Prevalence and correlates of self-reported psychotic symptoms in the British population

LOUISE C. JOHNS, MARY CANNON, NICOLA SINGLETON, ROBIN M. MURRAY, MICHAEL FARRELL, TRAOLACH BRUGHA, PAUL BEBBINGTON, RACHEL JENKINS and HOWARD MELTZER

Background The psychosis phenotype is generally thought of as a categorical entity. However, there is increasing evidence that psychosis exists in the population as a continuum of severity rather than an all-or-none phenomenon.

Aims To investigate the prevalence and correlates of self-reported psychotic symptoms using data from the 2000 British National Survey of Psychiatric Morbidity.

Method A total of 8580 respondents aged 16–74 years were interviewed. Questions covered mental health, physical health, substance use, life events and socio-demographic variables. The Psychosis Screening Questionnaire (PSQ) was used to identify psychotic symptoms.

Results Of the respondents, 5.5% endorsed one or more items on the PSQ. Factors independently associated with psychotic symptoms were cannabis dependence, alcohol dependence, victimisation, recent stressful life events, lower intellectual ability and neurotic symptoms. Male gender was associated with paranoid thoughts, whereas female gender predicted hallucinatory experiences.

Conclusions Self-reported psychotic symptoms are less common in this study than reported elsewhere, because of the measure used. These symptoms have demographic and clinical correlates similar to clinical psychosis.

Declaration of interest None.

In recent years there have been suggestions that psychosis exists in the general population as a continuous phenotype rather than as an all-or-none phenomenon (van Os *et al*, 2000). The existence of a psychosis continuum has been found in several large-scale community surveys. In the US National Comorbidity Survey, 28% of individuals endorsed psychosis-screening questions although the rate of clinician-defined psychosis was only 0.7% (Kendler *et al*, 1996). In the Dunedin birth cohort, 25% of the sample at age 26 years reported at least one delusional or hallucinatory experience that was unrelated to drug use or physical illness, but only 3.7% actually fulfilled criteria for schizophreniform disorder (Poulton *et al*, 2000). Data on psychotic symptoms were collected as part of the Dutch NEMESIS study (van Os *et al*, 2000). This representative general population sample of 7076 men and women was interviewed using the Composite International Diagnostic Interview (CIDI), which contains 17 core positive psychosis items; 17.5% of the sample scored at least one on any type of positive psychosis rating but only 2.1% received a DSM–III–R (American Psychiatric Association, 1987) diagnosis of non-affective psychosis. Together, these findings suggest that only a small part of the total phenotypic continuum of psychosis is represented by clinically verified and defined cases. Psychotic symptoms in the general population are associated with certain risk factors (e.g. urban residence or younger age group; Verdoux *et al*, 1998; van Os *et al*, 2000, 2001). Furthermore, the risk factors for psychotic symptoms mirror those for clinical psychosis, supporting the continuum hypothesis. Individual psychotic symptoms also seem to have specific correlates, suggesting different risk factors for these symptoms. For example, it has been reported that paranoia is associated with experience of victimisation (Janssen *et al*, 2003) and that hallucinatory experiences are more common among people of Caribbean origin living in Britain (Johns *et al*, 2002). We used data from a large cross-sectional survey of the British population to examine the distribution and correlates of self-reported psychotic symptoms. We also examined whether there were any specific demographic and clinical correlates of paranoid thoughts and hallucinatory experiences.

METHOD

Sample

The data were obtained from the second National Survey of Psychiatric Morbidity in Great Britain, conducted in 2000 by the Office for National Statistics (ONS). The survey examined the prevalence of mental health problems among adults aged 16–74 years living in private households in Great Britain. It covered mental health, physical health, drug and alcohol use, life events, service use and socio-demographic variables. The sample was drawn from the small-user Postcode Address File using a two-stage approach. Initially, postcode sectors were stratified on the basis of socio-economic status within region and 438 sectors were chosen with a probability proportional to size. Then, within each sector, 36 addresses were randomly selected for inclusion in the survey. One adult aged 16–74 years was interviewed in each household. The survey used a two-phase design. First-phase interviews were carried out by interviewers from the ONS field force. Personal interviews were carried out with 8580 adults (a response rate of 67%). Individuals who scored positively on one or more psychosis criteria were part of a subsample who had a follow-up second-phase interview by a clinician. Details of the survey methods can be found in Singleton *et al* (2001).

Assessment of psychotic symptoms

In the initial interview, the Psychosis Screening Questionnaire (PSQ; Bebbington & Nayani, 1995) was used to assess psychotic symptoms in the past year. The PSQ has five probe questions (plus secondary questions) enquiring about mania, thought insertion, paranoia, strange experiences and hallucinations (see Appendix). Respondents were asked all the items from the PSQ without the usual procedure of cutting off after a section was answered positively.

https://doi.org/10.1192/bjp.185.4.298 Published online by Cambridge University Press

For the current analyses, we selected individuals who endorsed one or more psychotic symptom (initial probe plus secondary questions) on the PSQ. Because we wanted to examine psychotic experiences in non-clinical subjects, we first excluded those people with definite or probable psychosis (defined below).

