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Clinical and neuropsychological features of violence in schizophrenia: A prospective cohort study

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ABSTRACT

The increased risk of violence in schizophrenia has been linked to several environmental, clinical and neuropsychological factors, including executive dysfunction. However, data about the nature of these effects are mixed and controversial. The main aim of this study was to investigate the relationship between clinical and neuropsychological factors with violence risk in patients with schizophrenia, taking into account current psychopathology and lifetime alcohol use. We compared a sample of patients living in Residential Facilities (RFs) with schizophrenia and a past history of interpersonal violence (vSZ, $N = 50$) to patients with schizophrenia matched on age, gender and alcohol abuse/dependence but with no violence history (nvSZ, $N = 37$). We then established the association between the clinical and neuropsychological factors that predicted violence over a 1 year follow-up period. The results revealed that vSZ patients living in RFs were characterized by greater compulsory hospital admissions, higher anger and less negative symptoms as compared to nvSZ patients. vSZ patients performed better on executive and motor tasks than nvSZ; however, these differences appeared to be explained by the lower negative psychotic symptom in the vSZ group. Both groups were involved in episodes of violence during the follow-up period; among the two, the vSZ patients were more likely to be violent. Negative symptoms predicted less verbal aggression at 1 year follow-up. Overall, these findings support a key role of negative rather than positive symptoms in driving violence risk among SZ patients living in RFs, in a manner that negative symptoms are linked to a lower risk of violence.

1. Introduction

People with schizophrenia are more likely to be violent than people with other mental disorders or the general population (Walsh et al., 2002). The relationship between schizophrenia and violence is complex because of the interplay between many factors, such as having a past history of violence (Iozzino et al., 2015), age and gender (Swanson et al., 1990; Dack et al., 2013), current psychotic symptoms and childhood conduct problems (Hodgins, 2008), alcohol and substance misuse (Bowers et al., 2009).

From a neuropsychological perspective, deficits in executive functioning may be key components in the pathway that increases the propensity to violence in some patients with schizophrenia. This is

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consistent with evidence that abnormalities in fronto-temporal circuitry are implicated in aggressive behavior among such patients (Weiss, 2012).

Executive functions embrace higher order cognitive functions mainly sustained by prefrontal cortex, including mental flexibility, response inhibition, problem solving, self-monitoring and the ability to use feedback to modulate behavior (Lezak, 1995; Miyake et al., 2000). They may be modulated by dynamic factors, as psychotic symptoms (Bora et al., 2009), mood (Volkow, 2009) and alcohol/substance use (Harvey, 2011; Donoghue and Doody, 2012).

Data exploring the link between executive deficits and risk of violence in schizophrenia are inconsistent (Weiss, 2012; Witt et al., 2013). Current psychopathology, social reasoning and functioning have also been reported to be linked to violence (Serper et al., 2008; O'Reilly et al., 2015), though a recent meta-analysis found that only global cognitive impairment and lack of insight predicted violence in schizophrenia (Reinharth et al., 2014).

Methodological challenges may help explain some of these inconsistencies, including small sample sizes, diagnostic heterogeneity, different clinical settings (*i.e.*, community outpatient services, acute inpatient units and specialized forensic units), lack of standardization in the quantification of violence (Harris et al., 2013) and a failure to assess dynamic factors (Rueve and Welton, 2008; Dack et al., 2013).

The main aim of this study was to establish whether cognitive deficits are linked to the propensity to violence in patients with schizophrenia living in Residential Facilities (RFs). We examined the demographic and clinical characteristics of patients with schizophrenia and a history of violence (vSZ) compared to those with no history of violence (nvSZ) (aim *i*). We compared these two groups on cognitive performances, taking into account potential confounding factors such as psychopathology and lifetime use of alcohol (aim *ii*). We then measured further acts of violence over 1 year (aim *iii*) and prospectively tested the roles of clinical and cognitive features in predicting the violence risk (aim *iv*).

We hypothesized that vSZ patients would exhibit higher anger scores and lifetime problematic alcohol use than nvSZ (*i*), and that vSZ patients would demonstrate impaired executive performances compared to nvSZ at baseline (*ii*). We also hypothesized that vSZ patients would be involved in higher rates of violence than nvSZ over the 1 year period (*iii*) and that current psychopathology and executive performance would predict that violence risk (*iv*).

