# Impact of comorbid personality disorder on violence in psychosis

## Report from the UK700 trial

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**Background** The impact of comorbid personality disorder on the occurrence of violence in psychosis has not been fully explored.

**Aims** To examine the association between comorbid personality disorder and violence in community-dwelling patients with psychosis.

**Method** A total of 670 patients with established psychotic illness were screened for comorbid personality disorder. Physical assault was measured from multiple data sources over the subsequent 2 years. Logistic regression was used to assess whether the presence of comorbid personality disorder predicted violence in the sample.

**Results** A total of 186 patients (28%) were rated as having a comorbid personality disorder. Patients with comorbid personality disorder were significantly more likely to behave violently over the 2-year period of the trial (adjusted odds ratio=1.71, 95% CI 1.05–2.79).

**Conclusions** Comorbid personality disorder is independently associated with an increased risk of violent behaviour in psychosis.

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Although there is a significant association between psychosis and violence, it is not clear why some patients with psychosis behave violently and others do not. Comorbid substance misuse significantly increases this risk (Walsh *et al*, 2001), and other factors suggested as being important include specific symptoms (Taylor, 1998) and non-adherence to medication (Swartz *et al*, 1998). A significant association has been demonstrated between psychopathy, as assessed by Hare's (1991) criteria, and violence in patients with schizophrenia (Nolan *et al*, 1999; Tengstrom *et al*, 2000), but psychopathy is not a diagnosis recognised by the International Classification of Diseases (ICD–10; World Health Organization, 1992*a*), nor indeed one used by the majority of UK clinicians. Comorbid personality disorder is associated traditionally with a poor prognosis for associated mental illness. Surprisingly, the association between comorbid personality disorder and violence in community-dwelling patients with psychosis has not been explored previously. We examined whether an association exists between comorbid personality disorder and violence in psychotic illness using data derived from the UK700 case management trial.

## METHOD

### Study population

The UK700 case management trial is a randomised controlled trial designed to examine the efficacy of intensive compared with standard case management. The trial design (UK700 Group, 1999) and outcomes (Burns *et al*, 1999) are described elsewhere. In brief, 708 patients from four inner-city mental health services were recruited at the point of discharge from hospital or in the community. Inclusion criteria were: age between 18 and 65 years, a diagnosis of a psychotic illness of at least 2 years' duration and at least two in-patient admissions for psychotic illness, with one in the previous 2 years. Patients with a primary diagnosis of substance misuse or organic brain damage were excluded.

### Baseline measures

The presence of comorbid personality disorder was assessed at baseline using a rapid version of the Personality Assessment Schedule (PAS–R). The Personality Assessment Schedule (PAS; Tyrer *et al*, 1979) is a semi-structured interview that measures personality traits and usually takes 30–60 min to complete. The PAS–R is a direct development of the PAS and allows for a rapid screen for the presence of ICD–10 personality disorder. It can be completed in approximately 10 min. In a study of 155 patients recruited at one of the UK700 trial centres (St Mary's Hospital, London), the weighted kappa between the PAS–R and the full PAS was 0.4, and sensitivity and specificity were 64% and 82%, respectively, suggesting that the PAS–R is a suitable screen for personality disorders (Tyrer & Cicchetti, 2000; Van Horn *et al*, 2000). Scoring for each category of personality disorder on the PAS–R is on a three-point scale from 0 to 2, where 0 reflects the absence of any dysfunction associated with the personality trait, 1 reflects personality difficulty and 2 reflects personality disorder. The PAS–R was administered by an independent research assistant at the end of the baseline clinical assessment. For the purposes of this study, the PAS–R data were regrouped into a dichotomous variable with two categories: personality disorder and no personality disorder. (Personality disorder was defined as a PAS–R score of 2 on any personality disorder category.)

Other information recorded at baseline included:

(a) a socio-demographic schedule;

(b) life circumstances over the previous 24 months – including information about violent behaviour (World Health Organization, 1992*b*) and being a victim of violence (Oliver *et al*, 1997);

(c) diagnosis determined by a structured examination of case notes, using OPCRIT (McGuffin *et al*, 1991);

(d) clinical symptom status assessed using the Comprehensive Psychopathological Rating Scale (CPRS; Åsberg *et al*, 1978);

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(e) patient needs recorded using the Camberwell Assessment of Need (CAN; Phelan *et al*, 1995);

(f) social disability measured using the World Health Organization Disability Assessment Schedule (DAS; Jablensky *et al*, 1980).

