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Persistence and Stability of Delusions Over Time

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Traditional descriptions of delusions have emphasized the conviction with which they are held and their resistance to change. This study utilizes data from a large cohort of delusional subjects to assess the persistence and stability of delusional beliefs, and the predictors of change. Data were collected from 1,136 acutely hospitalized psychiatric patients, reinterviewed at 10-week intervals for 1 year. Persistence of delusional beliefs was determined for those delusional subjects with at least one follow-up visit (n = 405), and stability for the subset with delusions at two or more points in time (n = 262). Marked plasticity in delusional beliefs was observed, with one third of delusional subjects at any interview no longer delusional 10 weeks later. Persistence of delusions was associated with schizophrenia, global psychopathology, and having acted on a delusion, among other variables. Most subjects showed variation in the content of their primary delusion over time. Delusions appear to be more fluid over relatively short periods of time than has been suggested by many classic descriptions and contemporary formulations.

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DELUSIONS, the paradigmatic symptoms of psychosis, remain curiously underexplored, even as regards their essential characteristics. To what extent, for example, are delusions transitory phenomena that mark a particular stage of psychotic illness, as opposed to permanent stigmata that once present will always endure? The psychiatric literature appears to be of two minds about this question.

Much theoretical writing sketches delusions as deeply held and resistant to change. Karl Jaspers' influential characterization, for example, emphasized that delusions "are held with an *extraordinary conviction*, with an incomparable, *subjective certainty*," and that "there is an *imperviousness* to other experiences and to compelling counter-argument" [emphasis in the original] (pp 95-96).[1] DSM-IV echoes that approach in defining a delusion as "A false belief . . . that is firmly sustained despite what almost everyone else believes and despite what constitutes incontrovertible and obvious proof or evidence to the contrary" (p. 765).[2] Although depth of conviction at a given point does not preclude change over time, graphic accounts of the resistance of delusions to confrontation with reality[3] have reinforced the view of delusions as stable phenomena, as have arguments regarding the self-reinforcing aspects of delusional ideation.[4]

On the other hand, considerable evidence exists of the plasticity of delusional beliefs. Delusions often fade or disappear with the resolution of an acute episode of psychosis, as most clinicians can testify from their own experience.[5-7] Longitudinal studies suggest that the presence of delusions may vary over time, and that in certain cases they may disappear entirely.[7-16] For example, Jorgensen's[17] follow-up data on 75 patients with acute delusional psychoses, who were interviewed three times during the 8 years following discharge, showed that 43% were continuously delusional, 28% were intermittently delusional, and 29% had complete re-

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missions. Recent data from Myin-Germeys et al.[18] indicate that a group of schizophrenic subjects were delusional on average only 32% of the time. Even when delusions persist, some data indicate that the type of delusion that patients manifest and the delusional theme are susceptible to change.[19,20]

Given the evolving consensus about the plasticity of delusions,[21] it is surprising that few efforts have been made to explore the predictors of this heterogeneity in the persistence and stability of delusional beliefs. In the study by Jorgensen mentioned above, a diagnosis of schizophrenia had by far the strongest predictive value for the persistence of delusions, followed by a primary delusion other than a delusion of reference, absence of psychosocial stressors prior to the index episode, and living alone.[13] Harrow et al.[15] also reported that delusions were significantly more likely to persist in schizophrenia than in schizoaffective or affective disorders. Duration of illness and presence of premorbid stressors were identified as predictors by Schanda et al.[12]

The importance of identifying those variables that are associated with persistence or remission of delusions is several-fold. Clinicians will be better able to predict the likely course of patients' symptoms and perhaps better situated to intervene so as to mitigate their effects. Difficult diagnostic determinations may be aided by knowledge of patterns of delusional persistence characteristic of different disorders. In addition, the analyses may shed light on critical aspects of the psychopathological construct of delusions itself. If delusions are heterogeneous in their origins across differing diagnostic categories or delusional types (e.g., persecutory, grandiose, etc.), we may expect to see different patterns and predictors of remission in various diagnostic and typological groups. Alternatively, similar patterns of presentation over time despite diagnostic and other differences would be compatible with the view of delusions as unitary phenomena, as has previously been demonstrated for their non–content-related dimensional characteristics.[22]

Here, we explore the persistence and stability of delusional beliefs in a large and diverse sample of acutely hospitalized psychiatric patients, followed intensively for 1 year after discharge. In addition to examining the effect of diagnostic categories, we focus on type of delusion and non–content-related descriptors to assess their impact on patterns of delusional presentation.