Assessment of psychosis

Four criteria from the first-phase interview were considered likely to be indicative of psychosis: a self-reported diagnosis or symptoms suggestive of psychotic disorder; taking anti-psychotic medication; a history of admission to a psychiatric hospital or ward; a positive response to question 5a of the PSQ (auditory hallucinations). Respondents who met one or more of these psychosis screening criteria were selected for a follow-up interview using the Schedules for Clinical Assessment in Neuropsychiatry (SCAN; World Health Organization, 1992*a*). Algorithms then were used to classify respondents into ICD–10 (World Health Organization, 1992*b*) psychosis categories. Some people selected for a second-phase interview could not be contacted or refused a second interview; in these cases, an assessment of 'probable psychosis' was assigned to those who scored positively on two or more of these psychosis criteria.

Correlates

Based on previously reported associations with psychotic symptoms (Verdoux *et al*, 1998; van Os *et al*, 2000, 2001; Johns *et al*, 2002; Janssen *et al*, 2003), the following variables were selected.

(a) Socio-demographic characteristics: age, gender, ethnic origin, area of residence, educational qualifications and intellectual functioning.

(b) Alcohol dependence, assessed by the Severity of Alcohol Dependence Questionnaire (SAD–Q; Stockwell *et al*, 1983).

(c) Drug use, drug dependence and cannabis dependence. Dependence was assessed with five specific questions, a positive response to any of which was taken to indicate dependence (Singleton *et al*, 2001).

(d) Neurotic symptoms (anxiety/depression), measured using the revised Clinical Interview Schedule (CIS–R; Lewis *et al*, 1992). Individuals with scores above 12 were classified as having neurosis.

(e) Life events. Respondents were asked whether they had experienced any of 11 stressful life events taken from the List of Threatening Experiences (life events with long-term threat; Brugha *et al*, 1985) in the 6 months prior to interview. The life events are: serious illness, injury or assault to you; serious illness, injury or assault to a close relative; death of a close relative; death of a close friend/other relative; separation or divorce; serious problem with a close friend, neighbour or relative; made redundant or sacked; unemployed/seeking work for more than 1 month; major financial crisis; problem with police and court appearance; something valued that is lost or stolen.

(f) Victimisation events. Respondents were asked whether they had ever experienced any of the following: bullying; violence at work; violence in the home; sexual abuse; being expelled from school; running away from home; being homeless.

Analyses

The data were analysed using the Statistical Package for the Social Sciences (version 11.0 for Windows). Binary logistic regression analyses were used to ascertain which factors were associated with the presence of psychotic symptoms. Associations were expressed as odds ratios (ORs). Sixty people (0.7%) with probable psychosis were excluded from the analyses, 27 of whom met the criteria for functional psychosis following a SCAN interview.

We examined the factors associated with the presence of any psychotic symptom (endorsement of initial plus secondary questions on one or more items of the PSQ). First, the predictor variables were entered individually to obtain unadjusted odds ratios. Age was collapsed into three age bands (16–34, 35–54, 55–74). Information about ethnic origin was divided into four groups: White, Black, South Asian and Other. Area of residence was divided into urban and rural. Educational qualifications covered three groups: none, GCSE level, A-level or above. Verbal IQ was estimated from respondents' scores on the National Adult Reading Test (NART; Nelson, 1982). Alcohol dependence was classified as present or absent. Drug use was any drug used in the last month (yes/no); and drug dependence was classified as no dependence, dependent on cannabis only or dependent on other drug. Experience of life events and victimisation events was classified dichotomously (yes/no). Second, all the significant variables were entered together to obtain the relative odds of psychotic symptoms controlling for interrelationships between these variables.

We examined whether specific factors were associated with the presence of either paranoid thoughts or hallucinatory experiences. These items were chosen because previous studies have suggested that they are associated with particular risk factors (Johns *et al*, 2002; Janssen *et al*, 2003). The response variables selected were 'Have there been times when you felt that people were deliberately acting to harm you or your interests?' and 'Have there been times when you heard or saw things that other people couldn't?' In order to examine specific risk factors, the analyses for each variable included individuals who had endorsed only that item and no other PSQ items.

