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Duration of Early Maternal Separation and Prediction of Schizotypal Symptoms from Early Adolescence to Midlife

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Abstract

Early childhood experiences influence the capacity for healthy social and emotional development. The present study uses longitudinal data to determine whether early maternal separation predicted the subsequent development of schizotypal personality disorder (SPD) symptoms assessed repeatedly from early adolescence over the following 20 years. Within this community sample (N=766), multilevel linear regression analyses revealed the duration of separation from mother in the first 2 years of life predicted elevated SPD symptoms. This relationship was specific to children with mother-reported early angry emotional behavior. These results provide support for the role of early childhood psychosocial risk factors in the development of subsequent schizophrenia spectrum symptoms in emotionally vulnerable children.

Keywords

Development; Schizotypal Personality; longitudinal; early separation

1. INTRODUCTION

1.1. The importance of early childhood experiences

A growing number of studies have demonstrated the importance of early childhood experiences in the development of psychosis and schizophrenia in adulthood (Wicks et al. 2005). The majority of these studies focus on early developmental delays (e.g., Isohanni et al. 2001); Jones et al. 1994, childhood maltreatment (Read et al. 2001), adult-reported early attachment problems (see Berry et al. 2007 for reviews), and parental loss during childhood (Agid et al. 1999; Erlenmeyer-Kimling et al. 1991). Some of this literature is limited by retrospective ascertainment of risk and risk periods that cover long spans of childhood (i.e., birth to 18 years). For example, Dozier (1990) found higher levels of attachment insecurity among individuals with schizophrenia, but the information about childhood attachment was obtained retrospectively and during adulthood.

Attachment theory emphasizes the crucial and formative role of early life experiences, especially during the first 2 years of life, for social and emotional development (Bowlby

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1969; 1973; Lamb et al. 1999). Through repeated transactions with familiar attachment figures, infants form internal working models, which include affective and cognitive mental representations of expectations about the behavior of self and other (Ainsworth 1979; Bowlby 1973; 1989). These models organize personality development and affect regulation, acting as heuristics in subsequent relationships (Levy 2005). Thus, early experiences are particularly significant because they frame the child's subsequent transactions with the environment. (Sroufe et al. 1999). Children with an early unstable foundation are left more vulnerable to normative stress and the development of pathology over time.

One potential disruption during early childhood is separation from the mother (Bowlby 1973; 1988). Early separations may interfere with attachment formation between the child and mother and reduce the probability that a secure relationship will develop (NICHD 1997) because the infant may lose confidence in the availability of mother. The threat of abandonment introduced by separation especially during the first 2 years of life generates a sense of loss and anger that can become dysfunctional (Bowlby 1973; 1989). In rodent studies of separations between mother and infant, Hofer and colleagues (2006) found that the distress in infant rats brought on by separation was evidenced in slowed behavior, low heart rate, and alterations in sleep-wave patterns (Myers et al. 1992; Polan and Hofer 1999). They concluded that maternal separation withdraws important regulatory influences such as nutrient supply and warmth that in combination results in these biological changes in infant rats.

1.2. The importance of early childhood experiences in schizophrenia

Early impaired interpersonal relations have been implicated in the etiology and onset of aspects of schizophrenia disturbances, particularly the break from reality (Wilson and Costanzo 1996). Strong negative beliefs about the self and the social world may increase vulnerability to psychosis. Detecting these psychosocial developmental risks in individuals with latent schizophrenia liability such as schizotypy would provide additional evidence that these risks are specifically relevant for schizophrenia spectrum disorders. Schizotypal disturbances including odd or eccentric beliefs, magical thinking, unusual perceptual experiences, and suspiciousness, as well as disorganized behavior and interpersonal problems are subtle signs of schizophrenia phenomena without overt psychosis (American Psychiatric Association 1994). Child maltreatment and problems with parental bonding have been implicated in the etiology of schizotypal personality disorder (Raine 2006). We have identified no studies that have empirically tested whether early separation predicts the development of schizotypal personality disorder symptoms.