METHOD

The data presented are drawn from a prospective, multisite study of violence among persons with mental disorder, the MacArthur Violence Risk Assessment Study. The methods of the larger study are described in detail elsewhere.[23] In brief, soon after hospitalization on an acute psychiatric unit at one of the three study sites (Western Missouri Mental Health Center, Kansas City, MO; Western Psychiatric Institute and Clinic, Pittsburgh, PA; and Worcester State Hospital and the University of Massachusetts Medical Center, Worcester, MA) patients were approached and asked for written consent to participate in the study. Those approached were selected randomly from all admissions to these facilities, within the constraints of a stratified sampling scheme designed to equalize the proportion of subjects recruited at each site by age, race, and gender. Of 1,695 patients approached, 1,203 (71%) agreed to participate, and 1,136 completed the baseline interview, a mean of 7 days after admission. Eligibility was limited to patients 18 to 40 years of age who were white, African-American, or Hispanic. Eligible primary diagnoses were grouped into the following categories: schizophrenia (including schizophreniform and schizoaffective disorders), depression (including major depression and dysthymia), bipolar disorder (including cyclothymic disorder), other psychotic disorders (including delusional disorder and brief reactive psychosis), alcohol/drug abuse or dependence, or personality disorder.

During the hospital admission, study clinicians (one Ph.D. and two masters' level) used the DSM-III-R Checklist,[24,25] a semistructured interview, to establish subjects' diagnoses and, following the criteria in that instrument, to determine the primary diagnosis, i.e., the diagnosis of greatest immediate clinical significance. When multiple diagnoses were present, that was almost always (84.5% of cases) the diagnosis judged most impairing. Interviewers underwent 3 days of intensive training in the use of study instruments, including mock interviews and patient interviews supervised by experienced psychiatrists. Inter-rater reliability for the primary diagnoses were calculated by examining the ratings of the three study clinicians on 22 videotaped diagnostic interviews; 12 of the interviews were rated by all three clinicians, and 10 were rated by two of the clinicians. The resulting 46 clinician pairs had an overall agreement rate of 83%, which corresponded to a Cohen kappa of .59.

To determine whether subjects had a delusion, clinicians asked a series of 17 questions drawn primarily from the Diagnostic Interview Schedule (questionnaire available from the authors).[26] Interviewers were trained to apply the DSM-III-R definition of a delusion and, by further structured questioning and review of subjects' medical records, to use their best judgment to determine whether subjects were definitely or possible delusional, or whether subjects' responses reflected reality (e.g., someone in their neighborhood really *was* trying to harm them) or some other nondelusional motivation (e.g., malingering). In case of doubt, interviewers were instructed to err on the side of inclusiveness, i.e., categorizing the belief as a delusion. At baseline, 83.8% of delusional subjects were rated definitely delusional; the percentage at each follow-up visit varied between 60% and 70%. To insure the consistency of these determinations, the first author reviewed all screening forms, which contained subjects' verbatim descriptions of their beliefs, and when necessary, listened to audiotapes of the interviews. In only

one case was the decision made to change the interviewer's scoring by moving a subject from the delusional to the nondelusional group. All subjects scored as definitely or possibly delusional were considered to have delusions for the purpose of this study, and interviewers categorized the delusions using a standard, content-based typology based largely on DSM-III-R.

Delusional subjects were given a substantially modified version of the Maudsley Assessment of Delusions Scale (MADS),[27] referred to as the MacArthur-Maudsley Delusion Assessment Schedule or MMDAS (available from the authors).[22] Subjects who had more than one delusion were asked to identify the delusional belief that had the greatest recent impact on their lives for more detailed examination with the MMDAS (referred to here as the "primary delusion"). In those rare cases in which the subject was unable to identify such a delusion, the interviewer selected the delusion that appeared to meet the criterion.