RESULTS

Frequency of psychotic symptoms

After excluding people with probable psychosis (n=60), data were available for 8520 individuals. Of this remaining sample, 5.5% reported one or more psychotic symptom as measured by the PSQ. For each item, more people endorsed the initial probe question than the secondary question(s) (Table 1). Thus, for paranoia, 9.1% endorsed the question 'Have there been times when you felt that people were deliberately acting to harm you or your interests?' whereas only 1.5% endorsed 'Have there been times when you felt that a group of people were plotting to cause you serious harm or injury?' Similarly for hallucinations, 4.2% of the sample said that there had been times when they heard or saw things that other people could not, but only 0.7% reported hearing voices saying quite a few words or sentences when there was no-one around that might account for it.

Socio-demographic distribution of self-reported psychotic symptoms

The frequencies of the variables that were investigated for associations with psychotic symptoms are shown in Table 2.

https://doi.org/10.1192/bjp.185.4.298 Published online by Cambridge University Press

Table 1 Percentage of respondents who endorsed each question on the Psychosis Screening Questionnaire (PSQ)

PSQ Items *Initial probe* Secondary question(s)	Prevalence (%) of 'Yes' responses (weighted)	Number of respondents (unweighted)
Hypomania		
Over the past year, have there been times when you felt very happy indeed without a break for days on end?	55.6	4633
Was there an obvious reason for this?	32.4	2710
Did your relatives or friends think it was strange or complain about it?	0.6	45
Thought insertion		
Over the past year, have you ever felt that your thoughts were directly interfered with or controlled by some outside force or person?	9.0	790
Did this come about in a way that many people would find hard to believe, for instance, through telepathy?	0.9	89
Paranoia		
Over the past year, have there been times when you felt that people were against you?	21.2	1769
Have there been times when you felt that people were deliberately acting to harm you or your interests?	9.1	782
Have there been times when you felt that a group of people were plotting to cause you serious harm or injury?	1.5	136
Strange experiences		
Over the past year, have there been times when you felt that something strange was going on?	8.9	731
Did you feel it was so strange that other people would find it very hard to believe?	3.0	264
Hallucinations		
Over the past year, have there been times when you heard or saw things that other people couldn't?	4.2	344
Did you at any time hear voices saying quite a few words or sentences when there was no-one around that might account for it?	0.7	57
Any psychotic symptom[1]		
Yes to one or more probe questions	66.1	5535
Yes to the secondary question(s)	5.5	478
Any psychotic symptom excluding mania		
Yes to one or more probe questions	28.6	2383
Yes to the secondary question(s)	5.0	438

1. Respondents who endorsed one or more PSQ item.

Any psychotic symptom

In the initial unadjusted analysis, the following variables were associated with the presence of any self-reported psychotic symptom: drug dependence, the presence of neurotic disorder, drug use, victimisation events, alcohol dependence, recent stressful life events, non-White ethnic group, younger age, lower IQ, fewer educational qualifications and urban residence (Table 3). Gender was not a significant predictor. In the final model of adjusted odds ratios, neurotic disorder and drug dependence were the variables most strongly associated with psychotic symptoms. Individuals were 3.5 times as likely (95% CI 2.9–4.5) to experience one or more psychotic symptoms if they scored above 12 on the CIS–R, were almost three times as likely (95% CI 2.0–4.4) if they were dependent on cannabis and were just under 2.5 times as likely (95% CI 1.3–3.9) if they were dependent on any other drug (with or without cannabis). Experience of victimisation and alcohol dependence were also strongly associated with psychotic symptoms (OR=2.0, 95% CI 1.7–2.6; OR=1.8, 95% CI 1.3–2.4, respectively). After controlling for interrelationships between all the variables, young age, non-White ethnic group, urban residence and recent drug use were no longer associated significantly with psychotic symptoms.

Paranoid thoughts

The following factors were independently associated with paranoid thoughts in a multivariate regression analysis: neurotic disorder, victimisation experiences, younger age group, alcohol dependence, recent stressful life event(s), average IQ and male gender (see Table 4).

Hallucinatory experiences

The following factors were independently associated with self-reported hallucinatory experiences in the multivariate analysis: neurotic disorder, victimisation experiences, average or below-average IQ, alcohol dependence and female gender (see Table 5).

DISCUSSION

This study examined the distribution and correlates of self-reported psychotic symptoms in the British population. Data were available for a large representative sample of the general population, and included a wealth of information on symptoms, socio-demographic factors, substance use and life events. As with any cross-sectional survey, this study lacks information on temporal relationships, and therefore it is possible to report only associations between variables.

