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Prodromal Symptoms in Schizophrenia

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This paper describes a prospective study of the relationship between non-psychotic prodromal symptoms and psychotic symptoms in 55 schizophrenic (DSM–III–R) out-patients. Once a month, a number of non-psychotic symptoms generally regarded as prodromal symptoms in schizophrenia were assessed, as well as psychotic symptoms, with standardised self-administered instruments and rating scales for a minimum of 12 months (range 12–29). The data were analysed for each patient using a longitudinal correlational design with a 1-month lag between the prodromal and psychotic symptoms over the total period. Results showed that in less than one-fifth of subjects did any of the prodromal symptoms, individually or in combination, show a significantly positive correlation with the subsequent level of psychotic symptoms. Such relationships were significant in an even smaller proportion of subjects when the confounding effect of concurrent psychotic symptoms on prodromal symptoms was partialled out. High levels of prodromal symptoms appeared to have adequate specificity but low sensitivity in their power to predict high levels of subsequent psychotic symptoms. There were no differences in age, gender, medication levels, and the number of previous admissions between the subjects who did or did not show a relationship between putative prodromal symptoms and psychotic symptoms.

It is generally believed that the onset and recurrence of psychotic symptoms in schizophrenia are often preceded by other symptoms and types of behaviour, usually referred to as prodromal symptoms. In recent years there has been more research designed to identify any such prodromal symptoms and assess their relationship to the psychotic process in schizophrenia. There are at least two major reasons for this interest. First, if such prodromal symptoms could be identified and then reduced, this might prevent the occurrence of full psychosis (Herz, 1985; Lukoff *et al*, 1986; Jolley *et al*, 1989). Second, the discovery of prodromal symptoms that are truly predictive of impending psychosis might provide additional insight into the psychopathology and aetiology of schizophrenia (DeLisi *et al*, 1986; Huber & Gross, 1989).

The empirical investigation of prodromal symptoms in schizophrenia is a relatively recent development. Before 1980, publications on the topic consisted mostly of case reports. Docherty *et al* (1978), in a review of a large number of case reports, suggested that there were five consistent stages in the development of psychotic symptoms, the first three consisting of primarily non-psychotic symptoms and types of behaviour (typically reflecting emotional dysphoria) which are then followed by psychotic disorganisation.

More recent and systematic investigations of prodromal symptoms in schizophrenia have used various methods. Some have been based on reports from patients and their families about symptoms and types of behaviour which they perceive to have occurred before psychosis appeared (Herz & Melville, 1980; Kumar *et al*, 1989). These investigations have shown that patients and family members often retrospectively report having observed a number of non-psychotic symptoms and/or certain alterations in behaviour, which they believe to have preceded any psychotic symptoms and behaviour. The most frequently cited possible prodromal symptoms consist of mood changes such as tension, irritability, depression, anxiety, withdrawal, and vegetative changes such as disturbed sleep and loss of appetite.

Information about the beliefs of psychiatrists and other mental health workers concerning prodromal symptoms comes from studies evaluating low-dose or intermittent medications (Herz *et al*, 1982, 1989, 1991; Carpenter & Heinrichs, 1983; Heinrichs & Carpenter, 1985; Hirsch & Jolley, 1989; Hirsch *et al*, 1989; Jolley *et al*, 1989, 1990). Such studies have used protocols in which neuroleptic medications were altered or reinstated when patients were judged to be showing symptoms prodromal to psychosis. Typically, in these studies there was no direct verification of the value of such symptoms as being actual prodromes to psychosis; and so generally their data is best interpreted as reflecting *beliefs* about prodromal symptoms. The most common symptoms treated as prodromal were similar to those reported by patients and their families and would fit the category of non-psychotic symptoms. However,

some investigators have also included symptoms suggestive of early exacerbation of psychosis, such as hallucinations, inappropriate suspiciousness and thought disorder (Carpenter & Heinrichs, 1983; Heinrichs & Carpenter, 1985; Herz *et al*, 1989).

