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Abnormal movements in first-episode, nonaffective psychosis: Dyskinesias, stereotypies, and catatonic-like signs ☆

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ABSTRACT

Motor abnormalities represent a neurobehavioral domain of signs intrinsic to schizophrenia-spectrum disorders, though they are commonly attributed to medication side effects and remain understudied. Individuals with first-episode psychosis represent an ideal group to study innate movement disorders due to minimal prior antipsychotic exposure. We measured dyskinesias, stereotypies, and catatonic-like signs and examined their associations with: (1) age at onset of psychotic symptoms and duration of untreated psychosis; (2) positive, negative, and disorganized symptoms; (3) neurocognition; and (4) neurological soft signs. Among 47 predominantly African American first-episode psychosis patients in a public-sector hospital, the presence and severity of dyskinesias, stereotypies, and catatonic-like features were assessed using approximately 30-min video recordings. Movement abnormalities were rated utilizing three scales (Dyskinesia Identification System Condensed User Scale, Stereotypy Checklist, and Catatonia Rating Scale). Correlational analyses were conducted. Scores for each of three movement abnormality types were modestly inter-correlated (r=0.29–0.40). Stereotypy score was significantly associated with age at onset of psychotic symptoms (r=0.32) and positive symptom severity scores (r=0.29–0.41). There were no meaningful or consistent associations with negative symptom severity, neurocognition, or neurological soft signs. Abnormal movements appear to represent a relatively distinct phenotypic domain deserving of further research.

1. Introduction

Intrinsic movement abnormalities have been recognized in schizophrenia since the pre-neuroleptic era (Fenton, 2000). For example, Kahlbaum described the syndrome of catatonia in 1874 (Berrios, 2007), and Kraepelin (1919) later included catatonia (along with hebephrenia and paranoia) as a type of dementia praecox (Fink, 2013). Abnormal movements—including dyskinesias (involuntary and spontaneous), stereotypies (voluntary and repetitive), and catatonic-like signs (hypokinetic and negativistic)—nonetheless remain an understudied neurobehavioral domain of schizophrenia-spectrum disorders, likely because they are largely attributed to (and indeed partly attributable to) the effects of antipsychotic medications. First-episode patients are an invaluable resource in understanding this phenotypic domain.

Movement abnormalities observed in schizophrenia are also present, though to a lesser extent, among biological family members, indicating probable genetic underpinnings (Koning et al., 2010). Furthermore, an analysis of childhood, pre-prodromal home videos of individuals who later developed schizophrenia and their siblings showed a greater number of neuromotor abnormalities in the former (Walker and Lewine, 1990). Motor abnormalities, including involuntary movements, neurological soft signs (NSS), hypokinesia, catatonic signs,

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echo-phenomena, and Parkinsonism occur in a majority of antipsychotic-naïve patients (Peralta and Cuesta, 2001; Whitty et al., 2009; Peralta et al., 2010). The prevalence and severity of dyskinesias may increase with age and duration of illness (Whitty et al., 2006; Pappa and Dazzan, 2008). The existing literature on movement abnormalities is very limited in terms of how this phenotypic domain relates to clinical features and neurocognition, particularly among first-episode patients. Furthermore, in most extant studies, movement abnormalities have been rated during or shortly after a single, unrecorded examination. Because many abnormal movements are subtle and easy to overlook, rigorous ratings based on video recordings—completely independent of ratings of clinical features and neurocognition—would be beneficial.

We evaluated three types of abnormal movements (dyskinesias, stereotypies, and catatonic-like signs). Such motor anomalies were rated in well-characterized, first-episode patients using digital video recordings by a trained clinician who was blinded to other clinical ratings. Associations with four domains of clinical features were examined: (1) age at onset of psychosis and duration of untreated psychosis (DUP); (2) positive, negative, and disorganized symptom severity; (3) neurocognition; and (4) NSS. We also examined three potential covariates, gender, substance abuse/dependence, and antipsychotic medication dosage. Although primarily an exploratory study given the relatively limited literature on clinical correlates of these specific movement abnormalities (and no literature using the particular methodology that we employed), we had four *a priori* hypotheses, tested specifically to confirm several prior findings in the limited available literature, and assuming a meaningful effect size to be $r > |0.25|$ (i.e., greater than a small effect): (1) greater abnormal movements generally would be associated with earlier age at onset (Gervin et al., 1998; Manschreck et al., 2004; Whitty et al., 2006); (2) dyskinesia and stereotypy scores would be correlated with positive symptom severity (Cortese et al., 2005; Pappa and Dazzan, 2008); (3) stereotypies would be correlated with severity of disorganization (Peralta and Cuesta, 2001); and (4) catatonic-like signs would be associated with negative symptom severity (Peralta and Cuesta, 2001; Pappa and Dazzan, 2008). Additionally given some degree of conceptual overlap, we expected the three domains of movement abnormalities to be at least modestly correlated with the severity of NSS. We had no *a priori* hypotheses pertaining to associations between the movement abnormalities and neurocognition, but wished to explore the magnitude of correlations.

