom and insight profiles that exist naturally. The second aim was to explore whether those with impaired insight experienced graver impairments in metacognition regardless of symptom profile. We predicted that we would identify a group with good insight and relatively fewer symptoms, and groups with impaired insight with varying symptoms presentations: predominantly positive symptoms, predominantly negative symptoms, and mixed positive and negative symptoms. We predicted that all impaired insight groups would show greater levels of metacognitive deficit than the good insight group, regardless of symptom severity and presentation.

Method

Participants

Participants were 324 adults in outpatient mental health treatment with a confirmed diagnosis of schizophrenia (219) or schizoaffective disorder (105) using the Structured Clinical Interview for DSM-IV.[62] Participants were recruited for studies of the effects of psychosocial rehabilitation at a Veterans' Affairs Medical Center and community mental health center in Indianapolis Indiana as well as 2 partial hospitalization programs and 1 outpatient clinic in Newark and Piscataway, New Jersey. All participants were in a non-acute phase of illness, defined by no hospitalizations or changes in housing or medication within 30 days of study enrollment. As noted above participants were excluded if they were included in the cluster analysis we have previously presented.[60] The mean age of the participants was 43.39 years (range: 18–71; SD = 12.32). The sample was 74% male (n = 241), 25% female (n = 80) and 1% transgender (n = 3) and the mean years of education was 11.44 years (range: 2–24; SD = 3.31).

Instruments

Indiana Psychiatric Illness Interview.[63] The Indiana Psychiatric Illness Interview (IPII) is a semi-structured interview designed to elicit a sample of how individuals' think about their psychiatric and related challenges. The interview typically lasts 30 to 60 minutes. The interview asks participants to talk about: (1) the story of their life; (2) whether they think they have a mental illness and, if so, how that has affected and not affected their thoughts, emotions, and behaviors; (3) the influence of their condition and their influence over their condition; (4) the influence of their condition on others and other's influence over their condition; and (5) the future. The IPII elicits a nuanced account of psychiatric challenges which goes far beyond the acceptance of psychiatric labels and which can be the basis for assessments of metacognitive capacity.

Metacognition Assessment Scale - Abbreviated.[46] The Metacognition Assessment Scale - Abbreviated (MAS-A) was used to rate metacognition on the basis of a typed transcript of the IPII. The MAS-A is an adaptation of the MAS which was originally designed to study metacognition within psychotherapy transcripts.[40] The MAS-A transformed the original items of the MAS into 4 ordinal scales. These scales represent the domains of self-reflectivity (S) which assesses the degree to which a person has an integrated vs fragmented sense of self; awareness of others (O) which assesses the degree to which a person has an integrated vs fragmented sense of other people, decentration (D) which assesses the degree to which a person has an integrated or fragmented sense of their

position within the larger community; and mastery (M) which assesses the degree to which a person can use metacognitive knowledge to respond to psychosocial challenges. The MAS-A frames metacognition as a series of increasingly complex and hierarchical processes such that once a given level is not attained, no further levels can be meaningfully achieved thus higher scores indicating a greater higher ability to form integrated sense of self and other. Good inter-rater reliability and validity have been presented elsewhere with intraclass correlations ranging from 0.80 to 0.92 for the MAS-A subscales.[45–47,64]

Positive and Negative Syndrome Scale.[65] The Positive and Negative Syndrome Scale (PANSS) is a 30-item rating scale used for measuring symptom severity of patients with schizophrenia and other mental disorders. In this study, we used the Bell et al[66] factor analytically-derived model which produces the following 5 component scores: positive, negative, cognitive, emotional discomfort, and hostility. We measured insight using the PANSS insight and judgment item and thus calculated the cognitive component excluding this item. Good inter-rater reliability was found in prior studies.[61,65] Acceptable levels of interrater reliability have been previously found with intraclass correlations ranging from 0.83 to 0.94.