The following additional information was recorded at baseline: duration of illness, use/misuse of drugs, history of conviction for violent offences and history of special needs education. All baseline and outcome assessments were conducted by senior trainee psychiatrists or psychology graduates who were independent of clinical care.

## Outcomes and follow-up

The outcome of interest for the current study was physical assault in the 2 years of the trial. Three data sources were combined to produce a binary outcome measure for each patient. A positive score on any of these sources indicated a positive score for assault. The frequency and seriousness of assault were not recorded. First, patients were asked whether they had physically assaulted anyone in the 2-year period (World Health Organization, 1992*b*). Where an interview with a participant was not possible, an attempt was made to complete the record with information from a carer. Second, case managers were interviewed in person or by telephone and asked about any physical assault committed by their patients. Third, case notes at all sites were inspected individually for evidence of physical assault. Home Office criminal records also were obtained for all participants.

## Power calculation

The study was a secondary analysis of the UK700 data-set; 22% of the UK700 study population committed an assault over the study period (Walsh *et al*, 2001). The prevalence of comorbid personality disorder in samples of UK patients with severe mental illness has been estimated previously to lie between 30 and 40% (Cutting *et al*, 1986; Pilgrim & Mann, 1990). Assuming either a 30% or a 40% prevalence of comorbid personality disorder in the UK700 population, the original trial with 700 patients would be able to detect a 10% increase in total violence in the group with a comorbid personality disorder as statistically significant at the 5% level with a high probability (power >80%).

## Statistical methods

Analyses were performed using Stata version 7 (StataCorp, 1999). A strategy for the statistical analysis of the association between comorbid personality disorder and violence was drawn up prior to inspecting the data. The data initially were inspected to examine the baseline demographic characteristics of the study sample. A check was performed for missing values to examine whether any biases had been introduced. Participants with missing values for the relevant variables were excluded from the analysis.

Univariate associations between comorbid personality disorder and other baseline measures were examined using $\chi^2$-tests (categorical variables), *t*-tests (normally distributed continuous variables) and Mann–Whitney tests (skewed continuous variables). Stratified analyses and logistic regression were then used to examine the association between personality disorder and assault in more detail. The first logistic regression model included only personality disorder as an explanatory variable and assault over the 2 years of the trial as the outcome. The second model included socio-demographic variables and also the randomisation status of participants. Variables that have already been shown to predict violent behaviour in psychosis were then entered into a series of separate regression models in order to examine further sources of confounding. The final model also included the baseline clinical status of the participants.

## RESULTS

A total of 708 patients were originally recruited to the trial. The demographic profile of the UK700 study population is described elsewhere (Burns *et al*, 1999). Of the total patients, 670 (95% of the original sample) had a PAS–R assessment. A comparison between the 38 individuals on whom personality data were not available with those for whom information was available revealed that those not rated were more likely to have a diagnosis of schizophrenia ($\chi^2=10.6$; *P*=0.01) and less likely to have a history of special needs education ($\chi^2=4.0$; *P*=0.05). No other significant differences were found between the groups.

## Baseline characteristics of patients with comorbid personality disorder

Of the 670 patients who were examined with the PAS–R, 186 were scored as having a comorbid personality disorder, giving an overall prevalence of 28% (95% CI 24–31). The prevalence of individual ICD–10 sub-categories of personality disorder is displayed in Table 1. The most prevalent category was schizoid personality disorder, although patients usually qualified for more than one sub-category of personality disorder (mean number of personality disorders per patient=1.9, s.d.=1.2).

Baseline characteristics of the study sample, by personality disorder status, are given in Table 2. A larger proportion of patients with personality disorders had a previous history of violence and special education and they also had higher mean baseline CPRS and DAS scores and a greater number of unmet needs.

