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Acting on delusions: the role of negative affect in the pathway towards serious violence

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ABSTRACT

Acting violently on delusions is a significant clinical problem. Recent research has identified state anger as key component in the pathway from persecutory/threat delusions to serious violence. To determine the magnitude of the effect of delusional anger and to investigate a dose-response relationship we carried out a prospective follow-up study of forensic in-patients discharged into the community. Men and women (n = 409) were assessed before/after discharge at 6 and 12 months (Positive and Negative Syndrome Scale, MacArthur Community Violence Interview). No association was found with a content un-specific measure of delusions, thought disorder, hallucinations, grandiosity and violence. Suspiciousness/persecution was significantly associated with both violence and anger. Anger was also associated with violence. Mediation analyses suggested that 84% of the association between suspiciousness/persecution and violence was explained by anger. Key target of interventions should primarily be the anger; treatment of delusional beliefs plays a secondary role in the management of risk.

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KEYWORDS Paranoid delusions; angry affect; violence; indirect pathway; dose-response

Introduction

Although there is a positive relationship between psychosis and violent behaviour (Douglas, Guy, & Hart, 2009; Fazel, Gulati, Linsell, Geddes, & Grann, 2009) not all persons with psychotic disorder act violently. Risk factors affecting non-psychotic persons increase the risk among those with psychosis (Bonta, Law, & Hanson, 1998) and are more commonly found among persons with psychotic

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illness (Elbogen & Johnson, 2009). However, risks are greatly increased when symptoms are acute (Coid et al., 2013; Nielssen & Large, 2010; Ullrich, Keers, & Coid, 2014; Van Dorn, Volavka, & Johnson, 2012), particularly at first presentation (Large & Nielssen, 2011; Nielssen & Large, 2010) and if not treated (Keers, Ullrich, DeStavola, & Coid, 2014). Recent research has indicated that persecutory and other delusions implying threat may be causal, independent risk factors for serious violence. However, the pathway from delusions to violent outcome was not direct. The key factor identified explaining this relationship was angry affect due to delusional beliefs (Coid et al., 2013; Ullrich et al., 2014).

These findings have important implications for management and treatment of those at risk for serious violence. Many patients with delusions respond poorly to antipsychotic medication and side effects may impair consistent and optimal treatment (Jones et al., 2006; Lieberman et al., 2005; Mizrahi et al., 2006). Approximately half demonstrate persisting delusions even after the first acute psychotic episode has abated (Craig et al., 2004); and – if left untreated – the likelihood of emergence of persecutory delusions is significantly increased, with corresponding higher level of serious violent behaviour (Keers et al., 2014). However, if anger is the central component in the pathway towards serious violence, treatment of delusional beliefs would play a secondary role in the management of risk.

Limitations of previous research into the relationship between delusions, anger and violence (Coid et al., 2013; Ullrich et al., 2014) have included administration of dichotomous measures of anger and delusional beliefs. However, affective states of anger lie on a continuum and delusional conviction/ systematization vary among psychotic individuals. Furthermore, continuous measures, rather than categories, allow investigation of a dose-response relationship, one criterion to infer causality (Hill, 1965). Moreover, no previous study has quantified the magnitude of the effect of anger in the pathway from delusions to violence to identify the focus for intervention and implications for treatments for future violence prevention.

The UK Validation of New Risk Assessment Instruments for Use with Patients Discharged from Medium Secure Services (VoRAMSS) study is a longitudinal investigation of risk factors for future violence among patients discharged into the community. In the present study, we aimed to answer the following questions: (1) is there a dose-response relationship between persecutory ideation/ delusional beliefs and severity of violence to support the notion of a causal relationship? (2) Do persecutory delusions (exposure) lead to angry affect (mediator) which in turn leads to outcome (level of violence)? (3) Are persecutory delusions the only positive psychotic symptoms associated with violent behaviour or do symptoms such as hallucinations and/ or thought disorder contribute to the risk of violence? (4) Should clinicians focus their interventions on persecutory delusions or the related anger to prevent violence?

