Empirical Article

Attachment representations in 7-year-old children at familial high risk of schizophrenia or bipolar disorder: Associations with mental disorders and daily functioning

The Danish High Risk and Resilience Study, VIA 7-A population-based cohort study

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Background
Attachment quality may affect psychological functioning. However, evidence on attachment representations and their correlates in children born to parents with schizophrenia and bipolar disorder is sparse.
Methods
We compared attachment representations in a Danish sample of 482 children aged 7 years at familial high risk of schizophrenia, bipolar disorder, and population-based controls and examined associations between attachment and mental disorders and daily functioning. Attachment representations were examined with the Story Stem Assessment Profile (SSAP). Mental disorders were ascertained in diagnostic interviews. Daily functioning was assessed with the Children's Global Assessment Scale.
Results
We found no between-group differences in attachment. Higher levels of secure attachment were associated with decreased risk of concurrent mental disorders in the schizophrenia high-risk group. Higher levels of insecure and disorganized attachment were associated with increased risk of mental disorders across the cohort. Higher levels of secure and insecure attachment were associated with better and poorer daily functioning, respectively. In the current study, results regarding defensive avoidance could not be reported due to methodological limitations.
Conclusion
Familial high risk of schizophrenia (FHR-SZ) or bipolar disorder is not associated with less secure or more insecure attachment at age 7. Insecure and disorganized attachment representations index risk of mental disorders and poorer functioning. Secure attachment may be a protective factor against mental disorders in children at FHR-SZ. Validation of the SSAP is needed.

Key words: Attachment, childhood and adolescence, psychosis, mental disorders, familial high risk.

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INTRODUCTION

Severe mental illness in parents may adversely impact their ability to engage in sensitive, mutually satisfying interactions with their children, as has been found in both parents with affective disorders and parents with psychosis (Anke *et al.*, 2020; Carter, Garrity-Rokous, Chazan-Cohen, Little & Briggs-Gowan, 2001; Davidsen, Harder, MacBeth, Lundy & Gumley, 2015; DeMulder & Radke-Yarrow, 1991; Radke-Yarrow, Cummings, Kuczynski & Chapman, 1985; Wan *et al.*, 2007). According to attachment theory, early interactions with the child's primary caregivers and

the quality and sensitivity of the caregivers' emotional responses to the child's behavior are of vital importance for the child's emerging, internal representations of self, of others, and of interpersonal relationships and for the development of emotional regulation (Ainsworth, Blehar, Waters & Wall, 1978; Bowlby, 1969; Cassidy, 1994; Cassidy, 2008). Secure attachment thus enables the individual to better cope with adversity and serves as a resilience factor throughout life, whereas insecure attachment is a risk factor for poor outcome (Belsky & Cassidy, 1994; Bowlby, 1969).

Empirical studies have supported the assertion of the importance of the quality of early caregiving for attachment. Sensitive caregiving predicts secure infant attachment, where the child experiences the caregiver as responsive to its needs and appropriately uses the caregiver as a secure base from which to explore the world, whereas caregiving characterized by psychological unavailability and reduced consideration for the child's needs predicts insecure attachment, where the child may need excessive reassurance from the caregiver or is less effective in using the caregiver as a source of comfort (Ainsworth *et al.*, 1978; Persson-Blennow, Binett & McNeil, 1988; Sroufe, Egeland, Carlson & Collins, 2005). Maltreatment and aggressive parental behavior, i.e., traumatic experiences, but also more subtle forms of intrusive and unpredictable caregiving increase the risk of disorganized attachment (Benoit, 2004; Carlson, 1998; Sroufe *et al.*, 2005), characterized by a lack of coherent child attachment behaviors, which may include displays of fear around the caregiver (Main & Solomon, 1990). Consequently, impairments in parent–child interactions may impede the formation of secure attachment. A recent meta-analysis of children aged 2 to 7 years similarly showed higher levels of caregiver sensitivity among parents with children with secure attachment than among parents with children with insecure and disorganized attachment (O'Neill *et al.*, 2021).