The MMDAS generates scores on seven dimensions: conviction, negative affect, action, inaction, preoccupation, pervasiveness, and fluidity. Specific questions are asked about the first four dimensions; the last three are rated on anchored scales on the basis of the interviewers' global impressions. (See Appelbaum et al.[22] for descriptions of each dimension and data on the reliability of the scoring of the instrument, which was generally quite good.) In addition, interviewers were asked to indicate the type(s) of delusion being evaluated by content-type, and to note whether it was the same as the delusion identified as primary at any previous interview. Change in the theme of the delusion or substantial change in the details presented were required for a delusion to be characterized as different from a previous delusion. The first author reviewed these determinations as well.

Subjects were recontacted in the community and interviewed five times (every 10 weeks) for 1 year from the date of discharge. (Data on the effectiveness of the follow-up procedures can be found in Steadman et al.[23]) The procedures for the assessment of delusions described above were followed at each interview. Assessment of subjects' adherence to treatment recommendations after discharge was based on subjects' self-report. Subjects were considered nonadherent to follow-up appointments if they reported missing more than 25% of scheduled appointments across all follow-up interviews. Subjects were considered nonadherent to medication recommendations if they reported refusing to take prescribed medications, failing to fill their prescriptions, or taking more or less than the prescribed dosage for more than 25% of their time in the community, aggregated across all follow-up interviews.

RESULTS

At baseline, the cohort was predominantly male (58.7%), white (69.1%; 29% were African-American, and 1.8% were Hispanic), voluntarily admitted (58.1%), and between 25 and 40 years of age (75.3%). Primary research diagnoses for the subjects were depression or dysthymia (40.3%), schizophrenia or schizoaffective disorder (17.2%), bipolar disorder (13.3%), other psychotic disorder (3.5%), alcohol or drug abuse/dependence (23.9%), and personality disorder only (1.8%). Of the 951 subjects with at least one follow-up interview, 405 (42.6%) had one or more delusions recorded. As would be expected, this group of delusional subjects differed significantly on many diagnostic, clinical, and historical variables from the group without delusions. These 405 subjects constitute the group in which the persistence of delusions over time is explored below, since they had at least two time points at which the presence or absence of delusions could be ascertained ("persistence sample"). Two hundred sixty-two of these 405 subjects (64.7%) had two or more interviews with delusions present; they constitute the subgroup in which stability of the content of the primary delusion is examined ("stability sample"). The characteristics of the persistence and stability samples are listed in Table 1.

Most subjects were available for most follow-up interviews. Of the 405 subjects in the persistence sample, 63% (256) had all five interviews, and 80% (323) had at least four interviews. The only highly significant differences on 114 demographic, clinical, and historical variables between those subjects who had all five follow-up interviews and those with four or fewer were in five variables: mothers' drug use (Fisher's exact test $P = .01$), work history (Fisher's exact test $P = .011$), number of helpers in social network (Spearman's rho = .135, n = 405, $P = .006$), perceived stress at admission (Spearman's rho = −.125, n = 404, $P = .013$), and attempt at self harm prior to admission (Fisher's exact test $P = .01$). Similarly, for the 262 subjects in the stability sample, 68% (177) had all five follow-up interviews, and 85% had at least four interviews.

Persistence of Delusions Over Time

The frequency of delusions across the baseline and five follow-up interviews was 28.9% (n = 328), 22.4% (n = 188), 22.1% (n = 183), 20.8% (n = 160), 18.2% (n = 137), and 18.1% (n = 136). Of those subjects with delusions at baseline and follow-up interviews 1 through 4, the percentages who were delusional at the subsequent follow-up visit were 50.8%, 68.1%, 70%, 64.3%, and 66.2%, respectively. Using a Markov analysis, the average transitional probability that someone who was delusional would remain delusional at the subsequent follow-up interview was 0.63. In contrast, the average transitional probability that someone who was not delusional would become so at the next