1.3. Early separation and schizophrenia

Recent evidence suggests a role of early separation and loss in psychosis and schizophrenia risk. Morgan et al. (2007) found parental separation of at least a year before the age of 16 was a risk factor for psychosis (OR=3.36 CI=2.41–4.70) in a first-contact incident study conducted in the UK. Likewise, Mallett et al. (2002) found that Black Caribbeans with schizophrenia living in the UK were more likely than schizophrenia cases of other racial and ethnic groups to have experienced long-term separation from parents during childhood (i.e., from birth to 18 years). No studies to the authors' knowledge have examined the effects of early separation on the development and persistence of schizotypal personality disorder symptoms. Furthermore, given Bowlby's emphasis on the first two years of life, it would be important to determine whether effects may be specific or of exceptional magnitude in this developmental period. In the present study, we examine the role of the duration of early separations from the mother on subsequent development of schizotypal personality disorder symptoms in the children followed prospectively in a community sample.

To further explore our findings regarding early separation, we also examine whether reasons for the separation such as child or maternal illness or characteristics of the mother or child predict schizotypal PD symptoms or account for any apparent association with early separation. We also examine whether the child-reported degree of attachment and closeness between the mother and child may mediate an association between early separation and schizotypal symptoms. Some studies (Kubicka et al. 2002) although not all (e.g., Herman et al. 2006) found that children born from unwanted pregnancies were at increased risk for subsequent emotional adjustment problems, and these children may be more likely to experience maternal separation. In addition, temperamentally difficult children may be more likely to experience maternal separation, as well as be more vulnerable to subsequent schizotypal symptoms. We examine these possibilities in the current study. Given the literature demonstrating strong familial aggregation among schizotypal PD and other schizophrenia spectrum disorders (Kendler et al. 1993), we also investigate the possible association of psychopathology in the mother with early separation and SPD problems in offspring. It is hypothesized that early separations from the mother will be directly positively related to schizotypal symptoms into adulthood.

2. Methods

2.1. Participants

Participants for the present study were an epidemiological cohort of children randomly sampled from families living in randomly sampled 100 block groups in two upstate New York counties in 1975 when they were mean age 5. This cohort has been repeatedly assessed for both Axis I and personality mental disorders, first in 1983 (mean age 13) and most recently at mean age 33. The analyses here are based on 766 youth who were followed up at least twice in 1985–86 (N=776; mean age 16.3, SD=2.8); 1991–93 (N=776; mean age 22.1, SD=2.7); and in 2001–2004 (N=678; mean age 33.1, SD=2.8), and on whom we had reports of separations from mother in the earliest years of life collected predominantly in 1975. This sample is about 91% Caucasian and 51% male. Attrition has been unbiased with regard to race, socioeconomic status, and psychiatric disorder. Additional detailed information about this community sample are provided in several previous reports (e.g., Cohen and Cohen 1996) and on the study Web site ((http://nyspi.org/childcom). Consent was obtained for all interviews and a National Institute of Health Certificate of Confidentiality exists for these data.

2.2. Measures

Schizotypal Personality Disorder Symptoms were assessed at mean age 13.7 in 1983, and subsequently at mean ages 16.4, 22.4, and 33.2. A combination of maternal and child-report items were employed in many earlier reports of empirical findings on SPD symptoms; however, in order to examine the trajectory of consistent measures of schizotypal symptoms into adulthood when maternal reports are no longer appropriate, we employ DSM-IV based symptom scales based on self-report (Crawford et al. 2005). In the absence of a 1983 measure of personality disorder suitable for adolescents items from the Personality Diagnostic Questionnaire (PDQ; Hyler et al. 1990) were adopted or adapted as appropriate for adolescents, and supplemented with relevant items from other study measures and by items written to match diagnostic criteria. These items in the Children in the Community-Self-Report (CIC-SR) Schizotypal Personality Disorder (SPD) symptom scale provide full coverage of DSM-IV criteria for schizotypal personality disorder. The 12 items are primarily measured on 4 point Likert scales with a resulting less skewed distribution than would be obtained by a symptom count measure. The reliability of this scale ranged from alpha = .45 at mean age 13 to alpha = .58 at mean age 33. The summed items were transformed into “percentage of maximum possible scores” (Cohen et al. 2003) that range from 0 to 100 percentage units to enhance interpretability.

