

Delusions Are Associated With Poor Cognitive Insight in Schizophrenia

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The purpose of the study was to investigate the relationship between the symptoms delusions and hallucinations measured by the Positive and Negative Syndrome Scale and cognitive insight as assessed with the Beck Cognitive Insight Scale (BCIS) in patients with schizophrenia. The BCIS is based on 2 subscales, self-reflectiveness and self-certainty, measuring objectivity, reflectiveness and openness to feedback, and mental flexibility. Overall cognitive insight was defined as the difference between self-reflectiveness and self-certainty. This cross-sectional study of 143 patients showed that the occurrence of delusions is associated with low self-reflectiveness and high self-certainty, reflecting low cognitive insight. Hallucinations in the absence of delusions were associated with high self-reflectiveness and low self-certainty, possibly reflecting more open-mindedness and higher cognitive insight. The present findings suggest that delusions are associated with low cognitive insight, whereas solitary hallucinations may be associated with high cognitive insight.

Key words: psychosis/hallucination/self-reflectiveness/self-certainty/Beck Cognitive Insight Scale

Introduction

Delusions (*Diagnostic and Statistical Manual of Mental Disorders* [Fourth Edition] [*DSM-IV*]¹) definition of a delusion: “A false belief based on incorrect inference about external reality that is firmly sustained despite what almost everyone else believes and despite what constitutes

the inconvertible and obvious proof or evidence to the contrary. The belief is not one ordinarily accepted by the members of the person’s culture and subculture [e.g. it is not an article of religious faith.]” and hallucinations (Delineation of hallucinations in *DSM-IV*¹: hallucinations may occur in any sensory modality [eg, auditory, visual, olfactory, gustatory, and tactile], but auditory hallucinations are by far the most common. Auditory hallucinations are usually experienced as voices, whether familiar or unfamiliar, that are perceived as distinct from the person’s own thoughts.) are cardinal symptoms in schizophrenia. It has been proposed that auditory verbal hallucinations arise from a problem with monitoring one’s own thoughts (or inner speech) so that they are misidentified as external “voices.”^{2,3} Several studies have investigated attribution of voices in relationship to hallucinations. When patients with schizophrenia are uncertain about the source of a perceived event, they tend to attribute it to an external source.⁴ Empirical evidence indicates that the propensity to misattribute the source of self-generated inner speech may be related to the presence of delusions.^{3,5} The close integration of delusions or misinterpretations in the hallucinatory process has been shown in several studies.^{6,7} In a recent study, schizophrenia patients with current delusions and no hallucinations were compared with healthy controls when exposed to their own voices being distorted in an experimental setting. An increased frequency of misattributions was found in the patient group compared with the control subjects.² It was also shown that schizophrenia patients with delusions but no hallucinations tended to attribute the distorted voices in the same manner as patients with both hallucinations and delusions.³ The authors speculated that misattributions in patients with hallucinations are related to their delusions in a larger degree than to their hallucinations. Delusional patients seem to have a defective “self-monitor” and thus are less aware of own interpretations and actions.⁸ Findings from previous studies have also suggested that patients with delusions tend to discard old hypotheses for new ones on the basis of little evidence.^{9,10}

A fruitful approach to this field would be to study *cognitive insight*, defined as the patients’ capacity and willingness to observe their mental productions and to consider alternative explanations and their overconfidence in their beliefs,¹¹ which could be a link between

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delusions and hallucinations. Cognitive insight can be measured with Beck Cognitive Insight Scale (BCIS).¹¹ The BCIS is based on 2 subscales, *self-reflectiveness* measuring objectivity and reflectiveness and openness to feedback and *self-certainty* measuring mental flexibility. High scores on the subscale self-reflectiveness and low scores on subscale self-certainty is considered as normal. The 2 subscale scores were weakly intercorrelated, indicating that they represent 2 different dimensions of cognitive insight.¹² Overall cognitive insight is assessed by a composite index defined as the difference between the scores of self-reflectiveness and self-certainty. This seems to be a valuable tool for studying underlying factors related to delusions. We suggest that cognitive insight could reflect the awareness of the voices' origin in patients with hallucinations.