The crucial importance of early attachment for subsequent psychological functioning has also been demonstrated. It has consistently been shown that insecure attachment in comparison with secure attachment is associated with a significantly higher risk of poor developmental outcomes in childhood, including both internalizing and externalizing problem behaviors (Brumariu & Kerns, 2010; DeKlyen & Greenberg, 2008; Fearon, Bakermans-Kranenburg, van Ijzendoorn, Lapsley & Roisman, 2010; Groh *et al.*, 2014; Madigan, Atkinson, Laurin & Benoit, 2013). Children with secure early attachment have better social competence, peer relations, stress coping abilities, and emotion regulation later in life than those with insecure attachment (Delgado, Serna, Martínez & Cruise, 2022; Groh *et al.*, 2014; Pallini, Baiocco, Schneider, Madigan & Atkinson, 2014; Sroufe, 2005). Both insecure and disorganized attachment have been shown to lead to an increased risk of psychopathology, with the strongest effects for disorganized attachment (Fearon *et al.*, 2010; Granqvist *et al.*, 2017; Green & Goldwyn, 2002; Groh, Roisman, van Ijzendoorn, Bakermans-Kranenburg & Fearon, 2012; Pallini *et al.*, 2019; van Ijzendoorn, Schuengel & Bakermans-Kranenburg, 1999). In contrast to the ample evidence of the potential consequences of insecure and disorganized attachment for the development of psychopathology in the general population, little is known of its correlates in children at familial high risk of schizophrenia and bipolar disorder. Elevated rates of insecure and disorganized attachment have been found in adults

with depression, bipolar disorders, and schizophrenia spectrum disorders, suggesting that these attachment styles could be potential risk factors for severe mental illness (Carr, Hardy & Fornells-Ambrojo 2018; Gumley *et al.*, 2014; Herstell *et al.*, 2021; Murphy, Goodall & Woodrow, 2020).

The majority of attachment studies concerning parental mental illness have been carried out in samples of mothers with depression, where elevated rates of insecure and disorganized attachment in their children have been reported (Atkinson *et al.*, 2000; Barnes & Theule, 2019; Carter *et al.*, 2001). Higher rates of insecure attachment have also been found in children of mothers with postpartum depression (Righetti-Veltema, Bousquet & Manzano, 2003). However, findings are not unequivocal (Tharner *et al.*, 2012), and one study found that maternal comorbidity determined impact of postpartum depression on attachment (Smith-Nielsen *et al.*, 2016). In spite of the abovementioned evidence of reduced sensitivity in early caregiving, studies of attachment in children born to parents with psychosis are few. To our knowledge, only three studies have examined attachment in infants born to mothers with schizophrenia. Two found an elevated risk of insecure infant attachment (D'angelo, 1986; Näslund, Persson-Blennow, McNeil, Kaij & Malmquist-Larsson, 1984), whereas the third study did not find any associations between maternal psychosis and infant attachment (Sameroff, Seifer & Zax, 1982). None of these studies included measures of disorganized attachment. Studies of attachment in children born to parents with bipolar disorder are also sparse, and findings are inconsistent. One study found more classifications of insecure attachment in infants and toddlers of parents with bipolar disorder than in non-psychiatric controls (Zahn-Waxler, Chapman & Cummings, 1984), and one reported higher rates than in offspring of mothers with unipolar depression (Radke-Yarrow *et al.*, 1985), including higher rates of disorganized attachment (DeMulder & Radke-Yarrow, 1991). In contrast, a study on postpartum maternal mental illness found significantly higher rates of security in infants of mothers with bipolar than with unipolar depression (Hipwell, Goossens, Melhuish & Kumar, 2000). Beyond infancy, one study did not find differences in attachment patterns in offspring of parents with bipolar disorder compared with non-psychiatric controls (aged 7 to 20 years) (Doucette, Horrocks, Grof, Keown-Stoneman & Duffy, 2013), whereas another study found more insecure attachment classifications in adolescence (Erkan, Gencoglan, Akguc, Ozatalay & Fettahoglu, 2015). To our knowledge, only one study has assessed the outcome of childhood attachment in relation to parental psychosis beyond infancy (Näslund *et al.*, 1984), and here infant attachment was not significantly associated with level of functioning at age 6 (McNeil & Kaij, 1987). The abovementioned study of children of parents with affective disorders (Radke-Yarrow *et al.*, 1985), against expectations, found insecure infant attachment to be protective and secure attachment to increase vulnerability to problematic behavior at ages 6 and 9 (Radke-Yarrow *et al.*, 1995).

Examining early risk factors within populations at familial high risk of severe mental illness is of importance as these children constitute a high-risk group for mental disorders in childhood (Ellersgaard *et al.*, 2018; Gregersen *et al.*, 2022) and severe mental illness later in life (Rasic, Hajek, Alda & Uher, 2014). Thus, insecure and disorganized attachment might be a part of the intergenerational transmission of risk. Therefore, identifying patterns and correlates of insecure and disorganized attachment in

these children is important to strengthen our understanding of possible pathways toward mental illness in these children and may improve prediction and provide knowledge to target early intervention and prevention.