Method

Study design and sample

Data were collected as part of VoRAMSS, a prospective cohort follow-up study of all forensic patients discharged from 32 National Health Service (NHS) medium secure units across England and Wales during the period from 1 September 2010 to 31 August 2011. Exclusion criteria were a primary diagnosis of intellectual disability or age outside the range of 18–65 years.

Of the 788 patients enrolled in the study, 409 (51.9%) were discharged into the community (independent tenancies, supported accommodation, hostels, open rehabilitation wards and open psychiatric units) and eligible for follow-up. The remainder of the sample was discharged to high, low security hospital inpatient services or prison.

The study was approved by the North-West England Multi Site Research Ethics committee. Furthermore, the UK National Information Governance Board granted ethical approval to conduct the study without patient consent under Section 251 of the NHS Act 2006.

Procedures

A link person was identified at each hospital site and a notification system set up to ensure that the research team was automatically informed when a patient was discharged. At the end of the recruitment phase, participating units were asked to provide a list of all patients discharged during the 12-month period to confirm that no one eligible for inclusion had been missed and that no patient with multiple discharges had been duplicated in the sample.

Date of discharge constituted baseline (T0). Baseline assessments comprised: (1) an interview with a member of staff who knew the patient very well in the 6 months prior to discharge; and (2) a review of each individual's full historical clinical record. All study participants who were discharged into the community were eligible to be followed-up at 6 (T1) and 12 months (T2) post-discharge. Follow-up assessments consisted of a review of clinical records and an interview with the community social supervisor or care-coordinator involved in the individual's care during the follow-up period.

Interviews were carried out by Research Assistants trained in the application of the study measures and supervised throughout the data collection period. Inter-rater reliability checks were carried out in intervals to ensure correct application of the instruments, accuracy of ratings and consistency among the research team.

Measures

Demographic and diagnostic information was recorded at baseline for each patient in standardized format.

The Positive and Negative Syndrome Scale (PANSS; Kay, Fiszbein, & Opler, 1987) was administered at baseline and at both follow-ups. The PANSS is a 30-item rating scale to assess the severity of positive and negative symptoms of psychosis, and general psychopathology. All items are rated on a seven-point scale (1 = absent to 7 = extreme). Delusional ideation/ beliefs were evaluated depending on the degree of conviction and systematization. The PANSS contains a Supplemental Aggression Risk profile of which a state measure of anger was included in the interview schedule. Ratings were completed following review of records and interview with the collateral informant based on the patient's behaviour and functioning in the past month. Intra-class correlation coefficients (ICCs) were calculated between four researchers based on 20 cases. Inter-rater reliability for the total PANSS score was very good (ICC = .93). Psychotic symptoms included in statistical analyses were: delusions (content unspecific; ICC = .92), conceptual disorganization (thought disorder; ICC = .83), hallucinatory behaviour (auditory, visual, olfactory or somatic hallucinations; ICC = .97), grandiosity (ICC = .83) and suspiciousness/ persecution (ICC = .79). Affective states investigated were: anxiety (ICC = .91), depression (ICC = .89) and anger (ICC = .69).

The Hare Psychopathy Checklist: Screening Version (Hart, Cox, & Hare, 1995) was rated at the 12-month follow-up using information from both the interview and review of the records. The recommended cut-off of 18+ was applied for categorical diagnosis of psychopathic personality disorder.

Outcome

The MacArthur Community Violence Interview (MCVI; Monahan et al., 2001) was administered at both follow-ups. Mental health staff completed the MCVI for the past 6 months. Actions were considered to constitute serious violence if they were (1) batteries that resulted in physical injury or involved the use of a weapon; (2) sexual assaults; or (3) threats made with a weapon in hand. Batteries not resulting in injury of the victim were coded as minor violence. Each study participant received ratings on a mutually exclusive scale (0 = no violent behaviour, 1 = minor violence, 2 = serious violence). If multiple incidents had occurred in the past 6 months, the most severe violent act was rated. Violent incidents were excluded if the patients had responded to violence directed towards them.