Beck et al¹¹ noted that patients with major psychoses typically have reduced capacity to reflect rationally on their anomalous experiences and to recognize that their conclusions are incorrect. The authors also found a significant negative correlation between scores on self-reflectiveness and delusions measured by the Positive and Negative Syndrome Scale (PANSS). The severity of positive symptoms in general (PANSS positive score) was found to be related to self-certainty but not to self-reflectiveness scores or to overall cognitive insight in middle-aged and older outpatients with schizophrenia or schizoaffective disorder.¹³ Warman et al examined middle-aged outpatients with schizophrenia and schizoaffective disorder and divided the patients in groups with and without current delusions.¹⁴ A significantly higher score was found on self-reflectiveness and self-certainty among the patients with delusions than among patients with no active delusions. As the authors pointed out, the finding involving self-reflectiveness was unexpected. However, the difference was due to a very low score in the group with psychosis but no delusions. This group was small (13 patients), was fairly old (mean age 50 y), came from a Veterans Administration setting, and had a skewed distribution of gender (11 of the 12 who reported gender were men) and ethnicity (5 Caucasian, 7 African American, and 1 other). The patients were not characterized beyond gender, age, and ethnicity. Hence, it remains to be seen if these results will be replicated in a larger and more representative patient group.

We hypothesize that the occurrence of delusions could be associated with "unidimensional" ideation in schizophrenia, in the sense that lack of mental flexibility would be assertive and override other intellectual functions, compatible with low self-reflectiveness and high self-certainty scores. On the other hand, absence of delusions despite the presence of hallucinations could be associated with a high degree of open-mindedness. We therefore hypothesize that patients with hallucinations but no delusions might show high self-reflectiveness and low self-certainty.

We therefore designed a study to investigate the relationship between delusions and hallucinations, occurring solitarily or concurrently, and cognitive insight in patients with schizophrenia. This has, to our knowledge, not previously been studied. We made the following predictions: in patients with schizophrenia, (1) delusions are associated with low self-reflectiveness and high self-certainty scores irrespective of the presence of hallucinations. (2) In contrast, current hallucinations but no delusions are associated with high self-reflectiveness and low self-certainty scores.

Materials and Methods

Participants

The subjects participated in a large ongoing study on schizophrenia and bipolar disorders, the Thematic Organized Psychoses (TOP) Research Study. From May 2003 through July 2007, the present study was conducted in outpatient and inpatient psychiatric units at 4 University Hospitals in Oslo, which provide treatment for patients referred from primary care. The psychiatric units in Norway are catchment area based and publicly funded.

In order to participate in the current study, subjects needed to be between 18 and 65 years, understand and speak a Scandinavian language, have no history of severe head trauma, obtain an IQ score of above 70, meet the *DSM-IV* criteria for schizophrenia or schizoaffective or schizophreniform disorder, and be willing and able to give informed consent. A total of 143 patients met the inclusion criteria (schizophrenia, $n = 107$; schizophreniform disorder, $n = 10$; schizoaffective disorder, $n = 26$).

Table 1 gives an overview of demographic and clinical characteristics. The mean Global Assessment of Functioning, symptoms (GAFs), score (see "Measures") for all patients was 43.8 (SD = 11.4), reflecting a severity of symptoms bordering psychosis. The mean illness duration for all patients was 3.9 years (SD = 4.5). Fifty-two percent of the patients had been ill for 2 years or less. Illness duration was defined as the time since the first contact with a specialized public health care unit due to psychosis.

All participants gave written informed consent, and the study was approved by the Regional Committee for Medical Research Ethics and the Norwegian Data Inspectorate.

Measures

General Assessments. Diagnosis was established using the Structured Clinical Interview for *Diagnostic and Statistical Manual of Mental Disorders* (Fourth Edition, Text Revision) axis I disorders (SCID-I).¹⁵ All interviewers completed a training course in SCID assessment based on the training program at the University of California

Table 1. Demographic and Clinical Characteristics in Groups of Patients Defined by Delusions and/or Hallucinations