The value of classifying early signs of increasing psychosis as prodromal is contentious (Herz & Simon, 1986). Generally in medical literature the term 'prodromal' is applied in the field of infectious diseases to describe a set of symptoms that indicate the initial stages of a disease: typically, generalised non-specific symptoms such as malaise, fever, aches and pains, etc., which occur before the appearance of the symptoms which are specific to a particular disease (such as a unique pattern of skin eruptions). Such prodromes are indicative of the possible onset of any one of a variety of infectious diseases. If we use the term 'prodromal symptoms' in an analogous fashion with regard to schizophrenia, then the nature of these symptoms must differ from the specific or defining psychotic symptoms of schizophrenia. It would appear, therefore, to be more appropriate and less confusing to restrict the use of the term 'prodromal' to non-psychotic symptoms.

Several longitudinal studies have measured changes in symptoms in patients suffering from schizophrenia and then retrospectively looked at the period before a documented increase in psychotic symptoms for evidence of increases in possible prodromal symptoms. For instance, both Marder *et al* (1984) and Subotnik & Nuechterlein (1988) have reported evidence of a higher average level of such symptoms as depression, anxiety and/or somatic concern in periods immediately before relapse than at other times. Such studies, however, fail to provide a prospective analysis of the relationship between non-psychotic prodromal symptoms and psychosis, which would be crucial in assessing the predictive power of such symptoms for future occurrence of psychosis.

The most direct evidence concerning the reliability of prodromal symptoms comes from studies which assess their sensitivity and specificity as predictors of psychosis (e.g. Hirsch & Jolley, 1989; Birchwood *et al*, 1989; Jolley *et al*, 1990; Tarrier *et al*, 1991). These studies have typically treated both prodromal and psychotic symptoms as dichotomous variables that are either present or absent. The operational definition of the presence of each type of symptom varies between studies, as do the number and types of possible prodromal symptoms examined and the length of time for which patients are followed. It is, therefore, not surprising that there is considerable variation between these studies in their estimates of sensitivity (from 50% to 73%) and specificity (from 16% to 100%) of prodromal symptoms as predictors of psychosis.

Several issues concerning prodromes of psychosis in schizophrenia have not been adequately addressed by previous research in this area. For instance, the published literature indicates that not all increases in psychosis are preceded by increases in putative prodromal symptoms, nor are all increases in such symptoms followed by increases in psychosis. It is unclear, however, whether this reflects differences between patients in the extent to which changes in non-psychotic symptoms anticipate changes in psychosis (some patients always showing prodromes and others never showing any) or whether for all patients prodromes have only modest power as predictors. In addition, although there is significant agreement regarding some of the broad categories of symptoms that are potential prodromes, there may well be idiosyncrasies across patients in the particular symptoms that are prodromal. The extent of individual differences in the nature and/or reliability of prodromal symptoms has not been adequately examined in previous research.

A second question is whether prodromal symptoms really precede increases in psychosis or are an integral part of, or reaction to, a gradual psychotic process. There is evidence to suggest that dysphoria in particular, a prominent putative prodromal symptom, may be an integral part of the psychotic process which occurs contemporaneously with psychosis or may be secondary to psychosis (Bartels & Drake, 1988; Siris *et al*, 1988; Barnes *et al*, 1989; Hirsch *et al*, 1989; Norman & Malla, 1991*a*). This is particularly important for our understanding of the relationship between psychotic and non-psychotic symptoms in schizophrenia.

In this paper we describe a longitudinal study which prospectively examines the relationship between a number of non-psychotic symptoms and types of behaviour which are generally regarded as prodromal symptoms in schizophrenia, and the subsequent level of psychotic symptoms. As a better way of finding out whether such prodromal symptoms occur prior to psychosis or are actually a response to initial increases in psychosis, both non-psychotic and psychotic symptoms are assessed on a graded scale rather than forced into a dichotomy of presence or absence (Falloon, 1984). For such assessments we used widely accepted and standardised measures of symptoms. In addition, the data are analysed in such a way that individual differences in the strength of association between any prodromes and psychosis will be noticed.

Method

Subjects for this study were schizophrenic patients attending out-patient treatment programmes in a teaching general

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hospital and two psychiatric hospitals. The subjects had all been diagnosed as schizophrenic, confirmed through a Structured Clinical Interview for DSM-III-R (Spitzer *et al*, 1985) conducted by an experienced psychiatrist. They were aged between 17 and 60, had at least one previous admission to hospital for treatment of schizophrenia and had achieved a relatively stable clinical condition with neuroleptic medication for at least 3 months. Patients with a history of organic brain disease, head injury, and/or significant drug or alcohol dependence were excluded.