Procedure

Procedures were approved by the local Institutional Review Boards. After written informed consent was obtained from participants, clinical psychologists met with participants to confirm diagnoses with the SCID-IV. Trained master's-level research assistants then administered the instruments as part of a baseline assessment. All measures were collected prior to randomization into a trial of psychosocial rehabilitation. Raters of the MAS-A were blind to PANSS scores and PANSS raters were blind to IPII content or MAS-A scores. There were a total of 4 PANSS raters deployed in the New Jersey Settings and 5 in the Indianapolis settings. All MAS-A ratings were conducted by raters in Indianapolis on the basis of typed IPII transcripts.

Analytical Strategy

Statistical analyses were conducted using SPSS version 24 and Mplus version 7.[67,68] Analyses were conducted in 1 preliminary phase, 3 primary phases and 1 exploratory stage. As a preliminary analysis, we examine the potential effects of settings by comparing MAS-A scores from participants in New Jersey with those in Indianapolis using an intraclass correlation. Turning to the primary analyses, we first conducted a LCA in order to identify the potential presence of homogenous groups of individuals based on symptomatology. Given that previous studies have suggested that higher levels of each are associated

with poorer insight, we included 4 of the PANSS primary symptom components: Positive, Negative, Cognitive and Hostility. In the second phase, we conducted a series of analyses of variance or covariance (ANOVAs) to compare demographics and MAS-A scores between groups. In the third phase, we conducted another set of ANCOVA repeated comparisons of a good insight group with impaired insight groups controlling for total symptoms. Finally, in order to characterize the groups in a more nuanced manner, we conducted exploratory ANOVA comparing the 4 groups on emotional discomfort symptoms as well as the individual positive and negative symptoms which make up the component scores.

LCA is a useful method to statistically identify latent homogenous groups (classes) of individuals from categorical or continuous multivariate data. It is based on probabilistic models of subgroup membership, which differs from other clustering methods that instead rely on finding clusters with distance measures that are arbitrary or theoretical.[67,68] In the present study, LCA was used to identify latent classes of individuals with schizophrenia spectrum disorders based on PANSS symptom subscales and the insight and judgment item. Differences among classes for demographic variables and metacognitive ability were calculated using ANOVA and chi-square tests (significance level of $P < .05$).

The number of classes were not hypothesized a priori but were determined from an examination of model fit statistics, including entropy values, Akaike's Information Criteria[69] (AIC), Bayesian Information Criteria[70] (BIC), and sample size-adjusted BIC[71] (ssaBIC) (lower AIC, BIC, ssaBIC and higher entropy values indicating better fit). Bootstrapped likelihood ratio tests[72,73] (BLRT) and Lo-Mendell-Rubin[74] (LMR) tests, where n and $n-1$ number of classes are compared, were also conducted.

Results

First, to compare the potential effects of setting we conducted an intraclass correlation comparing the MAS-A total scores from participants in Indianapolis Indiana and those from Northern New Jersey. This revealed an intraclass correlation coefficient (ICC) = 0.01 suggesting that only 1% of the variance in scores was accounted for by setting and thus there was no need to control for study setting. Five LCA models were estimated specifying between 1 and 5 latent classes. The AIC and ssaBIC values decreased with each successive class addition and thus did not readily discriminate a model of best fit. BIC values decreased for $k = 2$–4 classes, but increased for the $k = 5$ model, suggesting that the 5-class model is a poorer fit to the data. Entropy values were adequate for most models ($k = 3$–5) but decreased slightly for the $k = 5$ model. Bootstrapped likelihood ratio tests (BLRT) remained significant ($P < .0001$) with each successive

class addition to the model, thus not clearly discriminating a model of best fit. Lo-Mendell-Rubin (LMR) likelihood ratio tests were non-significant when comparing $k = 2$ to $k = 3$ classes, suggesting that the 3-class model did not significantly improve the fit of the model. However, the LMR test was significant when comparing the 3-class to the 4-class model, suggesting that the 4-class model was a significantly better fit to the data than the 3-class model. Taken together with the entropy value of the 4-class model, as well as model interpretability and consistency with the extant literature reviewed above, the 4-class model was determined to be the best fit to the data.