Table 1. Sample Characteristics

Description	% of Persistence Sample (N = 405)	% of Stability Sample (N = 262)
Gender (male)	58.5	59.5
Race (white)	63.2	61.1
Ever married	39.8	38.2
High school graduate (or equivalent)	70.0	67.8
Age at baseline (yr)		
18-24	21.7	21.8
25-34	48.1	47.7
35-40	30.1	30.5
Primary research diagnosis at baseline admission		
Schizophrenia	31.6	35.5
Depression	27.2	26.0
Bipolar disorder	20.0	15.6
Alcohol/drug abuse/dependence	14.6	16.0
Personality disorder only	1.5	1.5
Other psychotic disorder	5.2	5.3
Any alcohol abuse diagnosis	40.2	38.9
Any drug abuse diagnosis	32.3	32.4
No. of prior hospitalizations		
None	20.9	17.7
1-3 times	36.5	36.5
4 times of more	42.6	45.8
Adherence to follow-up appointment* (self-report)		
No follow-up recommended	23.6	23.6
Adherent (missed <25%)	52.8	50.9
Not adherent (missed >25%)	23.6	25.5
Adherence to medication (self-report)*		
No medications prescribed	12.1	8.8
Adherent	44.2	44.3
Not adherent	43.7	46.9
BPRS total score at baseline		
Low (<30)	10.4	8.4
Medium (30-39)	32.4	31.8
High (>39)	57.2	59.8
GAF functioning score at baseline		
Low (≤30)	67.7	68.7
Medium (31-60)	32.1	30.9
High (>60)	.2	.4

*See definitions in Methods section in text.

follow-up appointment was 0.08. Only 15.1% (n = 61) of subjects from the persistence sample (n = 405) were delusional at every follow-up appointment at which they were interviewed (mean number of follow-up interviews for the persistence sample = 4.27; SD = 1.15). Inclusion in this category was not associated with the number of follow-up interviews in which subjects participated (Spearman's rho = −.089, n = 405, $P = .075$).

To examine the predictors of persistent delusions, the persistence sample was divided into two groups: subjects with delusions at every follow-up visit at which they were interviewed (n = 61) and subjects with at least one follow-up visit free of delusions (n = 344). Never having been married (Fisher's exact test $P = .001$), increased age (Mann-Whitney [M-W] $\chi^2 = 4.59$, $df = 1$, $P = .032$), and a research diagnosis of schizophrenia at

Table 2. Logistic Regression Model for "Persistence"

Model Covariates*	Coefficients B	Significance *P*	Odds Ratio	95% CI
Marital status	−1.399	<.001	.247	.115-.529
Age	.072	.007	1.075	1.020-1.132
Primary diagnosis of schizophrenia	.783	.015	2.189	1.163-4.122
BPRS (total score)	.037	.016	1.037	1.007-1.069
Delusion of thought bradcasting at first MMDAS	1.685	.001	5.392	1.913-15.192
Acting on delusions at first MMDAS	.304	.021	1.356	1.047-1.756

Abbreviation: CI, confidence interval.

*The covariates were selected using forward Wald procedure from the following list of variables: (1) gender, age, race (white/non-white), education (years of education), marital status (ever married yes/no); (2) primary diagnosis (four indicator variables-depression/dysthymia, schizophrenia/schizoaffective disorder, bipolar, alcohol/drug abuse or dependence), BPRS (total score), GAF; and (3) "type of delusion at first MMDAS" (nine indicator variables) and "first MMDAS dimension measure" (six dimensions).

baseline (Fisher's exact test $P < .001$) predicted the persistence of delusions at every interview, while a diagnosis of alcohol abuse or dependence—even if not the primary diagnosis—predicted at least one follow-up visit free of delusions (Fisher's exact test $P = .034$). Analysis of the relationship between type of delusion at the first interview at which the subject was delusional and persistence revealed that delusions of body/mind control (Fisher's exact test $P = .04$) and of thought broadcasting (Fisher's exact test $P = .014$) predicted persistence of delusions at every interview.