The subjects were assessed each month as part of a larger study of stress and symptoms in schizophrenia: 55 completed monthly assessments for at least one year. Patients were entered into the study at different times, and the total length of time they stayed in the study was determined by funding considerations. The average number of monthly assessments carried out was 19, with a range from 12 to 29.

At the time of entry into the study, data were collected on each patient regarding age, gender, marital status, education, and employment status, as well as number of past admissions for psychiatric treatment, length of time since discharge from hospital, and current neuroleptic medications. Information on treatment variables was corroborated with clinicians and the patients' files.

In keeping with the broad categories reported in previous literature, the following symptoms and types of behaviour were chosen as representing possible prodromal symptoms: depression, anxiety, somatic concern, feelings of being stressed, low general functioning, and social withdrawal. Based on recent research on the structure of symptoms in schizophrenia (Kulhara *et al*, 1986; Liddle, 1987; Liddle & Barnes, 1990; Arndt *et al*, 1991), as well as the results of our own factor analysis of symptoms from this patient population (Malla *et al*, 1993), the psychotic symptoms were grouped into two syndromes: reality distortion and disorganisation. Previous work (including our own), has provided evidence of a third syndrome, psychomotor poverty, but we chose to exclude this from our analysis as some of the symptoms included in it could be regarded as prodromal and are not generally considered as part of the core psychotic symptoms.

During each monthly assessment, symptoms were assessed by a combination of self-report and rating scales completed by a trained interviewer. The Beck Depression Inventory (BDI; Beck, 1978) was used as a measure of the level of depression; anxiety was assessed with the Self-Evaluation Questionnaire (SEQ; Spielberger *et al*, 1968); and somatic concerns and level of general functioning were assessed using the relevant subscales of the General Health Questionnaire (GHQ-28; Goldberg, 1978). The Perceived Stress Scale (Cohen *et al*, 1983; Norman & Malla, 1991*b*) was used to provide a global measure of subjective stress; and social withdrawal was assessed through ratings on the asociality subscale of the Scale for Assessment of Negative Symptoms (SANS; Andreasen, 1983).

The two psychotic syndromes were rated primarily on the basis of relevant items of the Scale for the Assessment of Positive Symptoms (SAPS; Andreasen, 1984) and specific items from the SANS. The items from each instrument included to assess each syndrome were:

Disorganisation
- SAPS 23 – Aggressive and agitated behaviour
- SAPS 26 – Derailment
- SAPS 27 – Tangentiality
- SAPS 28 – Incoherence
- SAPS 29 – Illogicality
- SAPS 31 – Pressure of speech
- SAPS 32 – Distractible speech
- SANS 6 – Inappropriate affect
- SANS 10 – Poverty of content of speech

Reality distortion
- SAPS 1 – Auditory hallucinations
- SAPS 2 – Voices commenting
- SAPS 8 – Persecutory delusions
- SAPS 11 – Grandiose delusions
- SAPS 12 – Religious delusions
- SAPS 14 – Delusions of reference
- SAPS 15 – Delusions of being controlled
- SAPS 16 – Delusions of mind reading
- SAPS 17 – Thought broadcasting
- SAPS 18 – Thought insertion

Ratings on SAPS and SANS were conducted by interviewers who had received extensive training from the principal investigators (AM and RN). All ratings were made on 6-point scales. In our research programme we have found our inter-rater reliability, as estimated by the intraclass correlation coefficients (ICC), to be significant for all items at a minimum of the 0.005 level. The actual level of the ICC varies across items on the two scales between 0.61 and 0.98.

Data analysis

The data collected each month on both the non-psychotic and psychotic symptoms were analysed using a longitudinal correlational design. These relationships were examined with a one-month lag between the prodromal and the psychotic symptoms across all time points for each subject.

Since subjects who show little or no variation in the level of psychotic symptoms over time cannot provide information regarding possible prodromal symptoms, we selected for further study those patients who, during follow-up, demonstrated a range of scores on the reality distortion ($n=24$) and/or the disorganisation syndrome ($n=23$) (both: $n=15$) equal to, or greater than, 10% of the maximal potential range.

