Relationship between executive function, attachment style, and psychotic like experiences in typically developing youth

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A B S T R A C T

Psychotic like experiences (PLEs) are common in the general population, particularly during adolescence, which has generated interest in how PLE’s emerge, and the extent to which they reflect either risk for, or resilience to, psychosis. The “attachment-developmental-cognitive” (ADC) model is one effort to model the effect of risk factors on PLEs. The ADC model proposes attachment insecurity as an early environmental insult that can contribute to altered neurodevelopment, increasing the likelihood of PLE’s and psychosis. In particular, early-life attachment disruptions may negatively impact numerous aspects of executive function (EF), including behavioral inhibition and emotion regulation. Yet despite the relationship of disrupted attachment to EF impairments, no studies have examined how these factors may combine to contribute to PLE’s in adolescents. Here, we examined the relative contributions of daily-life EF and attachment difficulties (avoidance and anxiety) to PLEs in typically developing youth (N = 52; ages 10–21). We found that EF deficits and high attachment insecurity both accounted for a significant proportion of the variance in PLE’s, and interacted to predict PLE manifestation. Specifically, positive PLEs were predicted by greater difficulty monitoring behavioral impact, less difficulty completing tasks, greater difficulty regulating emotional reactions, greater difficulty controlling impulses and higher attachment anxiety. Negative PLEs were predicted by greater difficulty in alternating attention, transitioning across situations, and regulating emotional reactions as well as higher attachment anxiety. These results are consistent with the ADC model, providing evidence that early-life attachment disruptions may impact behavioral regulation and emotional control, which together may contribute to PLEs.

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1. Introduction

Considerable evidence now shows continuity between clinically-significant psychotic symptoms in patient populations and psychotic-like experiences (PLE’s) in the general population. PLE’s are subsyndromal experiences that approximate the positive and negative symptoms of psychotic disorders (DeRosse and Karlsgodt, 2015; Kaymaz and van Os, 2010). Moreover, although schizophrenia affects only 0.4%–0.7% of the global population (Linscott and van Os, 2010), the median annual prevalence rate for adults who report PLE manifestations is approximately 7.2% (Linscott and van Os, 2013). Prevalence rates of PLEs are substantially higher in late childhood and adolescence, with estimates between 40% and 66% (Laurens et al., 2012; Wigman et al., 2012). Continuity between PLEs and psychotic disorders is supported by 1) an overlap of etiological correlates including lower education, unemployment, and family psychiatric history (Linscott and van Os, 2013), and 2) similarities between the quality and distribution of symptom profiles in patients with psychotic disorders and healthy individuals who report PLEs (Derosse et al., 2014a). Even in the absence of a psychiatric diagnosis PLE’s may be associated with variation in cognition (Barnett et al., 2012; Cochrane et al., 2012; Korponay et al., 2014; Molland et al., 2016) and social function (DeRosse et al., 2017) and may engender emotional distress (Fervaha et al., 2014). Furthermore, PLEs are associated with greater rates of psychotic disorders later in life (Cannon et al., 2002; Chapman et al., 1994; Hansen et al., 2005; Poulton et al., 2000; Welham et al., 2009). Thus, efforts have been made to understand specific factors that contribute to the development of PLE’s,

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including developmental disruptions (Karlsogdt et al., 2009; Weinberger and Marenco, 2003), genetic factors (Linney et al.,
2003; Straub et al., 1996), and environmental factors (MacDonald
3rd et al., 2001), as well as to identify potential resilience factors
that impede these symptoms from reaching clinical significance.

In addition to genetic or developmental insults, the “attachment-
developmental-cognitive” (ADC) model posits that traumatic events
and psychosocial stressors that impair attachment may also contrib-
ute to vulnerability to psychotic disorders by disrupting neural con-
nectivity and structure formation in the developing brain (Rajkumar,
2014). Attachment theory proposes that child-caregiver emotional
bonds form a template for future interpersonal relationships
(Bowlby, 1969). Specifically, secure attachment, when the child ex-
periences the primary caregivers as responsive, available and trust-
worthy, facilitates healthy adult relationships. In contrast, insecure
attachment from unreliable or neglectful caregivers, results in dif-
culties establishing and maintaining relationships in adulthood
(Bowlby, 1980). Insecure attachment has been linked to a host of
negative outcomes throughout the lifespan, including behavioral dif-
ficulties and psychopathology (Hoeve et al., 2012; Lee and Hankin,
2009). Moreover, high rates of insecure attachment, with some esti-
mates of up to 74%, are seen in schizophrenia (Korver-Nieberg et
al., 2014; MacBeth et al., 2011).

Early trauma is a significant predictor of insecure attachment (Allen
et al., 1996; Styron and Janoff-Bulman, 1997) and the high prevalence
of insecure attachment in schizophrenia corresponds to the higher levels
of early adversity they experience relative to healthy controls (Cannon
et al., 2014; Read et al., 2005). A history of childhood trauma signifi-
cantly increases psychosis risk (Varese et al., 2012), and the severity
and frequency of childhood maltreatment are positively related to hal-
ucinations and delusions (Schenkel et al., 2005). Moreover, the rela-
tionship between severity of childhood trauma and severity of
psychotic symptoms is the same in healthy individuals assessed for
PLE’s (DeRoose et al., 2014b). The strong link between insecure attach-
ment and trauma, and their collective effect on symptom expression,
provides support for the role of attachment style in the development
of PLEs. In fact, insecure attachment has been related to increased
PLE’s, likelihood of developing maladaptive coping styles (Korver-
Nieberg et al., 2014) and has been found to mediate specific childhood
adversities and types of psychotic symptoms (Berry et al., 2007; Sitko
et al., 2014).