## Effect of personality disorder on violence at 2 years

Information on assault was available for all patients from at least one data source. Of the 708 patients enrolled in the trial, 158 (22%) committed an assault over the 2 years of the study (Walsh *et al*, 2001). Of the 670 patients who had baseline personality assessments, 32% (*n*=60) of the patients with comorbid personality disorders committed an assault compared with 19% (*n*=94) of those without comorbid personality disorders ($\chi^2=12.5$; *P*<0.001). Following adjustments for age, gender, social class, ethnicity and randomisation

**Table I** Frequencies of ICD–10 sub-categories of personality disorder in the UK700 trial (*n*=670)

| Personality disorder category | No. of patients | % | 95% CI |
|---|---|---|---|
| Paranoid | 60 | 8.9 | 6.9–11.4 |
| Schizoid | 66 | 9.9 | 7.7–12.4 |
| Dissocial | 41 | 6.1 | 4.4–8.2 |
| Impulsive | 55 | 8.2 | 6.2–10.6 |
| Borderline | 30 | 4.5 | 3.0–6.3 |
| Histrionic | 25 | 3.7 | 2.4–5.5 |
| Anankastic | 12 | 1.8 | 0.9–3.1 |
| Anxious | 39 | 5.8 | 4.2–7.9 |
| Dependent | 27 | 4.0 | 2.7–5.8 |

**Table 2** Baseline associations with comorbid personality disorder

| Variable | Comorbid personality disorder (n=186), n (%) | No comorbid personality disorder (n=484), n (%) | P |
|---|---|---|---|
| Gender | | | |
| Male | 107 (57.5) | 273 (56.4) | 0.8[1] |
| Female | 79 (42.5) | 211 (43.6) | |
| Age (years) | | | |
| ⩽40 | 117 (62.9) | 293 (60.5) | 0.6[1] |
| >40 | 69 (37.1) | 191 (39.5) | |
| Ethnic origin | | | |
| White | 97 (52.2) | 252 (52.1) | 0.9[1] |
| African–Caribbean | 52 (28.0) | 131 (27.1) | |
| Other | 37 (19.9) | 101 (20.9) | |
| Diagnosis | | | |
| Affective | 7 (3.8) | 38 (7.9) | 0.3[1] |
| Schizoaffective | 95 (51.1) | 241 (49.8) | |
| Schizophrenia | 71 (38.2) | 178 (36.8) | |
| Unspecified | 13 (7.0) | 27 (5.6) | |
| Previous history of violence | | | |
| Yes | 45 (24.2) | 72 (14.9) | 0.005[1] |
| No | 141 (75.8) | 408 (84.3) | |
| Missing data | – | 4 (0.8) | |
| Previous violent conviction | | | |
| Yes | 40 (21.5) | 82 (16.9) | 0.2[1] |
| No | 146 (78.5) | 402 (83.1) | |
| Victimised in past year | | | |
| Yes | 46 (24.7) | 57 (11.8) | <0.001[1] |
| No | 137 (73.7) | 416 (86.0) | |
| Missing data | 3 (1.6) | 11 (2.3) | |
| Special education | | | |
| Yes | 31 (16.8) | 34 (7.0) | <0.001[1] |
| No | 154 (83.2) | 448 (92.6) | |
| Missing data | – | 2 (0.4) | |
| Median (interquartile range) | | | |
| Duration of illness (months) | 128 (60–216) | 120 (51–205) | 0.4[2] |
| Days in hospital in past 2 years | 84 (34–158) | 70 (31–147) | 0.3[2] |
| Instrument scores (mean (s.d.)) | | | |
| CPRS | 24.8 (13.9) | 16.5 (11.6) | <0.001[3] |
| DAS total score | 1.5 (0.9) | 1.0 (0.8) | <0.001[3] |
| Unmet needs | 3.3 (2.5) | 2.4 (2.2) | <0.001[3] |

CPRS, Comprehensive Psychopathological Rating Scale; DAS, Disability Assessment Scale.
1. $\chi^2$-test.
2. Mann–Whitney test.
3. t-test.

status, the following sub-categories of personality disorder were significantly associated with violence at 2 years: paranoid (adjusted odds ratio=1.36; 95% CI 1.01–1.84), dissocial (adjusted odds ratio=1.66; 95% CI 1.19–2.31) and impulsive (adjusted odds ratio=1.45; 95% CI 1.08–1.95). Other sub-categories of personality disorder failed to reach significance in this model. Fully adjusted models of associations between paranoid, dissocial and impulsive personality disorder and violence were not significant.