Statistics

For descriptive purposes, absolute (n) and relative frequencies (%) were reported for dichotomous/ polytomous categorical variables, means (M) and standard deviations (SD) for variables on interval/ ratio level.

Ordinal logistic regression was performed to examine dose-response relationships between severity of psychotic symptoms, intensity of affect, and

occurrence/ seriousness of violence within each follow-up period. As data from both follow-up periods were included, we used a robust estimator of variance to take into account that data were collected repeatedly for each person. This approach produces standard errors that are robust to within-individual correlation and thus, relaxes the assumption that observations are independent. Our models therefore provided a single estimate (Odds Ratio [OR]), 95% confidence intervals [95% CI]) and significance value for associations observed over the entire course of the study.

We initially investigated associations between severity of each of the symptoms and occurrence/ seriousness of violence and tested their independent effects by including all symptoms simultaneously. Next, we examined whether these associations were mediated by the intensity of affect. Affect was considered as potential mediator when it demonstrated a significant relationship with both (1): level of violence and (2): symptom severity. By comparing standardized regression coefficients from models with and without affect as covariate (Mackinnon & Dwyer, 1993), we estimated the proportion of direct effects that were mediated by affect and tested their significance using bootstrapped standard errors and confidence intervals (using 1000 repetitions). This method is preferred over other tests for significant indirect effects such as the Sobel test because it is less conservative and does not require normality assumptions to be met (Preacher & Hayes, 2008).

Variables significantly associated with missingness ($p < .05$) of data at T1 and T2 (gender, primary diagnosis at baseline, length of inpatient stay) were entered as covariates in the statistical models. Furthermore, factors known to be risk factors for violence were adjusted for in all analyses.

All statistical analyses were conducted in STATA version 13.1 (StataCorp, College Station, TX). A significance level of $p < .05$ was adopted throughout.

Results

Sample characteristics

Of the 409 study participants discharged into the community, the majority were male ($n = 365$, 89.2%) with a mean age of 37.6 years (SD = 9.7). More than half were white ($n = 244$, 59.7%), 104 were of black ethnic origin (25.4%), 27 originated from the Asian subcontinent (6.6%), 24 (5.9%) were of mixed ethnic origin, and 9 (2.2%) belonged to other ethnic minority groups. The median length of inpatient stay was 622 days (Range: 7–7299).

Primary diagnoses at baseline were: non-affective psychosis (319, 78.0%), affective disorder (34, 8.3%), personality disorder (26, 6.4%) and other diagnoses (30, 7.3%) including anxiety disorder, substance use disorders and adjustment disorders. More than half had a history of substance abuse (267, 65.9%). The prevalence of psychopathy was 1.7% ($n = 7$).

At T1, 20 study participants (5.3%) had acted seriously violent during the past 6 months and 15 had committed minor violent acts (4.0%). At T2, 19 individuals (5.6%) had perpetrated a serious violent act and 8 (2.4%) had demonstrated minor violent behaviour.

Affect and violence

Before and after adjustment for demography and clinical characteristics, affective states of anxiety and anger demonstrated a significant association with violent outcome (see Table 1). In the final model, only anger was independently associated with level of violence.

Psychotic symptoms and violence

All symptom scores under study were significantly associated with level of violence before and following adjustment (Table 2). However, in the final, fully adjusted model, only the score on suspiciousness/ persecution was independently and significantly related with violent outcome.