In the current study, we aimed to compare attachment representations at age 7 in a cohort of children at familial high risk of schizophrenia (FHR-SZ), children at familial high risk of bipolar disorder (FHR-BP), and population-based controls (PBC). Further, we aimed to examine associations between attachment and Axis I mental disorders and level of daily functioning and potential differential associations across familial risk groups.

METHOD

Participants

The Danish High Risk and Resilience Study is a prospective cohort study of 522 children aged 7 years. The baseline assessment, the VIA 7 Study, was carried out between January 2013 and January 2016. The cohort comprises 202 children at FHR-SZ, i.e., with at least one biological parent with a schizophrenia spectrum disorder (ICD-8 codes: 295, 297, 298.29, 298.39, 298.89, 298.99; ICD-10 codes: F20, F22, F25), 120 children at FHR-BP, i.e., with at least one biological parent with bipolar disorder (ICD-8 codes: 296.19, 269.39; ICD-10 codes: F30, F31), and 200 PBC for whom neither of the parents had these disorders. PBC were matched to the children at FHR-SZ on sex, age, and municipality. Children at FHR-BP were an unmatched sample, though comparable to the other groups on age and sex (Table 1). The cohort was established through the Danish Psychiatric Central Research Register (Mors, Perto & Mortensen, 2011) and the Danish Civil Registration System (Pedersen, Gøtzsche, Møller & Mortensen, 2006). The Danish Ministry of Health granted permission to retrieve the cohort from the registers. The study was approved by the Danish Data Protection Agency. Ethical approval was deemed unnecessary by the Danish Committee on Health Research Ethics due to the study being observational. All adult participants and legal guardians provided written, informed consent. The study design has previously been described in more detail (Thorup et al., 2015). A total of 482 children from the full cohort contributed data on attachment (FHR-SZ N = 183, FHR-BP N = 113, PBC N = 186).

Procedure

Assessments were carried out by psychologists, research nurses, and medical doctors who received extensive training in the entire battery of tests prior to data collection. The child assessors were not aware of parental mental illness status. The majority of the assessments were carried out at the research sites in Copenhagen and Aarhus, Denmark, with a small proportion carried out in the homes of the families.

Measures

Attachment representations were assessed using a Danish translation of the seven-story version of the Story Stem Assessment Profile (SSAP) (Hodges, Steele, Hillman & Henderson, 2014). The SSAP is a narrative approach wherein a child is told the beginnings of different stories that each contain emotionally challenging family situations enacted with human and animal figures. The child is then asked to "show and tell" the interviewer what happens next. This is thought to indirectly elicit the child's internal representations of attachment relationships, both conscious and non-conscious, through the child's verbal and non-verbal enactments. The seven-story SSAP version is a shortened instrument based on the original 13-story version. It elicits results consistent with those of the original version (Hillman, 2011). The seven-story version consists of three story stems based on clinical experience with maltreated children and four story stems adapted from the MacArthur Story Stem Battery (Bretherton, Ridgeway & Cassidy, 1990; Hodges et al., 2014). All interviewers received accreditation from the Anna Freud National Centre for Children and Families in the administration of the SSAP prior to the data collection. All assessments were video-recorded and transcribed for verbal and non-verbal content. Every story was rated according to the coding rules (Hodges, Hillman, Stufkens & Steele, 2015) for the presence of 33 different themes that cover the child's representations and expectations of child and adult behavior and emotions, manifestations of aggression, positive adaptation, and indicators of disorganization and quality of the child's engagement with the story (Hodges et al., 2014). Each of the 33 themes was rated as either not present, limited/moderately present, or definitely present (a score of 0, 1, or 2, respectively) in each of the seven stories. The themes reduce into four overall attachment constructs: Security, Insecurity, Defensive Avoidance, and Disorganization (Resource S1) (Hillman & Hodges, 2017). Scores for the four attachment constructs were obtained by adding up the scores for all the themes contained in each of the constructs and then dividing the total score by the number of stories, producing four continuous, numeric attachment construct scores for each child.