Prevalence of psychotic symptoms in the sample

The annual prevalence of psychotic symptoms, in the absence of psychotic disorder, was 5.5%. This refers to the percentage of people who endorsed one or more items on the PSQ, including the secondary questions for the item (i.e. the more 'psychotic' experiences). As shown in Table 1, the prevalence was higher for the 'less psychotic' responses, consistent with the existence of a continuum of psychotic phenomena in the general population. The reported figure is lower than the rates of

https://doi.org/10.1192/bjp.185.4.298 Published online by Cambridge University Press

Table 2 Frequencies of the variables examined for associations with psychotic symptoms

Variable	Categories	Frequency (%) (weighted)[1]	No. of respondents (unweighted)
Age (years)	55–74	25.7	2696
	35–54	38.9	3360
	16–34	35.4	2464
Ethnic group	White	92.7	7978
	Black	2.2	181
	South Asian	2.5	142
	Other groups	2.0	156
Type of area	Rural	34.1	2974
	Urban	65.9	5546
Educational qualifications	A level or above	36.3	2971
	GCSE level	35.9	2946
	None	27.1	2541
Estimated verbal IQ	Above average	28.8	2610
	Average	44.9	3788
	Below average	19.9	1605
Alcohol dependence	No dependence	92.7	7923
	Mild/moderate/severe dependence	7.3	557
Used any drug in past month	No	93.3	8034
	Yes	6.4	449
Drug dependence	No dependence	95.9	8229
	Dependent on cannabis only	2.5	171
	Dependent on other drug (±cannabis)	1.2	83
Life event in past 6 months	No	75.0	6384
	Yes	25.0	2136
Victimisation experience	No	71.2	6026
	Yes	28.2	2437
Neurosis (CIS–R score > 12)	⩽12	85.1	7161
	>12	14.9	1359

CIS–R, Clinical Interview Schedule – Revised.
1. Not all the totals are 100% (n=8520) because of occasional missing data.

psychotic symptoms reported by other epidemiological studies (17.5%, Poulton *et al*, 2000; 25%, van Os *et al*, 2000). It is likely that variation in prevalence rates across studies is partly a consequence of the different instruments used (number and type of questions asked). The PSQ is a brief measure that assessed only five psychotic symptoms. One would expect higher prevalence rates with a more comprehensive measure such as the CIDI, which contains 17 psychotic symptom items. Also, as we found within the PSQ, questions probing for 'less psychotic' experiences are likely to be endorsed more frequently. In addition to differences in the measures, most epidemiological studies have assessed the lifetime prevalence of psychotic symptoms. This will be much greater than the annual prevalence, as measured by the PSQ.

Factors associated with any psychotic symptom

There were associations between psychotic symptoms and neurotic disorder, drug dependence, alcohol dependence, victimisation experiences, recent stressful life events, lower IQ and fewer educational qualifications. Younger age group, non-White ethnic group and urban residence no longer significantly predicted psychotic symptoms after controlling for interrelationships between predictor variables. In terms of drug dependence, the relationship between cannabis dependence and psychotic symptoms was the strongest and also may have contributed to the association between other drug dependence and psychotic symptoms.

The results from this sample replicate previous findings concerning risk factors associated with psychotic symptoms. Van Os *et al* (2000) reported an association between neurotic symptoms and all types of psychosis ratings, from 'not clinically relevant' symptoms to clinical psychosis. From our results, it is not possible to know whether neurotic disorder is associated with increased risk of developing psychotic symptoms, or whether it is a consequence of experiencing psychotic symptoms. In a study of adult primary care patients, Olfson *et al* (2002) found that psychotic symptoms were associated with anxiety, depression and alcohol use disorder, and suggested that the latter were all clinical consequences. On the other hand, neurotic symptoms have been reported in excess in those children who later develop psychosis (Jones *et al*, 1994; Cannon *et al*, 2002), and have been identified as part of the initial prodrome in psychosis (Yung & McGorry, 1996). Longitudinal studies have found that adolescent males with neurotic disorders are more likely to develop schizophrenia years later (Weiser *et al*, 2001), and that neuroticism (which is related to anxiety proneness) increases the risk for subsequent onset of psychotic symptoms (Krabbendam *et al*, 2002). In a recent review, Freeman & Garety (2003) argue that the frequent occurrence of emotional disorder prior to and accompanying psychosis suggests that neurosis contributes to the development of the positive symptoms of psychosis.

Similarly, we cannot determine the direction of the relationship between cannabis dependence and psychotic symptoms from these data. However, a number of cohort studies have shown that consumption of cannabis is a risk factor for later psychosis (e.g. Andreasson *et al*, 1987; van Os *et al*, 2002; Zammit *et al*, 2002). Thus, Arsenault *et al* (2002) found that cannabis use in adolescence increased the risk of experiencing schizophrenia symptoms in adulthood, indicating a causal link. Furthermore, this risk was specific to cannabis use, as opposed to the use of other drugs. The association between alcohol dependence and psychotic symptoms may be related to the occurrence of withdrawal symptoms.