The convergent validity of the dimensional scores on the CIC-SR SPD symptom scale to diagnoses obtained using the Structured Clinical Interview for DSM-IV (SCID-II) Personality Disorder Schizotypal Screen (SCID-II; First, Spitzer, Gibbon, & Williams, 1995) was good (r = .47, p<.01) and the dimensional scores correlated both with self-reported functional impairment (r = .38, p<.01), and the clinician's Global Assessment of Functioning Scale (r= −.45, p<.01). The stability coefficients for dimensional scores of the CIC-SR SPD symptom scale at mean age 22 to this measure at mean age 33 was good (r = .52, P<.01), indicating reasonable stability by adulthood. The CIC-SR SPD symptom scale predictive validity over the same 11 years of clinical schizotypal diagnoses obtained using the SCID-II was moderate (r = .26, p<.01). (Crawford et al. 2005)

Maternal Separations of at least one month were reported by mothers in the 1975 and 1983 interviews. Positive responses were followed up with questions about the duration, child age, and reason for the separation. In order to capture relevant developmental periods of early separation, we examined separations that occurred from birth to 2 years of age (n= 17), and from 3 to 5 years of age (n=18) as well as aggregated durations over the first 5 years. Reasons for separation in the first 5 years were coded as due to maternal hospitalization or illness (n=13) or to offspring hospitalization or illness (n=5). The remaining separations were grouped into an "other" category (n=17), which included child extended visits to a relative, or mother departure for personal or professional reasons.

2.3. Covariates

Based on significantly higher mean Schizotypal symptoms in males and children with lower family socioeconomic status (SES), we control for gender and (SES). SES was measured as a standardized sum of standardized measures of years of maternal and paternal education, occupational status, and family income. Mother-reported problems during pregnancy and early post-natal infant illness did not predict maternal separations of at least 1 month. However, mothers who indicted they and/or the father had been unhappy about the pregnancy reported more separations from their child during the first 5 years of life. To determine whether an association of maternal separations with offspring schizotypal symptoms may be due to maternal psychiatric problems, we control for mother-reported lifetime history of an Axis I psychiatric disorder.

Maternal affection. To capture the quality of relationship between mother and pre-adolescent child, we used child-reported maternal affection reported at mean age 13.7. This scale is composed of 4 items measured on a 4-point Likert scale. The 4 items are as follows: "She frequently shows her love for me;" "She often praises me," "She always hugged and kissed me goodnight when I was small," and "She frequently tells me I make her happy." The internal consistency of this scale at mean age 13.7 was alpha=.72. The items are summed to obtain a total score of child-reported maternal affection with higher scores indicating more endorsement.

Offspring temperament was reported in both the 1975 and 1983 interviews. However, in the earlier interview the questions asked varied for offspring under age 5. The follow-up cohort (i.e., 1983) was at least age 9, and the items used to assess older children in 1975 were employed. In order to produce a single mother-reported set of offspring characteristics, the report obtained closest to offspring at age 9 was employed for each member of the cohort and all scores were adjusted for age and sex deviations from age 9. The present analyses examined two temperament scales most clearly related to "difficult" and fearful temperamental styles. The angry temperament scale includes maternal descriptions of a child who argues often, cries or complains loudly, often screams, and is often angry. The fearful temperament scale includes maternal descriptions of a child who is timid, fearful, not friendly to strangers, shy, and has trouble making friends.

2.4. Data Analyses

Hierarchical linear regression (SAS PROC MIXED) was used to estimate the fixed (average) and random (differences between participants) effects (Chen and Cohen 2006) of predictors on the trajectories of schizotypal personality disorder (SPD) symptoms from age 9 to 39 in 766 members of the cohort. Age was centered at age 20 (the mean age of the four assessments): thus the equation intercept equals the mean level of symptoms estimated at that age when all predictors equal zero. Initial analyses examine the effects of early maternal separation of at least 4 weeks duration on this trajectory. Subsequent analyses add potential variables that may confound, mediate, or modify these effects. All models include sex and SES as control variables. All variables except weeks of separation and dichotomous variables were standardized to aid interpretation of the findings. Missing data for mother-reported lifetime history of an Axis I psychiatric disorder (25% missing), and parental unhappiness about the pregnancy (6.6% missing), was identified in dichotomous indicators in order to keep the sample size for these analyses at 766.