2. Methods

2.1. Setting/sample

Data were collected from a sub-sample of a larger study focused on the effects of premorbid/adolescent cannabis use on clinical features of early course psychotic disorders. The study was conducted at public-sector facilities serving a predominantly African American, low-income, socially disadvantaged population. Consecutively admitted, English-speaking patients with first-episode, nonaffective psychosis, aged 18–40 years, were eligible to participate. Exclusion criteria for the overarching study included known or suspected mental retardation, diagnosis of a substance-induced psychotic disorder, a Mini-Mental State Examination (Folstein et al., 1975; Cockrell and Folstein, 1988) score of <24, or a significant medical condition that could compromise ability to participate. Those with ≥ 3 months of prior treatment with an antipsychotic were excluded, as were those with a history of hospitalization for psychosis ≥ 3 months prior to the current hospitalization. However, for the majority of patients, the index hospitalization was the first psychiatric evaluation; for example, in the present sample ($n=47$), 20 patients (42.6%) were admitted directly from the psychiatric emergency service with no prior mental health professional contacts, and another 11 (23.4%) had made just one prior professional contact (e.g., another hospital or an outpatient clinic) that made an immediate referral for hospitalization.

A secondary focus of the larger project was to study movement abnormalities in a subset of this first-episode sample, and for this reason additional data were collected on the initial patients enrolled. Of 56 video recordings that were ultimately available, nine were excluded due to insufficient video quality, yielding a sample of 47 for this analysis. Patients were recruited from the inpatient psychiatric unit of a large, university-affiliated, urban hospital (28, 59.6%), a shorter-stay crisis stabilization unit in the same hospital (11, 23.4%), the psychiatric emergency room of that hospital (3, 6.4%), and a psychiatric crisis center in a neighboring suburban county (5, 10.6%).

2.2. General procedures

Data were collected between August 2008 and July 2010. All procedures were approved by the university's Institutional Review Board, and all participants provided written informed consent. The in-depth research assessment began after the individual was acclimated to the inpatient unit and clinically stabilized enough to take part in the research project, typically around hospital day 4 (median=4, mean=4.8). Video recordings were taken during the semi-structured research interview conducted for the purpose of later rating symptom severity. Virtually all patients were assessed within 1 week of initiating antipsychotic treatment.

Video recordings had a median length of 32.5 min (range, 23–33 min). For the purpose of the movement ratings described below, videos were played on VLC Media Player 1.1.3, with brightness, contrast, and saturation manipulated to enhance video quality. To ensure thorough and decidedly accurate ratings, videos were viewed 3–4 times, with audio muted, showing the patient's full body, and also zooming in on the face, torso, and legs. Portions were replayed with sound as necessary to differentiate between stereotypies and conversationally appropriate expressive gestures, the latter not rated as abnormal. All movement ratings were completed by a single trained assessor blinded to ratings of clinical/neurocognitive features, though 14 videos were rated by a second trained assessor to establish inter-rater reliability of the method.

2.3. Measures/rating scales

Movement abnormalities observable in the videos were rated using three instruments. The *Dyskinesia Identification System Condensed User Scale* (DISCUS) rates 15 involuntary movements on a five-point scale (0=not present, 1=minimal, 2=mild, 3=moderate, 4=severe) (Mittal et al., 2008). Three tongue movements and toe movements could not be rated, resulting in the following 11 dyskinesias being rated: tics, grimaces, blinking, chewing/lip-smacking, puckering/sucking/thrusting lower lip, tongue thrusting/tongue in cheek, retrocollis/torticollis, shoulder/hip torsion, athetoid/myokymic movements of the finger/wrist/arm, pill rolling, and ankle flexion/foot-tapping. Inter-rater reliability (two raters assessing 14 videos) was 0.92, the same as previously reported by Kalachnik and Sprague (1993). The 10-item *Stereotypy Checklist* (SC) was used to assess repetitive, abnormal movements in different regions of the body (Bodfish et al., 1995), applying the same 0–4 rating scale used in the DISCUS (rather than simply present/absent). Locomotor abnormalities were not assessed because videos were recorded while participants were seated during an interview, and vocal abnormalities were not scored as ratings were primarily conducted with audio muted (to maintain blinding of clinical features like delusions and disorganization). The resulting eight items/regions assessed were: whole body, mouth, object, hand/finger, head, eye/vision, ear/hearing, and leg/foot. Inter-rater reliability was 0.92, higher than reported previously (e.g., 0.81 in Bodfish et al., 1995). Catatonic-like signs were measured using an adapted nine-item version of the 21-item *Catatonia Rating Scale* (CRS) (Bräunig et al., 2000). The items (excitement, immobility/stupor, staring, posturing/catalepsy, grimacing, stereotypy, mannerisms, impulsivity, and perseveration of movements) were rated with a 0–3 scale. Scores in this study had an inter-rater reliability of 0.88.

Diagnoses of psychotic disorders and substance use disorders were made using the *Structured Clinical Interview for DSM-IV Axis I Disorders* (SCID; First et al., 1998). Consensus-based best estimates (using all available information, including collateral interviews with family members when available) of age at onset of psychotic symptoms and DUP were determined as described previously (Compton et al., 2009, 2011), using the *Symptom Onset in Schizophrenia* inventory (Perkins et al., 2000).

Symptom severity was assessed by clinically trained research staff (blinded to the later ratings of abnormal movements) with the widely used *Positive and Negative Syndrome Scale* (PANSS) (Kay et al., 1987), following a chart review and an in-depth interview focused on participants' current and past-month symptoms (it was a portion of this interview that was video-recorded). Given the exploratory nature of the study, the original positive and negative subscales were employed, as well as a subscale tapping disorganized symptoms (Perlstein et al., 2001). Inter-rater reliability of PANSS positive and negative subscale scores, across a number of trained raters in the larger study—calculated using a two-way mixed (judges fixed) effects intraclass correlation (ICC) coefficient analysis of variance model (Shrout and Fleiss, 1979)—was 0.92 for both subscales. As a secondary approach to the PANSS data, we also computed five subscale scores based on a commonly used five-factor model (Marder et al., 1997): positive, negative, disorganized, excited, and depressive/anxious.

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