Two raters who were unaware of the risk status of the children coded the SSAP based on the transcripts. The raters could view the video-recordings in cases of doubt. Both raters had accreditation for coding of the SSAP from the Anna Freud National Centre for Children and Families. The first author (MG) coded 429 cases, and the second rater (DG) coded 53 cases. Ten randomly chosen transcripts were coded by both raters. It was ensured that all three groups of children were represented. Interrater reliability (intraclass correlations) for the indicators of Security was good (0.86), for Insecurity it was excellent (0.95), for Defensive Avoidance it was poor (0.26), and for Disorganization it was excellent (0.99). Our data showed adequate internal consistency for the four attachment constructs. Cronbach's Alpha across the seven stories was acceptable for the indicators of Security (0.78), Insecurity (0.73), and Defensive Avoidance (0.72), and good (0.87) for Disorganization. Due to the low interrater reliability for Defensive Avoidance, these data were excluded from the analyses.

Current Axis I mental disorders were assessed with the Kiddie Schedule for Affective Disorders and Schizophrenia for School-Age Children –

Table 1. *Characteristics of the 482 children participating with Story Stem Assessment Profile data in the Danish High Risk and Resliednce Study–VIA 7*

	FHR-SZ	FHR-BP	PBC	*p*-value	FHR-SZ vs. PBC	FHR-BP vs. PBC	FHR-BP vs. FHR-SZ
Children, N	183	113	186	–	–	–	–
Female, N (%)	82 (44.8)	54 (47.8)	82 (44.1)	0.82[a]	–	–	–
Age at inclusion, years, mean (SD)	7.8 (0.2)	7.9 (0.2)	7.8 (0.2)	0.07[b]	–	–	–
Two ill parents, N (%)	7 (3.8)	1 (0.9)	–	–	–	–	–
Current Axis I mental disorders, N (%)	57 (31.1)	29 (25.9)	21 (11.3)	**<0.001**[a]	**<0.001**[a]	**0.001**[a]	0.34[a]
CGAS score, mean (SD) (N = 481)	68.2 (15.0)	73.8 (14.7)	78.1 (13.2)	**<0.001**[b]	**<0.001**[b]	**0.01**[b]	**0.001**[b]

Note: Statistically significant results (<0.05) are written in bold.
FHR-SZ = children at familial high risk of schizophrenia spectrum disorders; FHR-BP = children at familial high risk of bipolar disorder; PBC = population-based controls; CGAS = level of daily functioning assessed on Children's Global Assessment Scale, measuring current level of psychosocial functioning in adults.
[a]Chi-square test.
[b]One-way ANOVA test with post hoc Least Significant Difference *t* test.

Present and Lifetime Version (K-SADS-PL) (Kaufman *et al.*, 1997) carried out with both the primary caregiver and the child. Diagnosed mental disorders in the current cohort included affective disorders, psychotic disorders, anxiety disorders, disruptive behavior disorders, ADHD, autism spectrum disorders, PTSD, stress and adjustment disorders, and tic disorders. We excluded elimination disorders, transient and unspecified tics, and specific phobias. Level of daily functioning during the past month was evaluated with the Children's Global Assessment Scale (CGAS) (Shaffer *et al.*, 1983). Results and methods regarding mental disorders and daily functioning are described in detail elsewhere (Ellersgaard *et al.*, 2018).

Analyses

Differences in demographic and clinical background characteristics between the three groups were analyzed with chi-square tests and one-way analyses of variance as appropriate. The total scores for the attachment constructs were not normally distributed and were log^{10} transformed to approximate a normal distribution. Due to the presence of zeros in the construct scores, a constant of one was added to these scores before transformation.

The transformed data were used in the multivariate analyses of variance (MANOVAs) in which the four attachment construct scores were compared across the three groups of children. For between-group comparisons between the three familial risk groups, sex of the child was subsequently entered as a covariate in the analyses. A Kruskal-Wallis H test on the non-transformed data was also performed for the three familial risk groups. For the analyses of associations between attachment and mental disorders and level of daily functioning, logistic and linear regression analyses for binary (mental disorders) and continuous (level of daily functioning) outcomes, respectively, were performed. As we wished to examine the independent effects of each of the four attachment construct scores, analyses with each attachment construct score as predictor were run separately without adjustments for the other construct scores.

An interaction term between familial risk group and the predictor variable (attachment construct score) was then added to these analyses. The regression analyses were subsequently stratified by familial risk group if a significant interaction was found.

Alpha was set at <0.05. Data were analyzed with SPSS version 25.

