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Characterizing psychosis risk traits in Africa: A longitudinal study of Kenyan adolescents

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ABSTRACT

The schizophrenia prodrome has not been extensively studied in Africa. Identification of prodromal behavioral symptoms holds promise for early intervention and prevention of disorder onset. Our goal was to investigate schizophrenia risk traits in Kenyan adolescents and identify predictors of psychosis progression.

135 high-risk (HR) and 142 low-risk (LR) adolescents were identified from among secondary school students in Machakos, Kenya, using the structured interview of psychosis-risk syndromes (SIPS) and the Washington early recognition center affectivity and psychosis (WERCAP) screen. Clinical characteristics were compared across groups, and participants followed longitudinally over 0-, 4-, 7-, 14- and 20-months. Potential predictors of psychosis conversion and severity change were studied using multiple regression analyses.

More psychiatric comorbidities and increased psychosocial stress were observed in HR compared to LR participants. HR participants also had worse attention and better abstraction. The psychosis conversion rate was 3.8%, with only disorganized communication severity at baseline predicting conversion ($p = 0.007$). Decreasing psychotic symptom severity over the study period was observed in both HR and LR participants. ADHD, bipolar disorder, and major depression diagnoses, as well as poor occupational functioning and avolition were factors relating to lesser improvement in psychosis severity.

Our results indicate that psychopathology and disability occur at relatively high rates in Kenyan HR adolescents. Few psychosis conversions may reflect an inadequate time to conversion, warranting longer follow-up studies to clarify risk predictors. Identifying disorganized communication and other risk factors could be useful for developing preventive strategies for HR youth in Kenya.

1. Introduction

The onset of schizophrenia typically occurs during late adolescence or early adulthood (Jablensky et al., 1992; Kirkbride et al., 2006), a critical period of development during which young people are usually going through school and are becoming independent from their parents. Understanding how psychosis presents across cultures is crucial to both elucidating etiological process and improving treatment. However, there is relatively little information about psychotic disorders in the developing world (Saxena et al., 2006), and in particular, few epidemiologic studies of psychosis development in Africa (Guinness, 1992; Saha et al., 2005). The need for more studies is underscored by existing data, which suggests that there are differences in the presentation and course of psychotic disorders in Africa compared to developed countries (German, 1972; Guinness, 1992). For example, delusional content often reflects the prevalent cultural beliefs, with themes of witchcraft or ancestral worship more commonly experienced in Africa (Hurst, 1975). Also, existing studies suggest that while the prevalence of schizophrenia is comparable across the world, the course and outcome is often more severe in the developed world than in developing countries (Hopper and Wanderling, 2000; Kulhara, 1994; Sartorius et al., 1986).

In recent years, there has been a growing recognition of the need to develop pre-emptive strategies for schizophrenia that derail progression toward independence and productivity. In sub-Saharan Africa, where financial and health care resources for managing psychotic disorders are extremely limited, the role of early intervention strategies prior

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to disorder onset is particularly relevant (Ndetei, 2008). Clinical high risk (CHR) criteria for developing psychotic disorder, comprised primarily of attenuated psychotic symptoms, aim to identify the prodromal stage of schizophrenia (Cannon et al., 2008). Studies indicate that 16% to 54% of youth who meet current clinical risk criteria develop a major psychotic disorder within 1–2.5 years (Cannon et al., 2008; Ruhrmann et al., 2010; Schultze-Lutter et al., 2015; Yung et al., 2008). Major global research efforts involving CHR include the North American Prodrome Longitudinal Study (NAPLS), the European Prediction of Psychosis Study (EPOS), and the Personal Assessment and Crisis Evaluation (PACE) clinic in Melbourne Australia. The NAPLS study, which comprises of the largest database on prospectively followed prodromal cases worldwide previously found five features that contributed uniquely to the prediction of psychosis: familial risk with functional decline, unusual thought content, paranoia, low social functioning, and substance abuse (Cannon et al., 2008). These predictors had a substantial, but not complete, overlap with predictors found in related studies (Addington et al., 2015; Thompson et al., 2011). Based on identified predictors from existing studies, an individualized risk calculator for psychosis conversion has also been proposed (Schultze-Lutter et al., 2015).

To our knowledge, our group was the first to investigate the CHR state in Africa and we have maintained an active research program characterizing psychosis-risk traits in Kenyan youths. Our previous investigations using various psychosis-risk screening instruments showed relatively high rates of psychotic experiences in Kenyan children (Mamah et al., 2013a), adolescents (Mamah et al., 2013a) and young adults (Mamah et al., 2012; Ndetei et al., 2012) in school and community settings. These findings may have overestimated psychotic experience prevalence rates, as these were higher than those observed in some studies done in developed countries (e.g. (Gale et al., 2011; Kelleher et al., 2012; Mojtabai, 2006)). Large variations in prevalence rates have been reported globally (Nuevo et al., 2012), which suggests that assessment tools may not always be cross-culturally applicable. Results of our previous studies as well as information gathered from focus groups (Mamah et al., 2013b) contributed to our development of culturally-sensitive research tools to better characterize the CHR state in Kenya. The current study is the most extensive investigation of psychosis-risk individuals in Africa, incorporating multiple behavioral assessments in an adolescent population and including longitudinal investigations of at-risk individuals for the first time in the continent.