Descriptive statistics including group size, background characteristics, PANSS component and insight scores and MAS-A scores are presented in Table 1. Groups with mean PANSS insight item scores of "3" were classified as having impaired insight, while groups of scores with "2" or less were classified as having good insight, since the former scores reflect at least mild levels of unawareness of illness and the latter scores suggest less than minimal levels of unawareness. Based upon these scores and the PANSS component scores, the groups were classified as follows: Good Insight/Low Symptoms ($n = 71$), Impaired Insight/High Negative Symptoms ($n = 43$), Impaired Insight/High Positive Symptoms ($n = 50$), and Impaired Insight/Diffuse Symptoms ($n = 160$). By the label "Diffuse," we sought to describe a group with a broad range of symptoms in which no one was class was especially prominent compared to the others. Concerning demographics, groups differed significantly only on gender, with the Impaired Insight/High Positive Symptoms having a greater proportion of women than the other 3 groups.

As revealed in Table 2, when we compared groups on metacognitive ability with ANOVA and post hoc analyses using the Bonferroni correction for multiple comparisons, we found that the Good Insight group had better overall metacognitive functioning that the impaired insight groups. They also had significantly higher scores on self-reflectivity, awareness of the other and mastery than the 3 impaired insight groups. The metacognition scores of the Impaired Insight/High Positive Symptoms group was generally poorer than that of the Impaired Insight/Diffuse Symptoms group. When the MAS-A scores of the Good Insight group were compared with the 3 impaired insight groups, covarying for PANSS total score, the overall metacognition and self-reflectivity MAS-A sub-scales of the Good Insight group continued to be significantly higher than any of the 3 impaired insight groups. In addition, when PANSS total was covaried for, the Good Insight group was found to have better mastery scores than the Impaired Insight/High Negative Symptoms and the Impaired Insight/ Diffuse Symptoms groups, but not the Impaired Insight/High Positive Symptoms group.

Table 1. Latent Class Analysis (LCA) Based on Symptom and Insight Scores

	Class 1	Class 2	Class 3	Class 4	Test	P	Post hoc (0.05)
LCA items (m, SD)	n = 71	n = 43	n = 50	n = 160			
PANSS positive component	2.10 (0.65)	2.72 (0.73)	3.42 (0.75)	2.61 (0.71)	$F(3,317) = 33.649$	<.001***	1<2,3,4; 2,4<3
PANSS negative component	1.61 (0.40)	3.55 (0.40)	1.93 (0.41)	2.35 (0.43)	$F(3,317) = 206.833$	<.001***	1<2,3,4; 1,3,4<2; 3<4
PANSS hostility component	1.57 (0.45)	2.00 (0.66)	2.94 (0.44)	1.55 (0.41)	$F(3,317) = 122.167$	<.001***	1<2,3; 2,4<3; 4<2;
PANSS cognitive component[a]	1.68 (0.39)	3.07 (0.58)	2.55 (0.62)	2.39 (0.54)	$F(3,317) = 65.021$	<.001***	1<2,3,4; 1,3,4<2
PANSS insight and judgment item	1.87 (0.92)	4.40 (1.03)	3.4 (0.90)	3.54 (0.90)	$F(3,317) = 77.818$	<.001***	1<2,3,4; 3,4<2
Covariates							
Gender (n, % male)	47 (66.2)	38 (88.4)	24 (48.0)	132 (82.5)	$X^2 = 32.595$	<.001***	
Diagnosis (n, % schizophrenia)	43 (60.6)	29 (67.4)	30 (60.0)	115 (71.9)	$X^2 = 4.564$	.207	
Age	41.63 (12.81)	42.67 (14.20)	43.86 (11.02)	44.21 (11.95)	$F(3,320) = 0.790$	.5	
Education (y)	11.55 (3.39)	10.37 (3.86)	11.65 (3.32)	11.62 (3.09)	$F(3,320) = 1.749$	.157	

Note: PANSS, Positive and Negative Syndrome Scale.
[a]Insight and judgment item excluded from the cognitive component.
***$P < .001$.