Normal	No delusions, No Hallucination (1), <i>n</i> = 64	Delusions, No Hallucinations (2), <i>n</i> = 31	Delusions and Hallucinations (3), <i>n</i> = 33	No Delusions, Hallucinations (4), <i>n</i> = 15
Male, %	62.5	58.1	57.6	40.0
Age (y)	32.3 (9.8)	33.2 (10.1)	30.8 (8.5)	32.5 (9.5)
Illness duration (y)	4.4 (3.8)	3.3 (4.5)	2.8 (3.5)	5.6 (7.9)
Antipsychotic medication, %	92	77	77	100
GAFs	51.5 (10.7)	37.5 (5.0)	33.2 (4.6)	37.3 (5.6)
GAFf	50.0 (11.3)	39.4 (7.3)	37.3 (7.9)	40.8 (7.1)
PANSS delusions (P1)	1.6 (0.8)	4.4 (0.7)	4.8 (0.9)	2.1 (1.0)
PANSS. hallucinations (P3)	1.4 (0.8)	1.9 (1.0)	4.8 (0.7)	4.3 (0.5)
PANSS insight (G12)	2.1 (1.3)	3.1 (1.4)	3.1 (1.6)	2.6 (1.6)
PANSS depression (G6)	2.3 (1.3)	3.0 (1.4)	3.6 (1.2)	3.1 (1.6)
PANSS negative sum	13.0 (5.5)	15.2 (5.3)	16.6 (5.3)	14.3 (5.1)

Note: Mean with SD presented. Male and antipsychotic medication, percent presented; for other variables, SD in parenthesis. GAFs, Global Assessment of Functioning, symptom; GAFf, Global Assessment of Functioning, function; PANSS, Positive and Negative Syndrome Scale.

Los Angeles¹⁶ and participated in diagnostic evaluation meetings on regular basis led by an experienced clinical researcher in the field of diagnostics in severe mental disorder (S.O.). To assess reliability for the actual study interviews, a stratified random sample was drawn, consisting of cases from each of the raters. Utilizing 28 anonymous vignettes rated by 2 experts blind to the study ratings, the overall agreement for the *DSM-IV* diagnostic categories was 82% and the overall κ 0.77 (95% confidence interval = 0.60–0.94). Global Assessment of Functioning (GAF) Scale¹⁷ was utilized to measure psychosocial functioning and split into scales of symptoms (GAFs) and function to improve psychometric properties.¹⁸ The interrater reliability of the investigators was good for the GAF with an intraclass correlation, ICC (1.1), of 0.86.¹⁹

Measuring Positive Symptoms. The PANSS²⁰ was utilized to assess severity of positive symptoms. A score of 4 or higher was defined as having delusions or hallucinations. Concerning assessment of delusions, the PANSS P1 definition was followed as described by the rating manual: “Beliefs which are unfounded, unrealistic, and idiosyncratic.” Hallucinations were measured in accordance with the PANSS P3 rating criteria: “Verbal report or behavior indicating perceptions which are not generated by external stimuli. These may occur in the auditory, visual, olfactory, or somatic realms.” The severity of symptoms is not assessed by involvement of specific sensory modalities but is rated according to the number of (one or more than one) hallucination modalities and their impact on behavior. All interviewers participated in interrater reliability testing that entailed rating of patient videos. An ICC(1.1)¹⁹ of 0.73 was obtained for the PANSS positive subscale.

Assessment of Cognitive Insight. The BCIS is a self-report inventory consisting of 15 statements rated on a 4-point Likert scale (0 = do not agree at all to 3 = agree completely). Based on factor analyses, Beck et al¹¹ divided the 15 items into 2 subscales. The first component consisted of 9 items measuring objectivity, and reflectiveness and openness to feedback was given the label self-reflectiveness. Six items measured decision making and resistance to feedback and comprised a second component of the scale labeled self-certainty. The questionnaire was administered without a time limit. Psychometric properties of both subscales of the BCIS were found acceptable for patients with schizophrenia.¹²

Groups Based on Delusions and/or Hallucinations. The patients were divided in 4 groups according to the occurrence of delusions and/or hallucinations based on dichotomized scores of PANSS delusions (item P1) and PANSS hallucinations (item P3), with a cut off of ≥ 4 . The 4 groups were no delusions and no hallucinations (–D/–H), no delusions and hallucinations (–D/+H), delusions and no hallucinations (+D/–H), and delusions and hallucinations (+D/+H). Group characteristics are given in table 1. Several differences, although not significant, were found between the (–D/+H) group and the 2 groups of patients with delusions. In the (–D/+H) group, there was a higher percentage of women and longer mean illness duration, in addition to a larger percentage using antipsychotic medication. We also found that this moderately sized patient group had scores on insight of illness (measured by item G12 in PANSS) and negative symptoms between those of patients with delusions and those with neither delusions nor

hallucinations. The mean GAF scores in the 3 groups with delusions and/or hallucinations reflected moderate psychotic symptom load.