Scores on each of the non-psychotic symptoms previously described were correlated with scores on the reality distortion and disorganisation syndromes, as observed one month later, for each subject across all monthly observations. Such correlations indicate the extent to which the level of non-psychotic symptoms predicts the level at which the psychotic symptoms (reality distortion and disorganisation) will be one month later. In the case of patients for whom there was a significant serial correlation within a symptom over time, the correction to the degrees of freedom suggested by Holtzman (1963) was adopted for testing the significance of correlations of that symptom with any other symptoms.

Partial correlations between prodromal symptoms and psychotic symptoms occurring 1 month later were conducted

after controlling for level of psychotic symptoms at the initial assessment. This was done across all time points for each individual subject. Further, in order to explore the possibility that a combination of prodromal symptoms may be more clearly predictive of subsequent psychotic symptoms than are individual prodromal symptoms, we added the standard score equivalences of each of the prodromes for each subject into a composite measure. This composite index was then correlated over time with the 'reality distortion' and 'disorganisation' syndrome scores in the same manner as described above for individual prodromal symptoms. We also conducted additional analyses by defining substantial increases in prodromal and psychotic symptoms as discrete events. This allowed an assessment of the sensitivity and specificity of the composite index of prodromal symptoms in the prediction of subsequent psychotic symptoms for each subject.

Results

Of the sample of 55 subjects, 72.7% were male and 27.3% female, with ages ranging from 21 to 53 years (mean 37.8). The number of previous psychiatric admissions varied from 1 to 9, with an average of 3. Their educational levels were: incomplete primary school, 3.6%; primary completed but no secondary, 1.8%; incomplete secondary, 29.8%; secondary completed, but no post-secondary, 15.7%; post-secondary (college or university) but incomplete, 25.4%; post-secondary completed, 23.7%. Almost half (54.5%) were unemployed, 20% in casual and part-time employment, 20% in full-time employment, 4 were students and one was a housewife. Medication doses ranged from 20 to 2375 mg chlorpromazine equivalent per day, with an average of 412 mg. This sample probably represents a subacute or mildly chronic patient population with an average number of three psychiatric hospital admissions.

The percentage of correlations that were significant at the 0.025 level (1-tailed) or better, for each of the prodromal symptoms, are presented in Table 1. Substantially higher percentages of significant correlations than would be expected by chance were found when relating depression, anxiety, somatic concern and subjective stress to both reality distortion and disorganisation. Of the 144 correlations calculated regarding the reality distortion syndrome, 10.5% were significant at the 0.025 level and 8.3% at the 0.005 level. For the disorganisation syndrome, the corresponding figures were 10.1% and 5.8% respectively. Overall, these results certainly suggest a greater than chance level of significant correlations between non-psychotic symptoms and subsequent level of psychotic syndromes. However, this relationship only exists for a relatively small proportion of cases. Correlations between composite indices of prodromal symptoms and subsequent level of psychotic symptoms revealed significant relationship in 23.1% of patients for reality distortion and 15.4% for disorganisation syndrome, respectively. Comparing these figures with those in Table 1 shows that the composite index did not substantially improve prediction beyond the level attained by the best prodromal symptom – depression.

Of course the non-psychotic symptoms themselves may be primarily a reflection of concurrent level of psychosis rather than an independent predictor of subsequent psychosis. In order to assess this possibility we used variation in non-psychotic symptoms over time to predict psychosis in the subsequent months, after partialling out the variance in both that could be accounted for by the level of psychosis at the time that the non-psychotic symptoms were assessed. A summary of these partial correlations is presented in Table 2. A comparison of Tables 1 and 2 suggests that a substantial proportion of the predictive power of non-psychotic symptoms may, in fact, be a reflection of their correlation with contemporaneous measures of psychosis. This is particularly noteworthy for depression, somatic concerns, subjective stress, and, to a lesser extent, anxiety. The effect of general functioning and social withdrawal on future psychotic syndromes, although initially small, remains unchanged when the possible influence of earlier psychotic symptoms is partialled out. In general these results suggest that much of the predictive usefulness of the non-psychotic symptoms may be because they themselves are related to early and subtle signs of psychosis.