Consistent with previous studies (e.g. van Os *et al*, 2000), lower educational achievement was associated with self-reported psychotic symptoms. The association with potentially threatening life events and victimisation events also corresponds with previously reported risk factors for psychosis. Using the same National Survey

https://doi.org/10.1192/bjp.185.4.298 Published online by Cambridge University Press

Table 3 Associations between risk factors and psychotic symptoms on the Psychosis Screening Questionnaire (PSQ)

Exposure variable	Parameter coding	Model 1: unadjusted odds ratios			Final model: adjusted odds ratios		
		Odds ratio	95% CI	*P*	Odds ratio	95% CI	*P*
Age (years)	55–74 (0)						
	35–54 (1)	1.95	1.47–2.57	<0.001	1.52	1.11–2.09	0.008
	16–34 (2)	2.18	1.65–2.88	<0.001	1.30	0.92–1.82	0.14
Ethnic group	White (0)						
	Black (1)	2.27	1.43–3.61	0.001			
	South Asian (2)	1.91	1.19–3.06	0.007			
	Other groups (3)	1.01	0.51–1.99	NS			
Type of area	Rural (0)						
	Urban (1)	1.27	1.04–1.56	0.02			
Educational qualifications	A level or above (0)						
	GCSE level (1)	1.43	1.15–1.79	0.001	1.38	1.07–1.77	0.013
	None (2)	1.21	0.94–1.55	NS	1.31	0.97–1.78	0.078
Estimated verbal IQ	Above average (0)						
	Average (1)	1.61	1.25–2.07	<0.001	1.36	1.04–1.79	0.027
	Below average (2)	2.10	1.59–2.78	<0.001	1.50	1.08–2.07	0.015
Alcohol dependence	No dependence (0)						
	Mild/moderate/severe dependence (1)	2.97	2.31–3.83	<0.001	1.77	1.32–2.38	<0.001
Used any drug in past month	No (0)						
	Yes (1)	3.44	2.66–4.45	<0.001			
Drug dependence	No depencence (0)						
	Dependent on cannabis only (1)	4.90	3.46–6.95	<0.001	2.94	1.98–4.37	<0.001
	Dependent on other drug (±cannabis) (2)	6.94	4.43–10.89	<0.001	2.29	1.33–3.95	0.003
Life event in past 6 months	No (0)						
	Yes (1)	2.20	1.82–2.66	<0.001	1.55	1.26–1.92	<0.001
Victimisation experience	No (0)						
	Yes (1)	3.32	2.75–4.01	<0.001	2.06	1.66–2.55	<0.001
Neurosis (CIS–R score > 12)	⩽12 (0)						
	>12 (1)	5.06	4.17–6.14	<0.001	3.63	2.93–4.52	<0.001

CIS–R, Clinical Interview Schedule – Revised.

data, Bebbington *et al* (2004) found a high prevalence of reported victimisation among people with psychosis, greater than that found among people with neurotic disorder or drug and alcohol dependence. The association between non-White ethnic group and psychotic symptoms in this study was no longer significant after controlling for other factors, including victimisation and stressful life events. Although it has been reported that Black and ethnic minority patients with psychosis do not experience more life events than do White British patients, they do perceive these events as more threatening (Gilvarry *et al*, 1999).

Factors associated with paranoid thoughts

Paranoid thoughts were associated with neurotic symptoms, victimisation experience(s), younger age, alcohol dependence, stressful life events in the past 6 months, average IQ and male gender. The relationships between paranoia and victimisation and stressful life events are consistent with cognitive psychological theories about the development and maintenance of psychotic symptoms (Garety *et al*, 2001; Freeman *et al*, 2002). Thus, experiences of victimisation may lead individuals to believe that they are vulnerable and to view other people and the world as hostile and threatening; and stressful events may then trigger symptoms. Janssen *et al* (2003) found that perceived discrimination was associated longitudinally with onset of delusional ideation. Unfortunately, it is not possible from these data to determine the precise temporal relationships between victimisation, life events and paranoia. It could be that subjects with paranoid thoughts have a biased recall for these experiences, or that the supposedly paranoid thoughts are actually real, and that people are trying to harm them. Neurotic symptoms were strongly associated with paranoid thoughts in this sample. Again, this result is consistent with cognitive models of persecutory delusions (Freeman *et al*, 2002), in which anxiety and depression (particularly anxiety) are thought to play a central role in the formation of paranoid beliefs.