3. Results

3.1. Preliminary Analyses

Two variables that might account for an observed relationship of early maternal separation with offspring schizotypal PD symptoms were maternal lifetime history of psychiatric disorder and parental unhappiness about the pregnancy. Neither was significantly related to early separation duration. Early separation duration showed significant although modest relationships with both mother-reported angry temperament (r=.10, p<.01) and fearful temperament (r=.08, p<.05), and these variables were included in subsequent analyses. The relationship between maternal affection, and early separation duration was also significant (r=−.08, p<.05).

3.2. Findings from Multi-level Analyses

In the base model, both linear and curvilinear age changes in schizotypal symptoms were found to be significant and thus are included in all subsequent models. No variable interactions with either the linear or quadratic changes with age were statistically significant. Because the quadratic effect showing a slightly sharper decline in schizotypal symptoms before age 20 and a lesser decline per year after age 20 was constant at .02 (se=.002) it is not included in the tabled findings but is represented in the graph. The mean level of schizotypal symptoms declined with increasing age up to about age 25. When these youth were first assessed at mean age 13.7, their average responses to these symptom questions were at about 20% of the maximum possible level. The diagnostic level is at about 50% of this symptom scale. At mean age 22, the midpoint of ages in this trajectory, the average reported symptom level had declined about 4 percentage points to 15.61, and by the mid-thirties about another percentage point. We examined the across-participant covariance between the means and slopes of the SPD trajectory, which was not significant, indicating that those with high averages over the years showed about the same pattern of decline as did those with lower averages. Tests for potential effects of predictors on changes with age were not statistically significant and are not reported further.

3.2.1 Maternal Separation Effects on Schizotypal Symptoms—Participants who were separated from mother at least a month during the first 5 years of life exhibited a significant increase in average SPD symptoms (b=2.03, s.e. = 1.05, p =.05). However, subsequent analyses indicated that the greater impact of this variable was attributable to separations in the first two years of life. More specifically, while there was a significant .30 (SE = .11) percentage point increase in SPD symptoms per week of separation in the first 2 years, there was only a .11 (SE = .07, p > .10) percentage point increase associated with

separation weeks between age 2 and 5. Subsequent models thus employ only weeks of separations during the first two years of life.

On average over the trajectory, male SPD symptoms were 1.70 points higher than the level of females. Offspring from families of lower SES reported significantly higher levels of SPD symptoms. These control variables are included in every model. Model 1 in Table 1 demonstrates the estimated effects of separation durations of at least 4 weeks from birth to two years on average over the SPD symptom trajectory, net of gender and SES effects. This estimated early separation effect over this trajectory from early adolescence was about .26 per week of separation for these offspring with early separations. Thus, the effect was about 2.08 for the average separation duration (i.e., median=8 weeks).

We examined whether reasons indicated by mothers for early separations that occurred during the first 2 years of life predicted average SPD symptoms across the trajectories. Separations due to: mother illness or hospitalization (n = 7, b= −.95, s.e. = 2.26), child illness or hospitalization (n = 4, b=3.21, s.e.=3.22), and "other" reasons (n = 6,b=3.10, s.e.= 2.45), were not significantly predictive of SPD symptoms across the trajectories. Notably, the magnitude of the effects for child illness and "other" reasons were high but conclusions must be very tentative given the very low statistical power.