Additionally, insecure attachment may be linked to cognitive impair-
ments that make one vulnerable to the development of PLEs. In-
dividuals with a history of early trauma show neuropsychological impairments (DePrince et al., 2009; Mezzacappa et al., 2001; Perez
and Widom, 1994) that mirror those in psychosis patients, specifi-
cally in executive functions (e.g. cognitive control, working memory,
decision making). (Heaton et al., 2001; Heinrichs and Zakzanis,
1998). Despite evidence that developmental stressors may be risk
factors for psychosis by interrupting critical neurodevelopment, the
interaction between attachment disruptions, executive functioning
and PLE’s is unclear. Neuropsychological functioning has been exam-
nined in adults who experience PLEs, but little research has been con-
ducted in child or adolescent samples. Adolescence is particularly
important stage for executive function development and establish-
ment of social relationships (Blakemore, 2008), as well as a risk pe-
riod for conversion of subclinical PLEs into clinically significant
disorders (Murray and Jones, 2012; Trotman et al., 2013). Thus, the
relationship of insecure attachment to PLEs may be especially rele-
vant for this age group.

Our present study aims to understand the relationship between attach-
ment style, executive functioning (EF), and PLE’s in a sample of
healthy children and adolescents. Continued efforts to understand the
etiology of PLE’s during this key social, cognitive, and neuropsychologi-
cal developmental period are important for creating targeted interven-
tions to prevent the development of serious psychopathology.

2. Experimental materials and methods

2.1. Participants

Our community sample consisted of 52 healthy volunteers aged 10
to 21 (mean = 17.09 ± 2.95) recruited for a longitudinal study via
posted flyers, advertisements and referrals from previous study partici-
pants. Data utilized for the present analyses was collected at participant’s baseline study visit. Our sample was 51.9% female (n = 27)
and 61.5% Caucasian (n = 32), 23.1% African-American (n = 12),
5.8% Asian (n = 3), and 9.6% “Other” (n = 5). All participants over age
18 provided written informed consent and minors provided assent
alongside parental written consent; the protocol was approved by the
Northwell Health Institutional Review Board. Participants were ex-
cluded if they had any Axis-I diagnosis, any intellectual disability, any
incidence of head injury with loss of consciousness, any medical ill-
nesses that could affect brain functioning, or were taking any medica-
tions with known cognitive effects.

2.2. Clinical assessments

2.2.1. Diagnostic interviews

To rule out present and lifetime Axis-I disorders, all participants
were administered the Structured Clinical Interview for the DSM-IV,
Non-Patient Version (SCID-NP) (First et al., 1997). Participants aged
10–15 were also administered supplemental sections of the Kiddie-
Schedule for Affective Disorders and Schizophrenia – Present and Life-
time Version (K-SADS-PL) to rule out additional child-onset disorders.
Assessments were conducted by trained graduate-level raters, with di-
agnosis confirmed by a consensus of at least two faculty psychologists.
Diagnostic interviews were supplemented with family informants
whenever possible.

2.2.2. Subclinical psychosis

Subclinical psychosis was assessed using the Community Assess-
ment of Psychotic Experiences (CAPE) (Stefanis et al., 2002), a 42-item,
self-report questionnaire that measures three dimensions of subclinical
psychopathology including positive, negative and depressive symp-
toms. Because depressive symptoms fell outside the scope of the pres-
ent study, we only examined the positive (CAPE-p) and negative
(CAPE-n) subscales and did not include depressive items in our CAPE
total score. The CAPE-p and CAPE-n showed good reliability in the pres-
ent sample, with Cronbach’s alpha estimates of α = 0.84 and 0.85,
respectively.

2.2.3. Executive functioning behaviors

EF behaviors were measured using the 80-item self-report form of
the Behavior Rating Inventory of Executive Function (BRIEF-SR,
O’Doherty and Nguyen, 2004)). This self-report measure asks partici-
pants to rate real-world behaviors that would be adversely affected
in childhood and adolescence by EF deficits. The BRIEF-SR contains 8 sub-
cales: 1) Working Memory, 2) Plan/Organize, 3) Organization of Mat-
erials, 4) Task Completion, 5) Inhibit, 6) Shift, 7) Emotional Control, and
8) Monitor. All of these scales demonstrated acceptable reliability in
this sample, with Cronbach’s alpha estimates for all subscales ranging
from 0.60-to-0.87 and 0.95 for the BRIEF Total score.

2.2.4. Attachment insecurity

Attachment was assessed using a 20-item measure, the Experiences
in Close Relationship Scale – Revised – General Short Form (ECR-R-GSF),
which includes two 10-item subscales measuring attachment anxiety
and attachment avoidance (Wilkinson, 2011). Attachment insecurity
is conceptualized as the degree of difficulty with developing and main-
taining a stable sense of intimacy and trust in close relationships, includ-
ing the degree to which intimate relationships are avoided altogether
(attachment avoidance) and the degree to which existing intimate

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