



Brief report: Executive functions in adolescent offspring of mothers with a history of depression



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ABSTRACT

Deficits in executive functions (EFs) have been documented among individuals with unipolar depression, but controversy exists as to whether such deficits are state-dependent or are trait markers that precede disorder onset. The present study examined whether maternal history of unipolar depression was associated with deficits in EFs in early adolescent offspring, a finding that would support a trait marker conceptualization of EF deficits.

Participants were a diverse sample (N = 493) of adolescents and their mothers recruited through local schools. Measures included semi-structured diagnostic interviews of mother and adolescent, mother-report forms assessing demographic information, and tests of executive function. Hierarchical linear regression analyses were conducted to examine the association between maternal depression diagnosis and adolescent offspring performance on tests of EF. Maternal lifetime history of depression was not associated with offspring EF task performance. Findings are not consistent with the conceptualization of impaired executive functions as trait markers of unipolar depression.

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Executive functions (EFs) are separable but interrelated skills (Asato, Sweeney, & Luna, 2006; Miyake et al., 2000) necessary to purposeful, goal-directed activity and behavior (Anderson, 2002; Welsh, Pennington, & Groisser, 1991). Major depressive disorder is characterized by deficits in EFs in adulthood (Snyder, 2013; Wagner, Doering, Helmreich, & Lieb, 2011). A sparser and less consistent literature likewise has documented deficits in EFs in children and adolescents with unipolar depressions (Baune, Fuhr, Air, & Hering, 2014). However, debate exists as to whether EF deficits are trait markers of unipolar depression, which precede first onset of the disorder and persist following remission, or are state-dependent, arising as a consequence of depressive episode onset (Hasselbalch, Knorr, & Kessing, 2011). Deficits in executive functions in individuals at high risk for depression prior to disorder onset have been proposed to support a trait-marker conceptualization of EF deficits in depression (Micco et al., 2009), whereas lack of such evidence would be consistent with a state-dependent conceptualization.

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The few studies examining this question to date have yielded little evidence of deficits in EF in offspring of parents with a lifetime history of depression. [Micco et al. \(2009\)](#) compared executive functions and processing speed in a sample of offspring (age 6–17) of parents with a history of MDD and/or panic disorder to those with parents without a history of mood or anxiety disorders or psychiatric treatment. Controlling for child diagnostic status, parental diagnosis of depression was associated with fewer offspring perseverative errors on the Wisconsin Card Sorting Test (WCST), but did not predict performance on measures of attention verbal learning, or working memory. Examining performance on tests of EF in a sample of adolescent offspring (mean age = 15.6) of mothers with MDD, bipolar disorder, and parents without psychopathology, [Klimes-Dougan, Ronsaville, Wiggs, and Martinez \(2006\)](#) found no deficits in neuropsychological task performance (e.g., WCST, set shifting, or sustained attention) among children of mothers with MDD. Other research comparing EF in high risk youth compared with healthy controls has obtained no evidence of behavioral performance differences on a working memory (verbal n-back) task in a sample of late adolescents (age 16–20), but neuroimaging results suggesting greater allocation of processing resources to obtain comparable levels of working memory task performance in late adolescents ([Mannie, Harmer, Cowen, & Norbury, 2010](#)), or evidence of selective attention difficulties in high risk children (age 6–10) only under conditions of affective challenge ([Perez-Edgar, Fox, Cohn, & Kovacs, 2006](#)).

This research has been conducted primarily in samples who are of relatively high socioeconomic status (SES) or the majority of whom are Caucasian, and has selected children of parents with a history of mental health treatment for depression, factors which limit interpretability of findings ([Klimes-Dougan et al., 2006](#)). Moreover, this question has not been examined in a well-defined sample of early adolescents, who are at a period of high risk for emergence of depression and are simultaneously undergoing ongoing protracted development of cognitive competencies and pre-frontal cortex maturation necessary for executive functions.

This study examined the association between maternal history of unipolar depression and offspring deficits in executive functions using a large, racially and socioeconomically diverse community sample of mothers and their early adolescent offspring. It was hypothesized that offspring of mothers with a lifetime history of unipolar depression would exhibit deficits in EFs relative to those with no maternal history of unipolar depression.

Methods

Participants and procedure

Participants were a community sample of early adolescents and their mothers recruited as part of an NIMH-funded longitudinal study of the development of depressive disorders in adolescence. Inclusion criteria for adolescents included age 12–13, English fluency, and the absence of disability (developmental, cognitive, and emotional) that would prevent understanding of measures. Screening for study eligibility was conducted via telephone-based interviews of mothers during the recruitment phase of the study. Participants meeting study inclusion criteria were invited to complete the baseline assessment, two consecutive 3-h sessions during which the following relevant information was collected.

Lifetime history of *DSM-IV-TR* Axis I psychopathology was assessed via semi-structured diagnostic interview. Adolescents were assessed based on integration of parent and child report on The Kiddie-Schedule for Affective Disorders and Schizophrenia-Epidemiological Version (K-SADS-E; [Orvaschel, 1995](#)). Mothers were assessed via an expanded version of the SADS-L ([Endicott & Spitzer, 1978](#)). Adolescents' working memory was assessed via the Digit Span subtest of the Wechsler Intelligence Scale for Children – Fourth Edition (WISC-IV; [Wechsler, 2003](#)). Components of attention were assessed via subtests from the Test of Everyday Attention for Children (TEA-Ch; [Manly, Anderson, Nimmo-Smith, Turner, & Robertson, 2001](#)). The TEA-Ch offers a number of advantages over other frequently employed measures of attention: it is theory-driven, assesses all three components of attention, uses multiple modalities, uses ecologically valid tasks that simulate real-world demands, and minimizes confounding with motor speed, verbal comprehension and expression. Demographic information was obtained via parent questionnaire. Details of sample recruitment and methods can be found in [Alloy et al. \(2012\)](#). Mothers and children completed informed consent and assent, respectively, and were reimbursed for their time. The current study was comprised of adolescents and their mothers (N = 439) who completed both Time 1 sessions including diagnostic assessments, excluding 24 mothers with a history of bipolar spectrum disorders or psychosis.

Measures

Demographic information

Demographic information was assessed via parent self-report questionnaire. Mothers reported child eligibility for school lunch, age, race and ethnicity.

Executive functions

Working memory was assessed via the Wechsler Intelligence Scale for Children, Fourth Edition (WISC-IV; [Wechsler, 2003](#)) Digit Span Subtest, a test of auditory-verbal working memory standardized and normed for children age 6 to 18.

Attentional capacities were assessed via the Test of Everyday Attention for Children (TEA-Ch; [Manly et al., 2001](#)), which has demonstrated satisfactory test-retest reliability (r_s 0.64–0.92; [Manly et al., 2001](#)) and convergent and discriminant validity ([Manly et al., 2001](#)). The TEA-Ch has demonstrated a 3-factor structure across multiple studies and cultural contexts.

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