As indicated in Table 1, we examined the effect of maternal affection, and angry and fearful temperament estimated at age 9, on subsequent SPD symptoms. We found that children who reported more behavioral evidence of maternal affection at mean age 13.7 were less likely to report SPD symptoms. Children with an angry temperament were more likely to report SPD symptoms. The relationship between fearful temperament and SPD symptoms was not significant. In these equations, the effect of early separation duration remained statistically significant and its estimated effect did not decrease (Table 1). However, following tests of the potential conditionality of the effects of separation duration on maternal affection, angry temperament, or fearful temperament scales, we found that the effects of early separation were conditional on higher mother-reported angry offspring temperament (b= .33, SE= .15, p<.01). Figure 1 graphs these relationships based on the equation in Model 4 (Table 1). This graph demonstrates that the duration of early separation from mother in the first 2 years of life was associated with higher levels of SPD symptoms in offspring with an angry temperamental style.

4. Discussion

The present study examined the role of early maternal separations of at least 4 weeks duration on the subsequent offspring trajectory for schizotypal personality disorder (SPD) symptoms from mean age 13 to 33. SPD symptoms are characterized in large part by odd eccentric behavior and beliefs, suspiciousness, and unusual perceptual experiences, and inappropriate affect and behavior. Our effects suggest longer durations of separation are related to higher self-reported levels of these symptoms over the lifecourse in children with difficult temperament characterized by anger. Whereas we found a significant relationship for separations occurring during the first 2 years of life, this relationship was less apparent for separations occurring after 2 years of age. This difference suggests a possible role for attachment in these effects: Bowlby (1969) proposed that the critical period of attachment formation is during the first two years of life. Separations of a month and increasingly longer durations may disrupt or indicate an ongoing problem in the crucial formative attachment process between mother and child. Our results, however, indicated that maternal affection, as reported by the child, did not explain the relationship between separation and SPD symptoms. Thus, early separation's association with subsequent SPD symptoms was not attributable to mothers who were not affectionate as seen by their child. Reasons for the early separations

directly attributed to illness in the mother or child were also not significantly related to SPD symptoms, although low statistical power requires caution regarding these findings.

Despite a long literature indicating the complete absence of a mother-figure in early life has lasting negative effects on the cognitive and affective functioning of affected children (e.g., Rutter et al. 2004), there are no prospective studies estimating the effect of separation on subsequent emotional functioning. That said, the duration of early separation's association with subsequent SPD symptoms in angry temperamental children is fairly consistent with recent studies that show an association between parental separation and loss and psychosis (e.g., Morgan et al., 2007).

The possibility that the higher level of SPD symptoms among angry temperamental children with extended separations from their mother is due to the mothers' underlying vulnerability to psychiatric illness was not supported in the present study. Mothers with a lifetime history of psychiatric illness were not significantly more likely to experience early separations from their children. Likewise, mothers who reported parental unhappiness about the pregnancy were not more likely to experience early separations from their children.

4.1 Limitations and Future Directions

Despite the advantage of the prospective longitudinal design of the current study, these findings must be viewed with caution, of which the most extreme is the small sample of children exposed to separation. For the same reason, the lack of significance for the potentially smaller effects of extended separations at later preschool years also needs to be viewed cautiously. The present study is the first general population study to identify that early maternal separations influence subsequent schizotypal symptoms. The use of a community sample and attainment of the separation exposure information from mothers when their children were on average at pre-school age minimizes the risk of bias. Nevertheless, the small sample of children who had experienced early separation and the absence of externally assessed childhood temperament during infancy necessarily limits both the statistical power and our ability to explore age-specific explanatory hypotheses. Nevertheless, these findings strongly suggest that early separations are an important variable to be followed in other prospective studies of mental disorders beginning in early childhood.

The extremely low prevalence of schizotypal personality disorder did not permit us to examine the clinical level as an outcome variable in the offspring, as well as control for this specifically in the mothers. Thus, although the community sample improves generalizability, it limits power to make firm conclusions about subsequent disorders as such. Further, in order to maintain consistency of measurement of SPD into middle adulthood we were limited to self-report. This limitation may not be seriously problematic because other information suggests that self-report is as strongly predictive of subsequent dysfunction as is combined maternal-youth report (Crawford et al. 2005; Skodol et al. 1991). Most importantly, our findings point to an understudied area of risk with regard to schizophrenia spectrum disorders. The focus on much of the research identifying early childhood risk factors for schizophrenia spectrum disorders is on genetic vulnerability and environmental insults. In addressing the need to adequately measure "environment" in gene-environment schizophrenia studies, more attention should focus on early psychological experiences that may put both genetically vulnerable offspring and perhaps also those without clear genetic vulnerability at risk.