Statistics

For the statistical analysis, we used Statistical Package for the Social Sciences version 15.

To represent the outcome, cognitive insight, the BCIS subscale scores self-reflectiveness, self-certainty, and the composite index (difference between the 2 subscale scores) were used. Both multivariate and univariate models were employed. Multivariate analysis of variance (MANOVA) was applied with self-reflectiveness and self-certainty as response variables. As covariates, we used the grouping variable as well as the potential confounders gender, age, illness duration, and antipsychotic medication. Nonsignificant covariates were removed. The composite index was analyzed in a similar way with univariate analysis of variance (ANOVA). Nonlinearity and interactions were assessed. To test the null hypothesis that no single group departed from the remaining 3 groups combined, and the null hypothesis that the 2 groups with delusions were no different from the 2 groups without delusions (and similar for hallucinations), linear contrasts were specified and tested. Bonferroni correction for multiple testing was used.

Few patients had missing data in the study. On the BCIS, the missing items were scattered on the various items in both subscales. The average was 1.5 total missing registrations per item. There were no missing registrations on the various PANSS items.

Results

The scores on self-reflectiveness, self-certainty, and composite index are shown in figure 1.

Multivariate Analysis

In the multivariate model (MANOVA) with both self-reflectiveness and self-certainty as outcomes, the grouping variable was the only significant covariate ($P = .0297$). In other words, the null hypothesis of equality among the groups was rejected. Testing the 4 subhypotheses comparing one single group with the remaining 3 gave the following results:

(-D/-H) vs rest: $P = .8427$,
 (-D/+H) vs rest: $P = .0076$,
 (+D/-H) vs rest: $P = .0443$,
 (+D/+H) vs rest: $P = .1222$.

With Bonferroni correction (significance level of 0.0125), the (-D/+H) was the only group that was significantly different from the rest. Testing the null hypothesis that the 2 groups with delusions were no different from the groups without delusions (and similar for hallucinations) gave the following results:

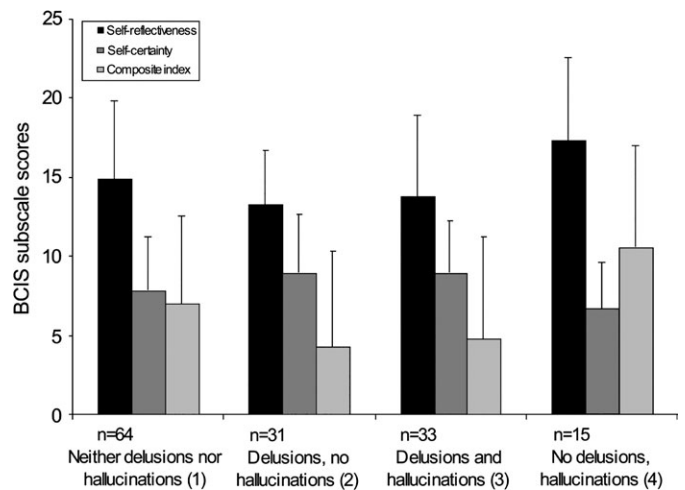


Fig. 1. Scores on Self-reflectiveness, Self-certainty, and Composite Index in Groups Defined by Delusions and/or Hallucinations.

(-D/-H and -D/+H) vs (+D/-H and +D/+H): $P = .0011$,
 (-D/-H and +D/-H) vs (-D/+H and +D/+H): $P = .2022$.

This showed that the groups with delusions were significantly different from the groups without delusions, but the groups with hallucinations were not significantly different from the groups without hallucinations.

Univariate Analysis

As univariate measure of cognitive insight, the composite index was used as outcome in an ANOVA with the grouping variable as the only significant covariate ($P = .0034$).

The similar tests as in the MANOVA were performed. Testing the 4 subhypotheses comparing 1 single group with the remaining 3 gave the following results:

(-D/-H) vs rest: $P = .6467$,
 (-D/+H) vs rest: $P = .0018$,
 (+D/-H) vs rest: $P = .0124$,
 (+D/+H) vs rest: $P = .0465$.