RESULTS

No significant differences between children in the FHR-SZ, FHR-BP, and PBC groups were found for child age and sex, whereas the groups differed with respect to Axis I mental disorders and level of daily functioning (Table 1).

Comparisons of attachment representations across familial risk groups

The one-way MANOVA revealed no statistically significant mean differences in any of the attachment construct scores between the three familial risk groups ($F = 0.976$; $p = 0.45$; Wilks $\Lambda = 0.984$; $n^2 = 0.008$). The differences remained non-significant when adding

sex of the child as a covariate to the model. The Kruskal-Wallis H test did not show statistically significant differences in attachment construct scores between the familial risk groups either (Table 2). These results did not change when subdividing the children into five groups: PBC, children at FHR-SZ living with an ill parent, children at FHR-SZ not living with an ill parent, children at FHR-BP living with an ill parent, and children at FHR-BP not living with an ill parent ($F = 1.424$; $p = 0.12$; Wilks $\Lambda = 0.953$; $n^2 = 0.012$).

Associations between attachment representations and Axis I mental disorders

In logistic regression analyses of the entire sample, increasing scores on the Insecurity and Disorganization constructs were associated with an increased likelihood of concurrent mental disorders. No significant associations were found for Security (Table 3). For Disorganization and Insecurity the analyses revealed no statistically significant interaction between the effects of familial risk group and attachment construct score on child mental disorders (test of interaction for Disorganization: $p = 0.37$; test of interaction for Insecurity: $p = 0.46$). For the Security construct, a statistically significant interaction between the effects of familial risk group and attachment construct score on child psychopathology was found ($p = 0.04$). Analyses stratified by familial risk group showed that attachment scores were significantly associated with the likelihood of psychopathology only in the FHR-SZ group, where an increasing score on the Security construct was significantly associated with a decreased likelihood of having a mental disorder (Table 3).

Associations between attachment representations and daily functioning

In linear regression analyses, an increasing score on the Security construct was associated with an increased level of concurrent daily functioning (CGAS score), whereas increasing scores on the Insecurity and Disorganization constructs were associated with a decreased level of daily functioning in the entire sample (Table 3). No statistically significant interactions between the effects of familial risk group and attachment construct scores on level of daily functioning were found for any of the attachment constructs (test of interaction for Disorganization: $p = 0.14$; test of interaction for Security: $p = 0.29$; test of interaction for Insecurity: $p = 0.53$).

DISCUSSION

To our knowledge, this is the first familial high risk study to examine attachment and its correlates in early middle childhood

Table 2. *Between-group scores on Story Stem Assessment Profile attachment constructs of 482 children aged 7 years at FHR-SZ or FHR-BP and PBC in the Danish High Risk and Resilience Study–VIA 7*

	FHR-SZ (N = 183)			FHR-BP (N = 113)			PBC (N = 186)			Kruskal-Wallis *p*-value
	Median	Mean (95% CI)	Range	Median	Mean (95% CI)	Range	Median	Mean (95% CI)	Range	
Security	3.1	3.4 (3.2–3.7)	0.0–10.0	3.3	3.5 (3.2–3.7)	0.0–8.6	3.3	3.4 (3.2–3.6)	0.6–8.0	0.90
Insecurity	0.9	1.1 (1.0–1.2)	0.0–4.9	0.7	1.0 (0.9–1.2)	0.1–4.4	0.7	1.0 (0.9–1.1)	0.0–5.3	0.55
Disorganization	0.3	0.6 (0.5–0.8)	0.0–5.4	0.0	0.4 (0.3–0.6)	0.0–4.7	0.1	0.5 (0.4–0.7)	0.0–6.7	0.10

Note: FHR-BP = children at familial high risk of bipolar disorder; FHR-SZ = children at familial high risk of schizophrenia spectrum disorders; PBC = population-based controls.

Table 3. *Associations between attachment representations, Axis I mental disorders, and Level of daily functioning in 482 children aged 7 years at FHR-SZ or FHR-BP and PBC in the Danish High Risk and Resilience Study–VIA 7*

	Current Axis I mental disorders			Level of daily functioning, CGAS		
	OR	95% CI	*p*-value	B	95% CI	*p*-value
All (*N* = 482)						
Security[a]		0.7-1.0		1.4	0.5;2.3	**0.003**
	0.9		0.09			
Insecurity		1.1–1.7		−2.4	−4.0;-0.8	**0.004**
	1.3		**0.02**			
Disorganization		1.1–1.6		−2.7	−4.1;-1.4	**<0.001**
	1.3		**0.007**			
Security, stratified by familial risk group						
FHR-SZ (*N* = 183)						
Security		0.6–0.9		–	–	–
	0.7		**0.007**			
FHR-BP (*N* = 113)						
Security		0.7–1.2		–	–	–
	0.9		0.50			
PBC (*N* = 186)						
Security		0.9–1.7		–	–	–
	1.2		0.22			