Factors associated with hallucinatory experiences

Neurotic disorder, victimisation experiences, average and below-average IQ, alcohol dependence and female gender were associated with hallucinatory experiences. There was a trend for an association between hallucinations and Black ethnic group, which replicates the findings of Johns *et al* (2002) from an earlier UK

https://doi.org/10.1192/bjp.185.4.298 Published online by Cambridge University Press

Table 4 Associations between risk factors and paranoid thoughts

Exposure variable	Parameter coding	Model 1: unadjusted odds ratios			Final model: adjusted odds ratios		
		Odds ratio	95% CI	*P*	Odds ratio	95% CI	*P*
Age (years)	55–74 (0)						
	35–74 (1)	2.63	2.00–3.47	<0.001	2.04	1.51–2.76	<0.001
	16–34 (2)	3.16	2.40–4.16	<0.001	2.18	1.60–2.97	<0.001
Gender	Female (0)						
	Male (1)	1.19	1.00–1.41	0.049	1.25	1.03–1.51	0.027
Ethnic group	White (0)						
	Black (1)	1.34	0.78–2.28	NS			
	South Asian (2)	0.97	0.55–1.72	NS			
	Other groups (3)	1.87	1.16–3.02	0.01			
Type of area	Rural (0)						
	Urban (1)	1.22	1.02–1.47	0.032			
Estimated verbal IQ	Above average (0)						
	Average (1)	1.53	1.24–1.89	<0.001	1.42	1.13–1.78	0.002
	Below average (2)	1.23	0.94–1.60	NS	1.02	0.77–1.36	NS
Alcohol dependence	No dependence (0)						
	Mild/moderate/severe dependence (1)	2.88	2.25–3.68	<0.001	1.92	1.45–2.56	<0.001
Drug dependence	No dependence (0)						
	Dependent on cannabis only (1)	3.13	2.11–4.64	<0.001			
	Dependent on other drug (±cannabis) (2)	4.35	2.54–7.46	<0.001			
Life event in past 6 months	No (0)						
	Yes (1)	2.15	1.81–2.57	<0.001	1.63	1.34–1.99	<0.001
Victimisation experience	No (0)						
	Yes (1)	3.85	3.23–4.57	<0.001	2.56	2.11–3.10	<0.001
Neurosis (CIS–R score > 12)	⩽12 (0)						
	>12 (1)	4.86	4.04–5.84	<0.001	3.72	3.02–4.58	<0.001

CIS–R, Clinical Interview Schedule – Revised.

Table 5 Associations between risk factors and hallucinatory experiences

Exposure variable	Parameter coding	Model 1: unadjusted odds ratios			Final model: adjusted odds ratios		
		Odds ratio	95% CI	*P*	Odds ratio	95% CI	*P*
Age (years)	55–74 (0)						
	35–54 (1)	1.09	0.76–1.57	NS			
	16–34 (2)	1.36	0.95–1.93	0.09			
Gender	Male (1)						
	Female (0)	1.31	1.00–1.72	0.055	1.49	1.09–2.02	0.012
Ethnic group	White (0)						
	Black (1)	2.27	1.15–4.49	0.018	2.48	0.99–6.21	0.052
	South Asian (2)	2.36	1.27–4.39	0.007	0.22	0.02–2.11	NS
	Other groups (3)	0.65	0.18–2.30	NS			
Estimated verbal IQ	Above average (0)						
	Average (1)	2.19	1.48–3.23	<0.001	2.11	1.42–3.14	<0.001
	Below average (2)	2.34	1.51–3.65	<0.001	2.22	1.42–3.47	<0.001
Alcohol dependence	No dependence (0)						
	Mild/moderate/severe dependence (1)	1.73	1.09–2.73	0.019	1.85	1.14–3.00	0.012
Victimisation experience	No (0)						
	Yes (1)	2.34	1.77–3.08	<0.001	2.12	1.57–2.87	<0.001
Neurosis (CIS–R score > 12)	⩽12 (0)						
	>12 (1)	2.91	2.13–3.98	<0.001	2.43	1.73–3.41	<0.001

CIS–R, Clinical Interview Schedule – Revised.

https://doi.org/10.1192/bjp.185.4.298 Published online by Cambridge University Press

national survey. In that study, the prevalence of hallucinations assessed by the PSQ in a sample of people of Caribbean origin living in Britain was 2.5 times higher than that in a White sample, although no statistical comparison was reported. The finding that women were more likely to report hallucinatory experiences is consistent with the higher rates of hallucinations in females found in previous studies (Tien, 1991). As with paranoia, the association with victimisation is consistent with psychological theories of hallucinations, particularly the link between exposure to trauma and the development of hallucinations (Romme & Escher, 1989).

Further research

This study found that self-reported psychotic experiences in the general population were associated with risk factors similar to those commonly reported for clinical psychosis. Using the interview data from both phases of the survey, we now intend to compare the correlates of self-reported psychotic symptoms and clinical psychotic disorder in this sample.