The effect of comorbid personality disorder on violence during the 2 years of the trial after adjusting for potential confounders is shown in Table 3. Personality disorder was significantly associated with an increased risk of violence after adjusting for baseline clinical state and other established risk factors for violence in the data-set (adjusted odds ratio=1.71; 95% CI 1.05–2.79).

## DISCUSSION

To the best of our knowledge, this is the first prospective multi-centre study of the association between comorbid personality disorder and violence in a sample of community-dwelling patients with psychosis. Comorbid personality disorder was significantly associated with violence over the 2-year period of the study and this association was independent of the effects of other risk factors for violence.

### Methodological considerations

*Assessment of premorbid personality*

Assessing the premorbid personality of patients with psychosis is a formidable task. The presence of an abnormal mental state can easily distort the assessment, leading to an overreporting of personality pathology. In this study, the assessment of personality disorder was carried out after the psychotic illness had been established and this may have led to distortions in the assessment of some patients' personalities. Although not immune to the problem of mental state biasing the assessment of premorbid personality, the PAS–R incorporates frequent reminders that the questions refer to the patients' 'normal selves' and not just what they are like when ill. In addition, the prevalence of personality disorder found in this study (28%) is lower than that reported in other UK studies (Cutting *et al*, 1986; Pilgrim & Mann, 1990), suggesting that the degree of overdiagnosis of personality disorder is less than that occurring in these other studies. Nevertheless, it still remains likely that some patients in this study were misdiagnosed with a comorbid personality disorder.

An abbreviated version of the PAS was used to assess personality status in view of the short time available for assessment at the end of a long baseline interview. The PAS was developed originally on a mixed sample of psychiatric patients (Tyrer *et al*, 1979) and, like other interview schedules for personality disorder, it has not been validated formally for use with 'pure' samples of patients with psychosis. However, given the strength of evidence showing that personality disorder is a major prognostic indicator in mental illness, it was felt important to incorporate an assessment of

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**Table 3** Logistic regression estimates for the effect of comorbid personality disorder on violence during the course of the trial

| Adjustments | Odds ratio (95% CI) |
|---|---|
| Comorbid personality disorder | 1.98 (1.35–2.90)*** |
| and age, gender, class, ethnicity | 2.07 (1.35–3.17)** |
| and randomisation | 2.07 (1.35–3.17)** |
| and special education | 1.97 (1.28–3.05)** |
| and victimisation | 1.81 (1.16–2.83)** |
| and drug use/misuse | 1.85 (1.18–2.91)** |
| and previous violence | 1.82 (1.16–2.87)* |
| and baseline CPRS, CAN and DAS scores | 1.71 (1.05–2.79)* |

CPRS, Comprehensive Psychopathological Rating Scale; CAN, Camberwell Assessment of Need; DAS, Disability Assessment Scale.
$*P < 0.05$; $**P < 0.01$; $***P < 0.001$.

this into the trial. The PAS is one of the few instruments that attempts to record premorbid personality either before the onset of psychosis or at times of remission, and it has been used in previous studies of personality disorder in psychosis (Tyrer *et al*, 1994; Cuesta *et al*, 1999; Gandhi *et al*, 2001).

Thirty-eight individuals did not have personality ratings and this will have affected the prevalence of comorbid personality disorder in the study sample. If all those not rated by the PAS–R had a comorbid personality disorder, then the prevalence of comorbid personality disorder in the sample would have risen to 32%. If all those not rated by the PAS–R had not had a comorbid personality disorder, then the prevalence of comorbid personality disorder in the sample would have fallen to 26%. Hence, the true sample prevalence of comorbid personality disorder must lie between 26% and 32%.