Multiple characteristics of delusions as measured by the MMDAS at the first interview at which delusions were present were predictive of persistence at every follow-up visit, including the extent of preoccupation with delusional thoughts (M-W $\chi^2 = 9.27$, $df = 1$, $P = .002$); pervasiveness of delusional thoughts (M-W $\chi^2 = 14.1$, $df = 1$, $P < .001$); history of having acted on the delusion (M-W $\chi^2 = 4.43$, $df = 1$, $P = .035$); and history of having refrained from acting because of the delusion (M-W $\chi^2 = 5.66$, $df = 1$, $P = .017$).

Other measures of psychopathology at baseline were predictive of whether delusions were present at each follow-up interview. These included the presence of auditory hallucinations (Fisher's exact test $P = .002$); higher scores (indicative of greater psychopathology) on the Brief Psychiatric Rating Scale (BPRS; M-W $\chi^2 = 12.44$, $df = 1$, $P < .001$), and on the thought disturbance (M-W $\chi^2 = 29.07$, $df = 1$, $P < .001$) and hostile-suspiciousness (M-W $\chi^2 = 14.55$, $df = 1$, $P < .001$) BPRS subscales; and lower scores (indicative of poorer functioning) on the Global Assessment of Functioning (GAF) scale (M-W $\chi^2 = 4.0$, $df = 1$, $P = .046$). Neither lack of adherence to follow-up appointments (number of missed appointments/number of scheduled appointments) (Spearman's rho = −.037, n = 322, $P = .511$) nor to medication (number of follow-ups at which compliant/total number of follow-ups) (Spearman's rho = .015, n = 405, $P = .769$) was associated with persistence of delusions.

Table 2 shows the results of a logistic regression analysis in which the available independent variables were entered in a forward stepwise fashion. Being married was negatively related to persistence of delusions, while greater age, a diagnosis of schizophrenia, higher total psychopathology scores (BPRS), an initial delusion of thought broadcasting, and a report of having acted on a delusion at the first administration of the MMDAS showed a positive relationship with persistence. The model accounted for 23% of the variance.

Stability of Primary Delusions

Subjects in the stability sample showed considerable variation in their primary delusion over time. The likelihood that subjects who were delusional at two consecutive interviews would show a change in their primary delusion at the second interview was 43.9%, 44.1%, 33.9%, 35.9%, and 39.5% for the 5 follow-up interviews, respectively. Applying a Markov analysis, the average probability of stability in the primary delusion across two interviews was .61. Subjects who manifested stability across two interviews had a probability of .74 of maintaining the same delusion at the third interview, whereas those whose primary delusion had changed across two interviews had only a .50 probability of showing stability at the third inter-

view. There were no significant differences (Spearman's rho = .031, n = 262, P = .617) in the likelihood of change in primary delusion (new or different delusion *v* same delusion) according to the number of follow-up interviews in which subjects participated.

Few variables were predictive of change in subjects' primary delusions over time. Compared with delusional subjects in the stability sample whose primary delusion remained the same over all interviews (n = 114), there was a trend for subjects who displayed variability in the content of their delusions (n = 148) to have a diagnosis of schizophrenia at baseline (Fisher's exact test P = .075). Subjects with persecutory delusions at the interview where delusions were first present were more likely to show stability in their primary delusion (Fisher's exact test P = .034), while those with delusions of thought broadcasting were more likely to show variation (Fisher's exact test P = .053).

Of the non–content-related characteristics of delusions measured by the MMDAS at the first interview where delusions were present, only a history of having refrained from acting because of a delusion was predictive of subsequent variability in the content of the delusion (M-W χ^2 = 4.25, df = 1, P = .039). Subjects who were delusional at every follow-up interview were more likely to show variation in their primary delusion (Fisher's exact test P = .001). Finally, the presence of hallucinations at baseline (Fisher's exact test P = .005) and subjects' scores on the BPRS thought disturbance subscale (M-W χ^2 = 8.73, df = 1, P = .003) predicted change in primary delusions. Again, neither adherence to follow-up appointments (Spearman's rho = .044, n = 212, P = .526) nor to medication (Spearman's rho = −.043, n = 262, P = .488) was associated with stability of delusions.

Multivariate analysis, using a forward stepwise logistic regression, yielded a model that accounted for less than 6% of the variance in stability, and thus is not reported here.