CLINICAL IMPLICATIONS

- **The psychological factors associated with psychotic symptoms in the general population are consistent with cognitive psychological models of psychotic symptoms in patient samples.**
- **Neurotic symptoms may contribute to the development of psychotic symptoms, and offer a target for intervention in people with prodromal or early warning signs of psychosis.**
- **Cannabis dependence may increase the risk of experiencing psychotic symptoms.**

LIMITATIONS

- **The PSQ items are intended to screen for psychotic symptoms, and do not provide data on the precise nature of the experiences.**
- **Because the study is cross-sectional, causal inferences cannot be drawn clearly for the associations. Longitudinal studies are needed.**
- **The number of interviewees with psychotic experiences was modest, particularly in the analyses of factors associated with hallucinations.**

LOUISE C. JOHNS, DPhil, MARY CANNON, MRCPsych, Department of Psychological Medicine, Institute of Psychiatry, London; NICOLA SINGLETON, Drugs & Alcohol Research Programme, Research Development & Statistics Directorate, Home Office, London; ROBIN M. MURRAY, DSc, Department of Psychological Medicine, Institute of Psychiatry, London; MICHAEL FARRELL, MRCPsych, National Addiction Centre, Institute of Psychiatry, London; TRAOLACH BRUGHA, FRCPsych, University of Leicester, Section of Social and Epidemiological Psychiatry, Department of Health Sciences, Leicester General Hospital, Leicester; PAUL BEBBINGTON, FRCPsych, Royal Free and University College Medical School, Department of Mental Health Sciences, London; RACHEL JENKINS, FRCPsych, WHO Collaborating Centre, Institute of Psychiatry, London; HOWARD MELTZER, PhD, Office for National Statistics, London

Correspondence: Dr L. C. Johns, PO67 Department of Psychological Medicine, Institute of Psychiatry, De Crespigny Park, London SE5 8AF, UK. E-mail: ljohns@iop.kcl.ac.uk

(First received 22 December 2003, final revision 1 June 2004, accepted 26 June 2004)

APPENDIX

The Psychosis Screening Questionnaire (PSQ; Bebbington and Nayani, 1995; reproduced by permission of the authors)

Hypomania

- *Probe*: Over the past year, have there been times when you felt very happy indeed without a break for days on end?

If yes,

- Was there an obvious reason for this?
- Did your relatives or friends think it was strange or complain about it?

Thought insertion

- *Probe*: Over the past year, have you ever felt that your thoughts were directly interfered with or controlled by some outside force or person?

If yes,

- Did this come about in a way that many people would find hard to believe, for instance, through telepathy?

Paranoia

- *Probe*: Over the past year, have there been times when you felt that people were against you?

If yes,

- Have there been times when you felt that people were deliberately acting to harm you or your interests?
- Have there been times when you felt that a group of people were plotting to cause you serious harm or injury?

Strange experiences

- *Probe*: Over the past year, have there been times when you felt that something *strange* was going on?

If yes,

- Did you feel it was so strange that other people would find it very hard to believe?

Hallucinations

- *Probe*: Over the past year, have there been times when you heard or saw things that other people couldn't?

If yes,

- Did you at any time hear voices saying quite a few words or sentences when there was no-one around that might account for it?

REFERENCES

American Psychiatric Association (1987) *Diagnostic and Statistical Manual of Mental Disorders* (3rd edn, revised) (DSM–III–R). Washington, DC: APA.

Andreasson, S., Allebeck, P., Engstrom, A., *et al* (1987) Cannabis and schizophrenia. A longitudinal study of Swedish conscripts. *Lancet*, *ii*, 1483–1486.

Arseneault, L., Cannon, M., Poulton, R., *et al* (2002) Cannabis use in adolescence and risk for adult psychosis: longitudinal prospective study. *BMJ*, **325**, 1212–1213.

Bebbington, P. E. & Nayani, T. (1995) The Psychosis Screening Questionnaire. *International Journal of Methods in Psychiatric Research*, **5**, 11–19.

https://doi.org/10.1192/bjp.185.4.298 Published online by Cambridge University Press

Bebbington, P. E., Bhugra, D., Brugha, T., *et al* (2004) Psychosis, victimisation and childhood disadvantage. Evidence from the Second British National Survey of Psychiatric Epidemiology. *British Journal of Psychiatry*, **185**, 220–226.

Brugha, T., Bebbington, P. E., Tennant, C., *et al* (1985) The List of Threatening Experiences: a subset of 12 life event categories with considerable long-term contextual threat. *Psychological Medicine*, **15**, 189–194.

Cannon, M., Caspi, A., Moffitt, T., *et al* (2002) Evidence for early-childhood pan-developmental impairment specific to schizophreniform disorder: results from a longitudinal birth cohort. *Archives of General Psychiatry*, **59**, 449–457.

Freeman, D. & Garety, P. A. (2003) Connecting neurosis and psychosis: the direct influence of emotion on delusions and hallucinations. *Behaviour Research and Therapy*, **41**, 923–947.

Freeman, D., Garety, P. A., Kuipers, E., *et al* (2002) A cognitive model of persecutory delusions. *British Journal of Clinical Psychology*, **41**, 331–347.