### Grouping of personality disorder data

Participants were grouped according to whether they belonged to any category of personality disorder or not. This dichotomous grouping of patients is supported by the fact that, in keeping with other studies, the patients in this study often qualified for more than one sub-category of personality disorder diagnosis. However, the ICD–10 group of personality disorders consists of eight different sub-categories of disorder,

some of which are more strongly associated with violence than others. In this study, paranoid, impulsive and dissocial personality disorders were found to be significantly associated with violence, after adjusting for age, gender, social class, ethnicity and randomisation status. However, fully adjusted models of the association between these sub-categories of personality disorder and violence were not significant and it is likely that these subgroup analyses were underpowered (type II statistical error). Other categories were not significantly associated with violence and, although this may also reflect type II error, evidence linking other categories of personality disorder with violent behaviour is slender. Indeed, for some categories (anxious and dependent personality disorder), there is likely to be an inverse relationship with violence (Gandhi *et al*, 2001). The grouping of personality disorder data, therefore, will have masked important behavioural differences between sub-categories and will have led to a degree of information bias.

### Measure of violence

The outcome variable used in this study was a multiple combined measure for physical assault. Such measures for violence have been found to be superior to single sources of information (Walsh *et al*, 2001). However, we were unable to examine whether comorbid personality disorder increases the risk of serious assaults in psychosis, as neither seriousness nor frequency of assault was recorded in the trial. Finally, participants were recruited from inner-city locations and therefore the results may not be generalisable to other settings. However, the multi-centre design, with over 600 patients, should increase the external validity of the study.

### Explanations for an association between comorbid personality disorder and violence in psychosis

In light of the above methodological considerations, the finding that patients with comorbid personality disorder had an increased risk of violence over the 2-year study period could have two possible explanations.

### Confounding

First, the increased risk of violence with comorbid personality disorder might be explained by confounding from other

variables associated with violence. However, after adjusting for special education, victimisation, drug use and previous violence (all of which have been found to predict violence), the presence of comorbid personality disorder still remained a significant predictor of future violence. The multivariate analyses showed some evidence of confounding by baseline clinical status (symptoms, unmet needs and disability). However, even after adjusting for this in the model, the association between comorbid personality disorder and violence remained statistically significant. The PAS–R assessments in this study therefore were likely to have been assessing premorbid personality status rather than the consequences of mental illness, and this conclusion is supported elsewhere (Gandhi *et al*, 2001).

### Abnormal premorbid personality: a risk factor for psychosis and later violence?

The second explanation for our findings is that some patients with severe mental illness are at higher risk of behaving violently as a direct consequence of abnormal premorbid personality traits. Epidemiological studies have found that abnormal premorbid personality is a risk factor for psychosis (Malmberg *et al*, 1998). In addition, people with personality disorders characterised by excessive impulsivity (Dolan *et al*, 2001) or multiple Axis II diagnoses are at higher risk of behaving aggressively (Coid *et al*, 1999). It is therefore conceivable that, for some individuals, abnormal premorbid personality acts as a common risk factor for both psychosis and later violence. We are unable to confirm the precise temporal sequence with these data but our findings strongly indicate that the routine assessment of premorbid personality can only enhance the assessment of longer-term risk of violence in patients with psychosis. Key risk prediction tools such as the Historical Clinical Risk – 20 (HCR–20; Webster *et al*, 1997) and the Psychopathy Checklist – Review (PCL–R; Hare, 1991) incorporate personality factors among their predictive variables. Indeed, the presence of personality disorder has been described as one of the variables most strongly predictive of future violence in samples of patients with mental disorders (Monahan *et al*, 2001). Our findings support the importance of this in a large sample of community-dwelling patients with psychosis.

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## CLINICAL IMPLICATIONS

- ■ It is feasible to assess premorbid personality in large numbers of patients with severe mental illness.

- ■ Comorbid personality disorder in patients with psychosis is independently associated with future violence.

- ■ Personality assessment should be part of the early routine assessment of all psychiatric patients.

## LIMITATIONS

- ■ The assessment of premorbid personality depended on an assessment carried out after the psychotic illness had been established. This may have led to distortions in the assessment of some patients' personalities.

- ■ The grouping of personality disorder data may have masked important behavioural differences between sub-categories.

- ■ The study was a secondary analysis of data originally collected for other purposes.

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