Table 2. Latent Class Analysis: Comparisons of Metacognition and Emotional Discomfort Symptoms

	Class 1	Class 2	Class 3	Class 4	Test	P	Post hoc (0.05)
MAS-A self-reflectivity	5.04 (1.42)	3.45 (1.17)	4.06 (1.17)	4.25 (1.36)	$F(3,320) = 13.915$	<.001***	1>2,3,4***; 4>2**
MAS-A awareness of the other	3.10 (0.70)	2.43 (0.95)	2.85 (0.96)	2.94 (0.96)	$F(3,320) = 5.177$	.002**	1>2***; 4>2**
MAS-A decentration	0.64 (0.68)	0.58 (0.75)	0.35 (0.61)	0.60 (0.77)	$F(3,320) = 1.864$	.136	
MAS-A mastery	4.25 (1.62)	2.71 (1.60)	3.11 (1.65)	3.30 (1.74)	$F(3,320) = 9.192$	<.001***	1>2,4***,3**
MAS-A total	13.04 (3.34)	9.17 (3.43)	10.37 (3.58)	11.10 (4.06)	$F(3,320) = 10.653$	<.001***	1>2,3***,4**; 4>2*
PANSS emotional discomfort component	2.92 (0.97)	3.22 (1.17)	3.78 (0.90)	2.97 (1.04)	$F(3,320) = 9.053$	<.001***	1<3***; 4<3***; 2<3+

Note: MAS-A, Metacognition Assessment Scale – Abbreviated; PANSS, Positive and Negative Syndrome Scale.
*$P < .05$, **$P < .01$, ****$P < .001$, +$P = .059$.

The Good Insight group continued to have higher awareness of the other scores, but only in comparison with the Impaired Insight/High Negative Symptoms group.

Next, to characterize the clinical features of the groups, we compared groups on the PANSS emotional discomfort scale and the individual items that comprise the positive and negative components. As revealed in Table 2, the Impaired Insight/High Positive Symptom group had higher levels of emotional distress compared to the other groups. ANOVA and post hoc analyses using the Bonferroni correction for multiple comparisons comparing the PANSS positive and negative sub-domain items revealed that the Impaired Insight/High Negative Symptoms group had significantly higher levels of each of the respective negative symptom PANSS items compared to the other 3 groups. The Impaired Insight/High Positive Symptoms group had significantly higher levels of 4 of the positive symptom sub-domain items: delusions, grandiosity, unusual thought content, and somatic concern (multiple comparisons using the Bonferroni correction $P < .05$). The Impaired Insight/High Positive Symptoms group did not have significantly higher levels of hallucinations or suspiciousness than the other groups.

Of note given the unexpected gender differences, we conducted a final set of ad hoc analyses comparing the PANSS insight and MAS-A total scores across gender. Here we found that men and women do not differ significantly on MAS total (means (SD): 11.10 (4.11) and 11.30 (3.37)) but did differ on PANSS insight and judgment item ($F(1,320) = 8.123$ $P = .005$), and that difference persisted after controlling for emotional distress ($F(1,319) = 6.547$ $P = .011$; means (SD): 3.39 (1.21) for men and 2.95 (1.1.8) for men and women, respectively.

Discussion

In this study, we empirically derived 4 groups of patients with schizophrenia on the basis of level of insight and symptoms. One group was found to have good insight and 3 groups were found to have impaired insight but different symptom presentations: one with predominantly negative symptoms, one with predominant positive symptoms and one with diffuse levels of most symptoms.

As expected, all of the impaired insight groups had lower levels of overall metacognition than the group with good insight. Specifically, the impaired insight groups all had lower levels of overall metacognition and more impairment in domains of self-reflectivity, awareness of other people and mastery, or integrating information about the self and others to effectively face psychological challenges. When severity of psychopathology was held constant, the impaired insight group with high negative symptoms continued to have the same forms of poorer metacognition relative to the good insight group, while both the diffuse symptom group and the positive symptom group continued to have poor overall metacognition and self-reflectivity relative to the good insight group; the diffuse symptom group also continued to demonstrate worse mastery.

Findings are thus consistent with the integrated model of insight that suggests metacognition is associated with insight independent of clinical profile.[35] Poor insight in the presence of uniquely high negative and/or positive symptoms all appear linked to dysfunctional abilities to form an integrated sense of self and others. Examination of mean scores suggest clinically significant differences, with all impaired insight groups struggling to see their mental states as changing and fallible and to use more than gross avoidance when facing psychosocial stressors.