Garety, P., Kuipers, E., Fowler, D., *et al* (2001) A cognitive model of the positive symptoms of psychosis. *Psychological Medicine*, **31**, 189–195.

Gilvarry, C. M., Walsh, E., Samele, C., *et al* (1999) Life events, ethnicity and perceptions of discrimination in patients with severe mental illness. *Social Psychiatry and Psychiatric Epidemiology*, **34**, 600–608.

Janssen, I., Hanssen, M., Bak, M., *et al* (2003) Discrimination and delusional ideation. *British Journal of Psychiatry*, **182**, 71–76.

Johns, L. C., Nazroo, J. Y., Bebbington, P., *et al* (2002) Occurrence of hallucinatory experiences in a community sample and ethnic variations. *British Journal of Psychiatry*, **180**, 174–178.

Jones, P., Rodgers, B., Murray, R., *et al* (1994) Child development risk factors for adult schizophrenia in the British 1946 birth cohort. *Lancet*, **344**, 1398–1402.

Kendler, K. S., Gallagher, T. J., Abelson, J. M., *et al* (1996) Lifetime prevalence, demographic risk factors, and diagnostic validity of nonaffective psychosis as assessed in a US community sample. The National Comorbidity Survey. *Archives of General Psychiatry*, **53**, 1022–1031.

Krabbendam, L., Janssen, I., Bak, M., *et al* (2002) Neuroticism and low self-esteem as risk factors for psychosis. *Social Psychiatry and Psychiatric Epidemiology*, **37**, 1–6.

Lewis, G., Pelosi, A. J., Araya, R., *et al* (1992) Measuring psychiatric disorder in the community: a standard assessment for use by lay interviewers. *Psychological Medicine*, **22**, 465–486.

Nelson, H. E. (1982) *National Adult Reading Test (NART)* (2nd edn). Windsor: NFER–Nelson.

Olfson, M., Lewis-Fernández, R., Weissman, M. M., *et al* (2002) Psychotic symptoms in an urban general medicine practice. *American Journal of Psychiatry*, **159**, 1412–1419.

Poulton, R., Caspi, A., Moffitt, T. E., *et al* (2000) Children's self-reported psychotic symptoms and adult schizophreniform disorder: a 15-year longitudinal study. *Archives of General Psychiatry*, **57**, 1053–1058.

Romme, M. A. & Escher, A. D. (1989) Hearing voices. *Schizophrenia Bulletin*, **15**, 209–216.

Singleton, N., Bumpstead, R., O'Brien, M., *et al* (2001) *Psychiatric Morbidity among Adults Living in Private Households, 2000*. London: Stationery Office.

Stockwell, T., Murphy, D. & Hogson, R. (1983) The Severity of Alcohol Dependence Questionnaire: its use, reliability and validity. *British Journal of Addiction*, **78**, 145–155.

Tien, A. Y. (1991) Distributions of hallucinations in the population. *Social Psychiatry and Psychiatric Epidemiology*, **26**, 287–292.

van Os, J., Hanssen, M., Bijl, R. V., *et al* (2000) Strauss (1969) revisited: a psychosis continuum in the general population? *Schizophrenia Research*, **45**, 11–20.

van Os, J., Hanssen, M., Bijl, R. V., *et al* (2001) Prevalence of psychotic disorder and community level of psychotic symptoms: an urban–rural comparison. *Archives of General Psychiatry*, **58**, 663–668.

van Os, J., Bak, M., Hanssen, M., *et al* (2002) Cannabis use and psychosis: a longitudinal population-based study. *American Journal of Epidemiology*, **156**, 319–327.

Verdoux, H., van Os, J., Maurice-Tison, S., *et al* (1998) Is early adulthood a critical developmental stage for psychosis proneness? A survey of delusional ideation in normal subjects. *Schizophrenia Research*, **29**, 247–254.

Weiser, M., Reichenberg, A., Rabinowitz, J., *et al* (2001) Association between nonpsychotic psychiatric diagnoses in adolescent males and subsequent onset of schizophrenia. *Archives of General Psychiatry*, **58**, 959–964.

World Health Organization (1992*a*) *SCAN Schedules for Clinical Assessment in Neuropsychiatry*. Geneva: WHO.

World Health Organization (1992*b*) *Tenth Revision of the International Classification of Diseases and Related Health Problems* (ICD–10). Geneva: WHO.

Yung, A. R. & McGorry, P. D. (1996) The initial prodrome in psychosis: descriptive and qualitative aspects. *Australian & New Zealand Journal of Psychiatry*, **30**, 587–599.

Zammit, S., Allebeck, P., Andreasson, S., *et al* (2002) Self reported cannabis use as a risk factor for schizophrenia in Swedish conscripts of 1969: historical cohort study. *BMJ*, **325**, 1199–1201.

https://doi.org/10.1192/bjp.185.4.298 Published online by Cambridge University Press