The relatively low proportion of significant correlations between the putative prodromal and subsequent psychotic symptoms may reflect either of two possibilities: (a) that psychotic symptoms are not frequently preceded by prodromal symptoms, but when the latter do occur, they are generally followed by psychotic symptoms; or (b) that when putative prodromal symptoms do occur they are often not followed by psychotic symptoms. In order to explore

Table 1
Percentage of significant positive correlations between non-psychotic symptoms and psychotic symptoms, with 1-month time lag

Non-psychotic symptoms	Psychotic syndrome: %	
	Reality distortion	Disorganisation
Depression	20.8	17.4
Anxiety	16.6	13
Somatic concern	12.5	13
Subjective stress	8.3	8.7
General functioning	4.2	4.3
Social withdrawal	0	4.3

Table 2
Percentage of significant partial correlations between non-psychotic symptoms controlling for previous level of psychotic syndrome

Non-psychotic symptoms	Psychotic syndrome: %	
	Reality distortion	Disorganisation
Depression	4.2	8.7
Anxiety	12.5	8.7
Somatic concern	0	0
Subjective stress	4.2	4.3
General functioning	4.2	4.3
Social withdrawal	0	4.3

these possibilities both the prodromal and psychotic symptoms need to be treated as discrete or categorical variables so that their presence or absence at a certain level can be defined. There are two additional reasons for carrying out an analysis based on a categorical measure of prodromal and psychotic symptoms. It might be argued that a strong relationship between prodromal and psychotic symptoms is likely to be found only when there is a substantial increase in these symptoms. Such an analysis may also be of practical value in that clinicians generally tend to make decisions regarding treatment when they observe a significant or a substantial change in symptoms.

To explore these possibilities further, we analysed the relationship between high levels of prodromal and psychotic symptoms. We have avoided the use of hospitalisation as an index of a high level of psychosis because experience indicates that hospitalisation can occur for a myriad of reasons other than an increase in psychosis (Falloon, 1984). We chose to define levels of both prodromal and psychotic symptoms as being high when they were at least one standard deviation above the relevant mean for each subject. We then calculated levels of sensitivity and specificity of the effectiveness of prodromal symptoms in predicting psychotic symptoms for each individual subject. The use of these indices to assess the predictive power of prodromal symptoms has been reported in several recent studies (Hirsch & Jolley, 1989; Birchwood *et al*, 1989; Jolley *et al*, 1990; Tarrier *et al*, 1991). For this purpose we used the composite score for prodromal symptoms (see above) as the predictor for the reality distortion and disorganisation syndromes. The results indicate high levels of specificity for prodromal symptoms as predictors of reality distortion and disorganisation for all subjects. The specificity was always 90% or higher for predicting reality distortion and 83% or higher for disorganisation. On the other hand, the sensitivity of the composite prodromal index as a predictor of both syndromes was very low (less than 50% for 83% of subjects).

A high specificity means that it is relatively rare that a substantial increase in prodromal symptoms is not followed by a substantial increase in psychotic symptoms (disorganisation or reality distortion). On the other hand, the comparatively low sensitivity indicates that many increases in psychotic symptoms are not preceded by increases in putative prodromal symptoms.

Discussion

The results of this provide some support for the notion that a number of non-psychotic symptoms and behavioural changes are prodromal to the onset of elevation of psychotic symptoms in the course of schizophrenia. The predictive validity of these prodromal symptoms appears, however, to be limited to a relatively small proportion of the patients, particularly when the confounding effect of previous psychotic symptoms was partialled out. Depression appeared to be the best predictor of subsequent psychotic symptoms, although its predictive validity was significantly less when the effect of concomitant psychotic symptoms was removed. Assessing the relationship between the composite of all prodromal symptoms and subsequent psychotic symptoms did not appear to improve upon this relationship. However, when this relationship was further examined, treating prodromal and psychotic symptoms as discrete events, the results showed that whenever high levels of prodromal symptoms occurred, they were likely to be followed by psychotic symptoms, but many increases in psychotic symptoms were not preceded by increases in prodromal symptoms. Therefore the non-psychotic symptoms that were treated as putative prodromal symptoms in this and in other previous studies do appear to have a specific value for subsequent psychotic symptoms in those subjects who experience such prodromal symptoms.

We have restricted our definition of prodromal symptoms to those non-psychotic symptoms and behaviours which have been reported in the literature for various samples of patients (Herz & Melville, 1980; Marder *et al*, 1984; Hirsch & Jolley, 1989; Jolley *et al*, 1989; Tarrier *et al*, 1991), and not included symptoms such as thought disturbance or hallucinations (Carpenter & Heinrichs, 1983; Subotnik & Nuerchterlein, 1988; Herz *et al*, 1989). As indicated earlier, we believe this distinction is conceptually fundamental to the understanding of the role of prodromal symptoms in schizophrenia.