There were unexpected findings. Decentration scores did not differ between groups. One explanation is that this reflects a restriction of range, both with limited variation in this score and less sensitivity to change in general. Further, we found that the positive symptoms and impaired insight group contained significantly more women. Paradoxically, we also found this group had higher levels of emotional discomfort whereas previous studies have found that good insight is more often related to emotional distress. This group also had higher levels of grandiosity, which may suggest a unique subgroup in which gender-specific factors play a role. One interpretation of the profile of this group is that in the face of emotional distress, grandiosity and impaired insight potentially play a self-protective role resulting in a cycle in which distress leads to denial and reality distortion which in turn leads to more distress. This interpretation is consistent with cognitive models that suggest that emotional concerns trigger or contribute to the maintenance of psychotic symptoms.[75,76]

Beyond this, however, results suggest clinical profile may not be irrelevant. The Impaired Insight/High Negative Symptoms group had poorer self-reflectivity and awareness of the other than the Impaired Insight/Diffuse symptoms group. This may suggest that this group has particularly significant metacognitive challenges. This is consistent with previous findings linking deficits in metacognitive capacity with future levels of negative symptoms.[77,78] As with all unexpected findings, all interpretations should be regarded as speculative at best and needing further study.

While the cross-sectional nature of these findings precludes drawing causal conclusions, there are several potential interpretations of the results that could guide future research. First, with lesser metacognitive capacity, persons, regardless of symptom levels, are less able to integrate streams of information into a complex account of psychiatric challenges. For example, with poorer metacognitive capacities, persons may be less able to track changes in their own mental states and then consider alternative explanations for those changes. Further, deficits in the ability to adaptively use metacognitive knowledge may leave patients with higher levels of negative symptoms and little sense that they can affect their fate; as such, they may invest less effort in forming an understanding of the challenges they are facing. Alternative interpretations also cannot be ruled out, including that impaired insight leads to difficulties integrating experience and reduced metacognitive capacity. Future longitudinal studies are needed to track the relationships of these variables over time in order to confirm these possibilities.

There are limitations to the current study. The sample included only persons enrolled in treatment. Thus, it is unknown if these or similar relationships would be observed in samples of individuals who refuse treatment, as many with impaired insight may. We also only included persons with schizophrenia spectrum disorders. It is consequently unknown if the relationships found here are specific to schizophrenia or whether they may also apply to other disorders where lesser metacognitive deficits have been observed, including Bipolar Disorder,[79] Borderline Personality Disorder,[80] PTSD,[81] and Major Depression.[82] Assessments were limited to symptoms and metacognition and we used one assessment of insight. Groups also tended to have mild to moderate impairments in insight; research is needed to explore groups with more severe levels of insight impairment. We also focused on clinical insight and future research is needed to explore the interface of metacognition with other forms of insight. Future research should also examine other factors that may influence insight, including social cognition and neurocognition, as well as different dimensions of insight including cognitive insight, or awareness of and attitudes towards one's general thought processes in longitudinal designs. A more nuanced study of the links of clinical insight and metacognition with subjective recovery is also needed. We also did not assess medication dosage or adherence and hence it is unknown to what extent pharmacological treatment may have influenced results.

Finally, concerning clinical practice, results emphasize the need to see insight as a matter of meaning making and not the acceptance of specific labels. As metacognition is fundamentally an intersubjective act,[83] insight is something evolved with or between persons and not something that happens in isolation or somehow

"within" the identified patient alone. This is consistent with observations that insight can readily become maladaptive when generated in interactions that are oppressive or laden with stigma.[84] Thus, interventions that affect metacognitive capacity, are free from stigma, and empower persons to manage their own lives may lead to improvements in adaptive insight. In other words, it may be that by assisting persons in forming more complex and integrated ideas about themselves and others, it may, in turn, enable them to form a personally meaningful and non-destructive account of their illness, thus leading to effective self-management and a quicker return to recovery. Such interventions include Metacognition Training,[85] which encourages persons to see how they draw conclusions and then reflect upon how they think about and respond to life, and Metacognition Reflection and Insight Therapy (MERIT),[86] which seeks to promote a more integrated sense of self and others that are needed to develop an enhanced experience of personal agency and self-management.[87]

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