



Impact of psychotic symptoms on cognitive functioning in child and adolescent psychiatric inpatients with severe mood disorders



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ABSTRACT

Despite established differences in cognitive functioning of adults with mood disorder-related psychosis and those with non-affective psychotic disorders, there is limited evidence of the impact of psychotic symptoms on the cognitive functioning of children and adolescents with mood disorders. This study investigates IQ, working memory, and processing speed scores in 80 child and adolescent inpatients discharged from an intermediate care state psychiatric hospital, using a retrospective chart review. Associations between diagnosis based on DSM-IV criteria (7 with Major Depression- MDD; 43 with Bipolar Disorders-BD, and 30 with Mood Disorders Not Otherwise Specified-NOS), presence of current psychotic features, and cognitive functioning (WISC-IV IQ, Coding, Symbol Search, and Digit Span) were investigated using Multivariate Analyses of Variance. No differences were found in cognitive functioning between patients with MDD and BD, or between those with severe Mood Disorders (MDD or BD) and those with NOS, when controlling for age, gender, and presence of psychotic features. However, patients with severe mood disorders and psychotic features showed lower IQs and greater working memory deficits than those without psychotic features or NOS. Results are discussed in terms of treatment planning for children and adolescents at risk for developing psychotic symptoms and severe mood disorders.

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1. Introduction

Psychotic symptoms are related to the severity of the mood disturbance in children and adolescents with Major Depressive Disorder (MDD) or Bipolar Disorder (BD) (McCarthy and Dobroski, 2014). Research has shown that the combination of severe mood disturbance (e.g., MDD or BD) and psychotic symptoms in adults is related to deficits in attention (Godard et al., 2012), processing speed, executive functioning, memory (Reichenberg et al., 2009), information processing (Daniel et al., 2013; Sarapas et al., 2012), and poor psychosocial functioning (Godard et al., 2011). In a meta-analysis of studies on the cognitive functioning of adolescents with early-onset BD and schizophrenia, Nieto and Castellanos (2011) reported that both groups of youths had deficits in processing speed, executive control, verbal learning, and memory although the impairments of those with BD were less severe. Although differences in cognitive functioning have been demonstrated

between adults with mood disorder-related psychosis and those with non-affective psychotic disorders, those differences have not yet been thoroughly explored in children and adolescents. This study investigated group differences in Full Scale IQ (FSIQ), working memory, and processing speed in child and adolescent psychiatric inpatients with mood disorders (with versus without psychotic features), and child and adolescent psychiatric inpatients with Mood Disorders Not Otherwise Specified (NOS). Given the paucity of research in this area, specific hypotheses regarding cognitive functioning of these groups were partially derived from research on the cognitive functioning on adults with MDD, BD, and their interaction with psychotic features.

1.1. Major depression and cognitive functioning

For adults with MDD, psychotic manifestations of the disorder are associated with executive functioning deficits (Basso and Bornstein, 1999; Hill et al., 2004; Lampe et al., 2003) and attention deficits (DelBello et al., 2003), but not necessarily with mood symptom severity (Caldieraro et al., 2013). For adults with MDD without psychotic features, cognitive deficits seem to be less apparent (Castaneda et al., 2007). Baune et al. (2014) noted that

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symptomatic adolescents and young adults with MDD have worse working memory, executive functioning, processing and psychomotor speed, verbal fluency, and visual memory than controls. A meta-analysis concluded that MDD in youth might negatively impact cognitive maturation, contributing to lower Full Scale IQs (FSIQ) and worse sustained attention, verbal memory, planning ability, verbal fluency, and inhibition capacity (Wagner et al., 2015). However, a recent review did not find evidence of deficits in attention, working memory, and verbal fluency (Vilgis et al., 2015). Hermens et al. (2010) found no significant differences in cognitive functioning between symptomatic depressed 16–32 year olds and those with BD, though both groups had attention and verbal memory deficits. Yet, deficits in attention and concentration have been identified in up to 70% of a community sample of adolescent girls with MDD (Cooper and Goodyer, 1993; Goodyer and Cooper, 1993). MDD has also been associated with processing speed and working memory deficits (Klimkeit et al., 2011; Wilkinson and Goodyer, 2006), which seem to be independent of clinical characteristics (Gu et al., 2016). Investigations of the general intellectual functioning, working memory, and processing speed of children and adolescents with MDD have thus yielded inconsistent results.