Affect and delusions

After adjustment, anxiety was positively associated with thought disorder (AOR 1.30, 95% CI 1.05–1.59, $p = .014$) and suspiciousness/ persecution (AOR 1.21, 95% CI 1.02–1.43, $p = .030$). Depression demonstrated an inverse relationship with grandiosity (AOR .67, 95% CI .55–.83, $p < .001$). Anger showed a positive, significant association with grandiosity (AOR 1.36, 95% CI 1.15–1.62, $p < .001$) and suspiciousness/ persecution (AOR 2.00, 95% CI 1.64–2.44, $p < .001$).

Mediation analyses

Affective states of anger at T1 and T2 and the score on suspiciousness/ persecution were the only variables that qualified for mediation analyses since both demonstrated a significant association with level of violence and were

Table 1. Affect and violence.

	OR	95% CI	*p*	AOR[a]	95% CI	*p*	AOR[b]	95% CI	*p*
Anxiety	1.31	1.11, 1.55	.002	1.34	1.12, 1.59	.001	.87	.70, 1.08	.194
Depression	1.04	.84, 1.30	.700	1.08	.85, 1.36	.546	.91	.70, 1.19	.491
Anger	2.10	1.75, 2.51	<.001	2.16	1.78, 2.62	<.001	2.36	1.86, 3.00	<.001

[a]Adjusted for gender, ethnicity, age, primary diagnosis, history of substance abuse, psychopathy, and length of stay in MSU.
[b]Further adjustment for other affects.

Table 2. Positive psychotic symptoms and violence.

	OR	95% CI	*p*	AOR[a]	95% CI	*p*	AOR[b]	95% CI	*p*
Delusions	1.28	1.10, 1.48	.001	1.28	1.09, 1.49	.002	.83	.65, 1.04	.108
Conceptual disorganization	1.43	1.21, 1.68	<.001	1.46	1.24, 1.73	<.001	1.10	.85, 1.41	.487
Hallucinatory behaviour	1.30	1.07, 1.57	.008	1.33	1.09, 1.62	.005	1.13	.86, 1.47	.379
Grandiosity	1.32	1.13, 1.54	<.001	1.30	1.11, 1.53	.001	1.05	.85, 1.29	.673
Suspiciousness/ persecution	1.58	1.37, 1.82	<.001	1.58	1.36, 1.83	<.001	1.59	1.26, 2.01	<.001

[a]Adjusted for gender, ethnicity, age, primary diagnosis, history of substance abuse, psychopathy, and length of stay in MSU.
[b]Further adjustments for other positive psychotic symptoms.

associated with each other. Therefore, anger was included as mediator in the final fully adjusted model. After inclusion, the score on suspiciousness/ persecution was no longer significantly associated with violent outcome (Figure 1) and the proportion of the total effect mediated by anger was 84.1%.

Discussion

Our findings confirm the association between persecutory delusional beliefs (implying threat to the individual) and acting violently on these beliefs. No other positive psychotic symptom demonstrated this relationship, including a general measure of content-unrelated delusions, hallucinations, thought disorder and grandiosity. Delusions are commonly defined as fixed false beliefs held with strong and unjustified conviction. However, models asserting a rigid absent *vs*. present dichotomy have been increasingly challenged by findings suggesting a continuum of paranoid delusional beliefs in the general population (Freeman et al., 2005; Verdoux & van Os, 2002). We demonstrated a dose-response relationship between persecutory beliefs/ delusions and violence. This is in accordance with findings of a recent study (Moritz & Van Quaquebeke, 2013) suggesting that a higher degree of belief conviction exacerbates the behavioural consequences of persecutory beliefs in a linear fashion.