2. Material and methods

2.1. Study design and participants

This study was part of the VIOlence Risk and MEntal Disorders (VIORMED) project (de Girolamo et al., 2016). Patients were recruited from medium-long term RFs in 4 centers of the Saint John of God Order in Italy between May and September 2013. All RFs were non-hospital facilities which care for long-term psychiatric patients. In Italy in 2000 there were 1370 RFs with 17,138 beds; most of them had 24-hour staffing with 1.42 patients per full-time worker and 12.5 beds per RF on average (de Girolamo et al., 2002).

Fifty patients with schizophrenia and a past history of violence (vSZ) and 37 patients with schizophrenia without a violence history (nvSZ) were recruited, matched on age, gender and lifetime alcohol abuse/dependence as secondary diagnoses. We focused on alcohol because it was the most commonly abused drug in our sample; indeed all patients with lifetime abuse of other substances also abused of alcohol. Six eligible participants refused to participate.

All subjects had a primary diagnosis of a DSM-IV schizophrenia spectrum disorder (APA, 1994) as ascertained with the SCID-I (First et al., 2002), were aged between 18 and 65 years, lived in a RF at recruitment and were Italian fluent. Exclusion criteria were a diagnosis of mental retardation, dementia, organic brain disorder, or cancer. The study was approved by the Ethical Committee (EC) of the Saint John of God Clinical Research Center in Brescia (Italy) as coordinating site, and by ECs of the other centers. All patients gave their written informed consent before entering the study.

2.2. Definition of "history of violence"

We defined "history of violence" as a categorical variable if the patient had committed an act of severe interpersonal violence in the last 10 years, as reported in the clinical records. Only "violent acts committed against others which caused (or might have caused) physical harm to the victim" were considered. If a patient committed several violent acts within this time frame, we included the act that had the most severe physical consequences for the victim.

2.3. Socio-demographic and clinical factors

Socio-demographic and clinical information were collected through a specific form at study entry; this tool also included an assessment of the past history of violence, such as age, mental state and type of violence, based on patients' clinical records and interviews. Lifetime substance abuse was assessed using SCID-I. Current psychopathology was also evaluated using the Brief Psychiatric Rating Scale (BPRS) (Ventura et al., 1993) to yield total, positive and negative psychotic symptom scores (Ungvari et al., 2008). Psychosocial functioning was measured with Personal and Social Performance Scale (PSP) (Morosini et al., 2000) and patients' self-awareness about their disorder using the Insight Scale (IS) (Markovà et al., 2003).

Lifetime aggressive behavior was assessed through the Brown–Goodwin Lifetime History of Aggression (BGHA) (Brown et al., 1979). Impulsivity and anger were evaluated by the Barratt Impulsiveness Scale-11 (BIS-11) (Fossati et al., 2001) and the State-Trait Anger Inventory-2 (STAXI-2) (Cumunian, 2004).

2.4. Neuropsychological assessment

All patients underwent a neuropsychological assessment over a maximum of two sessions of about 45 min at study entry. All tests were administered and scored according to standard procedures.

The Brief Assessment of Cognition in Schizophrenia (BACS) (Anselmetti et al., 2008) was used to assess cognition broadly. The BACS evaluates verbal memory, working memory, motor speed, verbal fluency, attention and speed of information processing, and planning. The cognitive foci were working memory (Digit Sequencing Task), motor speed (Token Motor Task), speed of information processing and attention (Symbol Coding Test).

The Wisconsin Card Sorting Test (WCST) (Laiacona et al., 2000) was used to test executive functioning. WCST performance was indexed using the total score, the number of perseverations and not perseverative errors as index of mental flexibility and inhibition.

The Iowa Gambling Test (IGT) requires inhibitory control and learning from external feedbacks. We employed an experimental computerized IGT task based on the original version (Bechara et al., 1994). The task involved four visually similar decks of cards, which can either provide high rewards and losses (disadvantageous decks: A and B) or small rewards and losses (advantageous decks: C and D). The aim is to maximize the starting budget of $2000. The subject is allowed to pick from any of the decks for a total of 100 cards, one at a time. After turning a card, the subject is informed of their gain or loss. Performance was evaluated in final total budget and net score. The net score was calculated as $[(C + D) - (A + B)]$, where positive net score reflects advantageous performance and negative net score reflects disadvantageous performance.

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