With Bonferroni-corrected significance level, both the (-D/+H) and the (+D/-H) groups were significantly different from the rest. Testing the null hypothesis that the 2 groups with delusions were no different from the groups without delusions (and similar for hallucinations) gave the following results:

(-D/-H and -D/+H) vs (+D/-H and +D/+H): $P = .0003$,
 (-D/-H and +D/-H) vs (-D/+H and +D/+H): $P = .0743$.

As in the multivariate analysis, the groups with delusions were significantly different from the groups without

delusions, but the groups with hallucinations were not significantly different from the groups without hallucinations.

Discussion

Investigating the relationship between delusions and hallucinations occurring solitarily or concurrently is a new perspective when appraising cognitive insight. Our findings indicate that this approach could be beneficial. The main findings in the present schizophrenia sample were that delusions irrespective of the presence or absence of hallucinations were associated with low self-reflectiveness and high self-certainty, reflecting low cognitive insight. In contrast, solitary hallucinations may be associated with high self-reflectiveness and low self-certainty, reflecting high cognitive insight.

The present results of low self-reflectiveness and high self-certainty in patients with delusions were expected because subjective certainty of judgment and not listening to counterarguments are implicit in the concept of delusions and also in line with several but not all previous reports. Beck *et al.*¹¹ reported a significant negative correlation between scores on PANSS delusions and self-reflectiveness, which is consistent with our findings. The authors also found a tendency toward a negative association between overall cognitive insight and both delusions and hallucinations.¹¹ Our data on delusions and self-certainty are in accordance with the findings of Warman *et al.*²¹ but incompatible concerning delusions and self-reflectiveness. The low sample size in that study indicates that their results should be interpreted with caution, as the authors discussed.¹¹ Patients with delusions request little information before reaching a decision^{9,22} and seem to express high certainty levels and overconfidence in their estimates of future events' probabilities.²² Patients with schizophrenia have deficient reality testing, and in their cognitive model, Beck and Rector²³ proposed that the same deficiencies that weaken the reality testing functions also favor easy but erroneous methods of processing information.²³ This implies that delusions could be associated with "unidimensional" ideation, meaning that lack of mental flexibility would be assertive and override other intellectual functions. To escape the "easy solution bias," sophisticated forms of self-correction are required. If the self-correction strategies are ineffective, reflected in high self-certainty and low self-reflection, it seems more likely that delusions will occur.

The finding that the (–D/+H) group was more cognitively insightful than the (–D/–H) group was surprising. Our data suggest that solitary hallucinations without delusions may be associated with high self-reflectiveness and low self-certainty, reflecting high cognitive insight, a finding that has not been reported earlier. Probably, solitary hallucinations co-occurring with open-mindedness and high cognitive insight cannot be entirely explained by lack of delusional ideation. In general, hal-

lucinations create increased ambiguity and incoherence that make delusional misinterpretations more likely. The most cognitively insightful and grounded individuals, however, might overcome the challenge of incorporating hallucinatory sensations into a reality-based interpretation of the world. Hence, (–D/+H) patients on average would be expected to be more insightful than (–D/–H) patients who have not had the challenge of incorporating hallucinated sensations into a reality-based interpretation of the world.

The current findings may lead to some speculations about the relationship between delusions, hallucinations, and cognitive insight. If the self-correction strategies are ineffective, with high self-certainty and low self-reflection, it seems more likely that delusions will occur. On the other hand, absence of delusions in the presence of hallucinations could be associated with a high degree of open-mindedness. This seems to be supported by the current findings. Furthermore, intact cognitive insight would be concordant with internalization of voices and avoidance of aberrant beliefs possibly reflecting awareness of the voices' origin in these patients.

Important limitations to our study are the small sample of patients with solitary hallucinations and the cross-sectional design that make it impossible to infer whether there is a causal relationship between cognitive insight and positive symptoms.

Nonetheless, our findings indicate that evaluation of delusions and hallucinations are essential when appraising cognitive insight. The occurrence of delusions is associated with low self-reflectiveness and high self-certainty, reflecting low cognitive insight. Current hallucinations without delusions may be associated with high cognitive insight. This discrepancy in cognitive insight needs replication.

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