The pathway from persecutory beliefs to violence was not direct. State anger was the key mediator and accounted for more than two-thirds of the association. More than two decades ago it was emphasized that fear and anger in delusional disorder were not sufficiently recognized as part of the illness and as explanatory variables in acting on delusions, particularly violence (Kennedy, Kemp, & Dyer, 1992). In a recent systematic review (Reagu, Jones, Kumari, & Taylor, 2013) it has been shown that psychotic patients who acted violently had higher anger scores compared to those who did not demonstrate violence. Previous research has highlighted the importance of specific symptoms of psychosis (persecutory and other delusions implying threat) for serious violence (Coid et al., 2013; Ullrich et al., 2014). However, this association was mediated by angry affect. This study confirms the importance of state anger in the pathway towards violence. Most

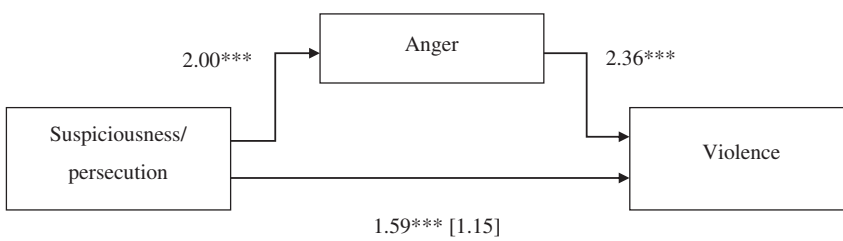

Figure 1. Pathways towards violent behaviour.
Note: ***$p < .001$.

importantly, we used a different methodological approach and were able to quantify the effect of anger on violent outcome.

Cognitive models of delusions

Cognitive models of delusions have emphasized the role of anxiety and depression in the pathogenesis/ maintenance of persecutory delusional beliefs (Garety, Kuipers, Fowler, Freeman, & Bebbington, 2001; Freeman, Garety, Kuipers, Fowler, & Bebbington, 2002). In our study, anxiety was associated with thought disorder and suspiciousness/persecution, supportive of previous research. Unsurprisingly, depression demonstrated an inverse association with grandiosity, but was not associated with persecutory delusions. Neither anxiety nor depression showed any association with occurrence/level of violence during follow-up. However, two different types of paranoia have been proposed (Trower & Chadwick, 1995) contingent on whether persecution is perceived as deserved ('bad me') or undeserved ('poor me'). Correspondingly, it can be hypothesized that (depending on external/ internal attributional style) individuals demonstrate different emotional states and that angry affect is primarily associated with 'poor me' delusions, whereas anxiety and depression are related to delusional beliefs perceived as deserved. Furthermore, acting on delusions may differ depending on affective states. From a clinical perspective, it can be assumed that anxiety and depression lead to avoidance and withdrawal rather than resulting in violence towards others. Future research is necessary to test this hypothesis.

Acting on delusions is a significant clinical issue. It is widely expected by policy-makers and the public that assessment of violence risk in patients with mental illness should be a core skill and responsibility of mental health professionals. Violence risk assessment plays an important role in mental health law worldwide and 'dangerousness to others' is a key criterion for civil and forensic commitment in most jurisdictions. Imposition of tort liability on mental health professionals who negligently fail to predict, manage and prevent a patient's violence towards others has become common. Anger in persons presenting with persecutory delusions should, therefore, be a warning sign for mental health professionals to be acted upon.

Limitations

Our study relied on data collected from extensive case files. Baseline and follow-up interviews were conducted with collaterals who were professional staff currently working with the patients with good knowledge of their past history, recent mental state and functioning. The absence of a direct patient interview is a limitation of this approach. However, this method also limits the effects of patient/ illness characteristics on loss to follow-up and resulting biases.

Nevertheless, we identified variables associated with missing data in the follow-ups and included these as covariates in our statistical analyses.

When investigating relationships between symptoms of psychosis and violence, it is essential to account for the fact that both exposure and outcome are dynamic in nature and fluctuate over time. It has been emphasized that temporal proximity is of utmost importance to uncover such associations (Coid et al., 2013; Ullrich et al., 2014; Van Dorn et al., 2012). However, it can be argued that temporal proximity does not necessarily imply temporal ordering and, therefore, the possibility of reversed causality has to be taken into consideration. Criteria of causality were published some decades ago (Hill, 1965) and have been the guidelines in epidemiology. One of these is plausibility and (from a clinical perspective) it is more plausible that persecutory delusions lead to anger which in turn leads to violence than the reverse pathway. However, one shortcoming of our study are the different time frames in which symptoms of mental illness (past month) and violence (past 6 months) were measured. Replication of the findings of two previous studies using a different methodology (Coid et al., 2013; Ullrich et al., 2014), though, indicates the robustness of our results.