2. Methods

2.1. Recruitment

The study was approved by the ethical review board of the Kenya Medical Research Institute and the Institutional Review Board of Washington University in St. Louis. Participants were students from 22 secondary schools in *Machakos* county, Kenya, a largely rural area near Nairobi. Participants were selected from among 2800 students in the 10th–12th grades of study, aged 14–20 years, who completed the Washington Early Recognition Center Affectivity and Psychosis (WERCAP) Screen (Mamah et al., 2014). The selection process is summarized in Fig. 1. As a preliminary selection process, screened subjects were divided into those at preliminary high-risk (HR) and those at preliminary low-risk (LR) based on WERCAP psychosis-risk scores (i.e. ≥30 and <30 respectively) (Mamah et al., 2014). Based on preliminarily assigned risk status, 330 individuals were enrolled in the study. Determination of final risk status was done as described below. Written consent was provided by a parent or guardian or by the student if aged 18 or older.

2.2. Inclusion and exclusion criteria

Participants were excluded from the HR or LR groups if they met criteria for current or lifetime Axis I psychotic disorder. Participants in the HR groups met diagnostic criteria for a prodromal syndrome using the Structured Interview for Psychosis-Risk Syndromes (SIPS) (McGlashan et al., 2010) or the WERCAP Screen criteria (Mamah et al., 2014). The decision to use both structured and self-report measures to estimate risk state capitalizes on the strengths of each assessment format in obtaining behavioral data. Structured assessments alone can be influenced by perceived stigma and rater characteristics, while self-report questionnaires may not be adequately understood by the respondent (Mamah et al., 2014).

2.3. Clinical assessments and core evaluations

Psychosis-risk symptoms were assessed using the positive symptom subscale of the SIPS and the WERCAP Screen. The SIPS is a structured interview that includes five positive symptom subscales: P1-unusual thought content/delusional ideas, P2-suspiciousness/persecutory ideas, P3-grandiose ideas, P4-perceptual abnormalities, and P5-disorganization communication. Positive symptoms are rated from 0 (absent) to 6 (severe/psychotic). In addition to the positive symptom subscale, the SIPS contains three additional subscales that were also assessed: negative, disorganization and general symptoms. The WERCAP Screen estimates the severity of psychotic symptoms and "affectivity", a measure of mood dysregulation (Mamah et al., 2014). Psychiatric diagnoses were assessed using the computerized Diagnostic Interview Schedule version IV (c-DIS-IV) (Robins et al., 1981) using laptop computers. Cognitive functioning was assessed using 11 test modules (Continuous Performance Task – Number Letter; Short Letter N-Back Test – 2 Back; Word Memory Test for Children; Facial Memory Test; Visual Object Learning Test – Short; Logical Reasoning Test For Children – Short; Motor Praxis Test; Matrix Analysis Test; List Learning Test; Emotion Recognition Test for Children – 40 Faces; and Measured Emotion Differentiation Test) from the University of Pennsylvania Computerized Neurocognitive Battery (CNB) (Gur et al., 2010). Quantitative measures of psychosocial stress was assessed using the WERC Stress Screen (Mamah et al., 2014). The Dyskinesia Identification System: Condensed User Scale (DISCUS) (Kalachnik and Sprague, 1993) was used to rate items relating to dyskinesia in six upper body regions. Head size was estimated by measuring the circumference of the head with a cloth tape measure wrapped around the glabella and the opisthocranion.

2.4. Timeline and schedule of assessments

Participants were evaluated between January 2014 and December 2015. The assessment schedule was baseline, 4-, 7-, 14- and 20-months, as depicted in Fig. 1. All assessments took place on site in the respective secondary schools, in confidential spaces within various school meeting rooms and classrooms.

2.5. Assessing psychosis conversion and progression

Clinical outcome at specific follow-up assessments was evaluated using results from the c-DIS-IV and the SIPS. Transition to psychosis was determined by the presence of a new psychotic diagnosis on the c-DIS-IV, and/or by meeting psychosis criteria on the SIPS(McGlashan et al., 2010), i.e. that at least one of the five SIPS positive symptoms reached a psychotic level of intensity for a frequency of ≥1 h per day for 4 days per week during the past month or that symptoms seriously impacted functioning.

2.6. Statistical analysis

All statistical analyses were done using SAS 9.4 (SAS Institute Inc., Cary, NC). Chi-square and two-sided Wilcoxon-Mann-Whitney tests were used to compare groups on clinical and demographic variables, considering that many variables did not meet criteria for normality. Cognitive domains were derived similarly as previously described