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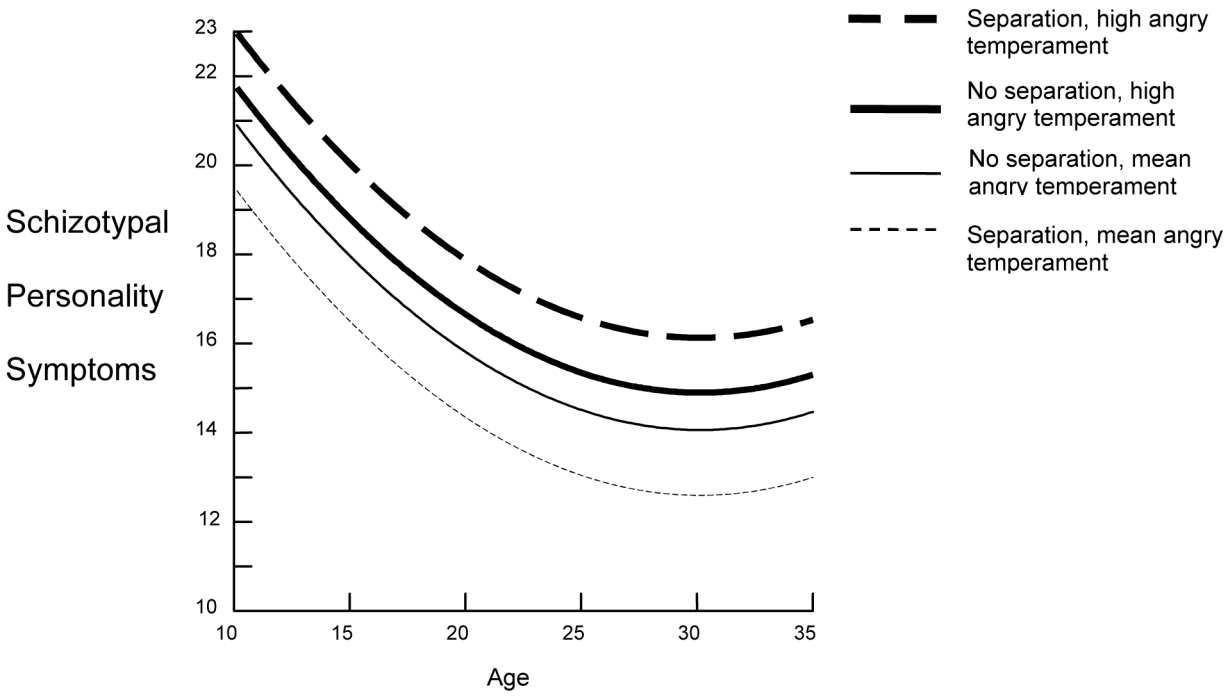

Figure 1.
Schizotypal personality disorder symptoms from age 10 to 35 for those with and without a) early separation of 8 weeks duration from mother and b) angry temperament

Table 1

Multilevel Regression Analyses for Effects of Separation Duration From Birth to 2 Years, Maternal Affection, and Temperament on Schizotypal Personality Disorder Symptoms

	Model 1		Model 2		Model 3		Model 4	
Variables	***b***	**s.e.**	***b***	**s.e.**	**b**	**s.e.**	**b**	**s.e.**
Mean Schizotypal Symptoms at age 20 of entire sample	15.77	.32	15.78	.31	15.86	.32	15.94	.31
Separation weeks 0to2	.26*	.11	.22*	.11	.22*	.11	−.18	.19
Maternal Affection	--		−1.00**	.20	--		--	
Anxious Temperament	--		--		.24	.22	--	
Angry Temperament	--		--		.86**	.22	.84**	.21
Separation X Predictor								
Angry X Separation	--		--		--		.34**	.13

* p <.05

** p<.001

Note: Control variables sex and SES are included in all models.