DISCUSSION

Persons with delusions in this sample displayed considerable heterogeneity in the persistence and stability of their delusional beliefs. Nonetheless, the most striking finding was the degree of plasticity of most delusions. Fully one third of subjects in the persistence sample who reported a delusion at any given interview were no longer delusional the next time their condition was assessed. Only 15.1% were delusional at every interview. Thus, these data provide a picture of delusions as impersistent, even over relatively brief periods of time, a finding that amplifies the results of prior studies in which subjects were interviewed after longer intervals.[7-18]

Clinicians looking to predict the course of patients' delusional symptoms can gain some guidance from these data. Delusional ideation is more likely to persist in never married and older patients, those with schizophrenia, and with delusions of body/mind control and thought broadcasting, as well as those with higher levels of psychopathology and functional impairment. The more intense a delusion—as indicated by the patient's degree of preoccupation, the pervasiveness of the delusion, and its impact on the patient's behavior—the more likely it is to persist as well. Multivariate analysis suggests that marital status, age, schizophrenia, global psychopathology, delusions of thought broadcasting, and having acted on a delusion all significantly increased the likelihood of persistence.

The content of subjects' primary delusions was also far from stable, with the majority of subjects who were delusional at two or more interviews showing substantial variation in the content of the delusion that had the greatest impact on their lives. Only a small number of variables were predictive of these changes in content, although it is of interest that those subjects who were more likely to be persistently delusional were also more likely to have more than one primary delusion over time. Indeed several of the same variables that predicted persistence of delusional ideation also predicted change in the content of that ideation. Thus, even when a propensity to experience delusional ideation continues, that by no means suggests that the primary delusion itself will remain the same. Patients with a delusional diathesis typically experience changes over time in the specific content of their primary delusions, perhaps linked to changes in their environmental circumstances.

Taken as a whole, these findings may be of some assistance to clinicians confronted with patients who present diagnostic challenges. A primary diagnosis of schizophrenia more than doubles the likelihood that delusions will persist. Clinicians observing this pattern in patients whose diagnosis

is uncertain might want to consider schizophrenia more carefully, while the disappearance of delusions might lead them to look elsewhere. On the other hand, alteration in the content of the primary delusion appears characteristic even in schizophrenia, and thus should not tilt the balance against that diagnosis. In addition, a delusion of thought broadcasting at baseline was the strongest predictor of persistence, even when the effect of symptom severity and diagnosis were taken into account. This is the first time that delusional content has been shown to have prognostic impact independent of these variables—something that might contribute to treatment planning, especially early in the course of illness.

As best we can tell, these findings do not represent artifacts based on differential attrition of our subjects. Though there was some loss of subjects over the year of follow-up interviews, most subjects participated in the entire study and there were few significant differences between subjects who had all five interviews, and those who did not. None of those differences seems prima facie likely to be related to the persistence or stability of delusions. Moreover, the number of interviews in which delusional subjects participated did not predict either persistence or stability of their delusions.

All subjects were hospitalized at baseline interview and thus received at least initial treatment for their disorders. This may well account for the fact that the steepest drop in the prevalence of delusional ideation occurred between the baseline interview and the first follow-up interview. Thereafter, subjects were free to seek or avoid additional treatment. It is of interest that their subsequent adherence to treatment recommendations, including medication, did not relate to the persistence of their delusions. Since our measures of adherence are based on subjects' self-reports and their accuracy is therefore unknown, it is important not to overinterpret this finding. Nonetheless, clinicians have recognized for many years that entrenched delusional symptoms may persist even when medications are effective in controlling other symptoms of psychosis. Of course, given our naturalistic design, it is not possible for us to say whether more consistent treatment would have resulted in reductions in the presence of delusions, or to what degree treatment was responsible for the patterns observed.

To the extent that their understanding of Jaspers' and others' characterizations of delusions—generally not based on systematically collected data—has led succeeding generations of clinicians and researchers to believe that delusions tend to persist and their content to remain unchanged, it has provided a misleading impression of the phenomenology of delusional thoughts. Delusions appear to be more dynamic and fluid over relatively short periods of time than has been suggested by many classic descriptions and contemporary formulations.

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