Most previous research on prodromal symptoms in schizophrenia has considered the onset of psychosis to be a discrete event of 'relapse'. As Herz *et al* (1989) have suggested, the onset of psychosis should not be considered an all-or-none phenomenon. It is much more likely to be a gradual process involving a progression from subtle disruptions in perception of reality and thought structure to more blatant inability to identify reality or think coherently. Reports by Marder *et al* (1984), Subotnik & Neuchterlein (1988), and Herz *et al* (1991) suggest that, if careful observations are made, gradual increases in psychotic symptoms can be observed. In many cases, the supposedly prodromal signs may reflect difficulty that the individual is having in coping with initial stages of psychosis, but the non-psychotic symptoms may be more apparent than the more subtle, and perhaps more private, psychotic symptoms.

Few studies have provided a true prospective analysis of the relationship between prodromal symptoms and psychosis. Subotnik & Nuechterlein (1988) provide initial prospective analysis of the predictive power of only the early increases in thought disturbance, but not of other, non-psychotic

prodromal symptoms. Our present paper reports on one of the few attempts to use prospective analyses to describe the longitudinal relationship between non-psychotic prodromal symptoms and psychotic symptoms in schizophrenia. We have carefully examined this relationship in each subject at monthly intervals for at least one year, and often longer. Correlations reported for each subject over time are likely to provide more accurate information than correlations between subjects, as the variation in vulnerability within subjects with time is likely to be relatively less than that between subjects. Further analysis using higher levels of prodromal and psychotic symptoms as discrete events has provided evidence in support of prodromal symptoms being able to predict subsequent psychotic symptoms, although many psychotic episodes clearly occur without prior prodromal symptoms.

The relationships we have observed are unlikely to have been confounded by changes in the patients' medication over time. Of the 55 patients, only four (7%) appear to have had changes in medication in response to increasing severity of symptoms.

The issue of whether prodromal symptoms truly occur prior to psychosis is probably of little consequence if they are used simply for the prediction of subsequent level of psychosis. It may, however, have implications for our understanding of schizophrenia. Docherty *et al* (1978) proposed five identifiable stages in the onset of psychosis in schizophrenia, extending from general feelings of nervousness and being overwhelmed, to frank psychosis. This is consistent with a number of models which see psychosis as an end-point in a hierarchy of symptoms (e.g. Foulds & Bedford, 1975; Foulds, 1976). Our findings suggest that dysphoria and other putative early stages may not always occur before increases in psychosis. Furthermore, even when such non-psychotic symptoms do appear to predict subsequent psychosis, they may partially reflect early and subtle increases in psychotic symptoms.

We have contrasted our data for those patients who did and did not show a time-lagged correlation between each non-psychotic symptom and psychosis. In these contrasts we have looked for evidence of any significant differences in such characteristics as age, gender, number of previous admissions and chlorpromazine equivalence of their neuroleptic medication. We found no consistent evidence that any of these variables are related to the likelihood of prodromal symptoms. It may be that prodromal symptoms are more consistent predictors of variation in level of psychosis than our data suggest. Patterns consistent with a sequence of symptoms from non-psychotic to psychotic may not be observed because they occur more rapidly than can be detected by our monthly assessments. Another possibility is that some patients are displaying prodromal symptoms other than those we have assessed. It should be borne in mind that the potential prodromal symptoms assessed are consistent with suggestions from previous research, and that a one-month assessment schedule has typically been used in previous research.

Conclusion

The study presented here differs from much previous research on prodromal symptoms of psychosis in schizophrenia in that symptoms were measured on a graded scale, the analysis was truly prospective, and we analysed the data so as to allow for the examination of patterns of inter-relationship between symptoms for individual patients. Only a relatively small percentage of patients showed a significant correlation between non-psychotic symptoms and the level of psychotic symptoms one month later, and this percentage was reduced even further when statistically controlling for the level of psychosis at the time the non-psychotic symptoms were assessed. However, additional analysis revealed that comparatively high levels of prodromal symptoms do have the power to predict subsequent psychotic symptoms. Nevertheless, a large proportion of psychotic episodes appear to occur without identifiable prior prodromal symptoms.

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