1.2. Bipolar disorder and cognitive functioning

There is support for the hypotheses that pediatric BD 1 disrupts cognitive development and that there are associated neuropsychological deficits indicative of prefrontal cortex dysfunction (Bearden et al., 2007) or loss of gray matter in the frontal lobes (Arango et al., 2012). For adults with BD, attention and processing speed deficits appear to be stable over time even when there are significant changes in mood symptoms (Chaves et al., 2011), and cognitive complaints are associated with poor psychosocial functioning (Demant et al., 2015). For children and youth with BD, verbal memory seems to be impaired independent of the severity of the mood symptoms (Glahn et al., 2005), and continuing deficits in executive functioning, working memory, attention, and visual memory have also been detected (Lera-Miguel et al., 2014; Pavuluri et al., 2006). Compared with healthy controls, adolescents with BD have worse working memory (Biederman et al., 2011) and worse processing speed (Udal et al., 2013). For adolescents and adults, visuospatial, verbal memory, and sustained attention deficits appear to be trait features for BD (Cahill et al., 2009). Pavuluri et al. (2006, 2009) similarly suggested that children and adolescents with BD may have cognitive deficits regardless of treatment with medication, and that these vulnerabilities represent characteristic traits of the disorder.

Regardless of whether children or adolescents with BD experience comorbid Attention Deficit Hyperactivity Disorder (ADHD) and Anxiety Disorders (Doyle et al., 2005; Frías et al., 2014), they have more attention, working memory, and processing speed deficits, and lower FSIQs, Vocabulary, Digit Span, Digit Symbol and Coding scores than community controls and might have a greater family history of BD (Kennedy et al., 2005). A meta-analysis of cognitive studies on BD 1 in youth (Joseph et al., 2008) found strong evidence of verbal memory deficits, moderate evidence of attention, visual perceptual ability, memory, and executive functioning deficits with only small differences in FSIQ, motor speed, and reading ability. Horn et al. (2011), similarly noted strong evidence of problems in verbal memory and some evidence of attention and processing speed deficits. McCarthy et al. (2004) reported that youth with BD had significantly lower Performance IQs than those with ADHD, Conduct Disorder, and Oppositional Defiant Disorder. A number of the studies on cognitive functioning of youth with BD have either relied on estimated FSIQs (Singh et al., 2009), or have focused on patients with average or high

average FSIQs (Doyle et al., 2005). However, few studies about the FSIQ scores of adolescents with MDD or BD have included patients with very low cognitive functioning (e.g., Han et al., 2011).

1.3. Impact of psychotic features on cognitive functioning in mood disorders

Psychotic symptoms have been clearly associated with severity of cognitive deficits in adults with BD (Martinez-Aran et al., 2008; Nenadic et al., 2015), particularly deficits in attention, verbal learning, memory (Levy and Weiss, 2010), and executive functioning (Levy et al., 2011, 2012). Although Savitz et al. (2009) found no difference in cognitive functioning in adults with BD, with and without psychosis, other research (Hill et al., 2009; Zanelli et al., 2010) reported cognitive impairments in individuals with BD with psychosis, MDD with psychosis, and schizophrenia, and the least severe deficits in BD only. Children and youth who develop BD generally have less severe cognitive deficits than those who develop schizophrenia (Seidman et al., 2013). However, the presence of psychotic features in children and adolescents with BD has been associated with lower cognitive functioning (Arango et al., 2014; Shiratsuchi et al., 2000), as well as deficits in processing speed (Fitzgerald et al., 2004), verbal memory, and executive functioning (Udal et al., 2012). Importantly, there is often a deterioration in intellectual functioning when adolescents are hospitalized for the first episode of psychosis, regardless of their primary diagnosis and their pre-morbid IQ (Brickman et al., 2004; Müller et al., 2013).

At present, it is unclear how much the association between mood symptoms and cognitive deficits in children and adolescents with MDD or BD might be moderated by accompanying psychotic features and how much the presence of psychotic symptoms has a differential effect on different aspects of cognitive functioning such as working memory and processing speed. In the present study, we explored differences in overall intellectual functioning (measured by the WISC-IV FSIQ), working memory (measured by WISC-IV Digit Span subtest), and processing speed (Coding and Symbol Search subtests) among child and adolescent psychiatric inpatients with MDD or BD with and without psychotic features.

In light of the literature (mainly with adult samples), we had three main hypotheses. First, we hypothesized that patients with BD or MDD and current psychotic symptoms would have lower FSIQs, Digit Span, Coding, and Symbol Search scores than patients with mood disorders without psychosis (Bilginer et al., 2005; Levy and Weiss, 2010; Martinez-Aran et al., 2008; Sarapas et al., 2012). Second, we expected no differences in cognitive functioning in the children and adolescents with BD and those with MDD (Daniel et al., 2013; Nieto and Castellanos, 2011). Third, because studies which have found lower cognitive abilities in MDD and BD than in Mood Disorders NOS have not explored the role of psychotic features (Doyle et al., 2005; Horn et al., 2011; McCarthy et al., 2004; Pavuluri et al., 2009; Wagner et al., 2015; Wilkinson and Goodyer, 2006), we expected that the patients with BD and those with MDD would not have more cognitive deficits than patients with Mood Disorders NOS, if psychotic features were taken into account. Hence, the interaction between psychotic features and severity of mood disturbance would correspond to the greatest deficits in overall intellectual functioning, working memory, and processing speed. This investigation is one of the first of its kind with a sample of chronically disturbed child and adolescent inpatients, including those with very low cognitive functioning.

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