Apart from suspiciousness/persecutory delusions and grandiosity, the other positive symptoms under study included a broader range of symptomatology (a general, content-unrelated measure of delusions, different forms of thought disorder coded as conceptual disorganization, and hallucinations, including auditory, visual, olfactory and somatic hallucinations). It has been suggested that command hallucinations are linked to violence, although driven by complex interactions (Bjørkly, 2002; Shawyer et al., 2008). However, due to the broad definition of hallucinations, it was not possible to investigate such associations.

Despite inclusion of primary diagnosis of personality disorder and psychopathy in the statistical model, we did not cover the whole range of personality pathology, and therefore, may have missed some potential confounders in the pathway to violence.

Our study examined only patients deemed safe enough for release into the community from a forensic psychiatric hospital. Therefore, these findings may not apply to individuals deemed unsafe for release due to their symptoms of mental illness. Future research should aim to address this issue with an inpatient sample.

Treatment implications

This study cannot answer the question whether anger is reactive to the delusional belief, precedes the delusion or is part of the delusion itself. However, our findings emphasize the importance of angry affect as substantial mediator in the pathway towards violence. Key target of interventions should, therefore, primarily (but not exclusively) be the anger.

Anger due to delusions and acting violently as a consequence correspond to current models of defensive rage behaviour associated with marked sympathetic output, thought to result in impulsivity with minimal cortical involvement. It can be activated by a threatening stimulus that is real or perceived and requires activation of the medial hypothalamus and midbrain periaqueductal grey in animal models (Siegel & Victoroff, 2009). Failure of 'top-down' control in the prefrontal cortex to modulate aggressive acts, triggered by anger-provoking stimuli is considered to play an important role. Insufficient serotonergic facilitation, excessive catecholamine stimulation, subcortical imbalances of glutamatergic/ gabaminergic systems and pathology in neuropeptide systems, may all contribute. This has led to proposals that pharmacological interventions such as mood stabilizers which dampen mood irritability are warranted. Selective serotonin reuptake inhibitors might also enhance 'top-down' control (Siever, 2008). However, specific effects of medication have not been studied on violence due to delusions. Meta-analysis of studies among populations at high risk of violence has shown large effects for atypical antipsychotics (Hockenhull et al., 2012). In one study, the superior effect of Clozapine appeared separate from its antipsychotic and sedative actions (Krakowski, Czobor, Citrome, Bark, & Cooper, 2006).

A review of meta-analyses examining efficacy of psychological treatments revealed beneficial effects of cognitive-behavioural therapy on positive symptoms, with medium effect sizes on secondary outcomes including mood and social anxiety (Hofmann, Asnaani, Vonk, Sawyer, & Fang, 2012). A meta-analysis of nine different psychological treatments of anger suggested that psychological treatments are generally effective in treating anger (Saini, 2009). However, anger due to delusions of persecution/ threat may be both quantitatively and qualitatively different from anger not resulting from delusions. It remains unclear whether current psychological treatments would need to be adapted to be effective with delusional anger. Potentially synergistic effects of targeted cognitive interventions with short-term medication have not been sufficiently tested. It has also been recommended that rather than trials of schizophrenia, single psychotic experiences such as persecutory delusions should be the future focus (Garety & Freeman, 2013). However, as yet there is no state of the art for the treatment of anger and clearly indicates an area of future research.

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Declaration of interest

JS is Editor-in-Chief, MD is Associate Editor of the journal.

Disclosure statement

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