Note: Statistically significant results (<0.05) are written in bold.
FHR-SZ = children at familial high risk of schizophrenia spectrum disorders; FHR-BP = children at familial high risk of bipolar disorder; PBC = population-based controls; CGAS = level of daily functioning assessed on Children's Global Assessment Scale.
[a]Interaction between familial risk group and Security was significant for Axis I disorders; therefore, stratified analyses are reported.

in offspring of parents with schizophrenia spectrum disorders or bipolar disorder conjointly. In this large, nationwide cohort study, we did not find any significant effects of familial high-risk status or living with an ill parent on attachment representations in children at age 7 measured with a narrative instrument. We did, however, find associations between attachment representations and Axis I mental disorders and level of daily functioning. In the entire cohort, higher levels of Insecurity and Disorganization were associated with a higher occurrence of concurrent mental disorders. There was a significant interaction with familial risk group and secure attachment on mental disorders. In the stratified regression analyses, higher levels of Security were associated with a lower likelihood of concurrent mental disorders in the FHR-SZ group but not in the other groups. In the entire cohort, higher levels of Security were associated with higher levels of concurrent daily functioning, whereas higher levels of Insecurity and Disorganization were associated with lower levels of daily functioning.

Our findings did not support the notion that parental psychopathology is directly associated with less secure or more insecure or disorganized offspring attachment. This could indicate that parents with schizophrenia or bipolar disorder are just as able to establish secure attachment with their children as parents without these illnesses. Although lack of an effect of parental psychosis or bipolar disorder per se is in keeping with some of the previous sparse evidence (Doucette *et al.*, 2013; Sameroff *et al.*, 1982), this contrasts with findings that children of parents with severe mental illness have an increased risk of diagnosed attachment disorders (Davidsen *et al.*, 2021). Another possible explanation could be that attachment measured beyond infancy is not solely an expression of the relationships with the primary caregivers, as the child's social world is expanding and other

interpersonal relationships become sources of influence on attachment representations. In keeping with this, changes in the social context and aspects of peer relationships have been found to be associated with changes in attachment patterns in adolescence (Van Ryzin, Carlson & Sroufe, 2011). Additionally, both extensive social services in Denmark, providing support to vulnerable families, and other caretakers looking after the child during times of parental illness might have had buffering effects on the potential detrimental impact of parental psychopathology on child attachment. Since the design of the SSAP does not allow for the measure of attachment specifically with one caregiver, the child's attachment representations in the SSAP may also partially be expressions of attachment relationships with caregivers other than the ill parent. Studies have pointed to social-marital support as a moderator of the impact of maternal depression on child attachment (Atkinson *et al.*, 2000). Additionally, the heterogeneous nature of both parental diagnoses, course of illness, and severity in our familial high-risk groups may have obscured some of the potential differences in attachment. There is evidence that severity and chronicity of parental disorder impact attachment more than parental disorder per se (Sameroff *et al.*, 1982). As previously mentioned for postpartum depression, it has been found that parental comorbidity affects child attachment outcome (Smith-Nielsen *et al.*, 2016). To improve our understanding of the possible impact of parental mental illness on child attachment, more detailed information on the types of symptoms, severity, and timing of parental mental illness as well as comorbidity would be beneficial to include in future studies.

Our findings of associations between attachment and mental disorders and level of daily functioning are in keeping with previous findings of secure vs. insecure attachment representations as protective and risk factors, respectively

(Brumariu & Kerns, 2010; Fearon *et al.*, 2010; Madigan *et al.*, 2013; Sroufe, 2005). There was evidence that secure attachment conferred reduced risk of mental disorders in the FHR-SZ group, suggesting that secure attachment is a protective factor for children at FHR-SZ. The lack of this association in the control group contrasts with findings pointing to secure attachment in middle childhood being associated with positive outcomes in the general population (Granot & Mayseless, 2001; Psouni, Di Folco & Zavattini, 2015).

Presupposing that the results of the current study can be replicated, it should be considered positive that having a parent with schizophrenia or bipolar disorder did not per se appear to determine the child for more insecure or disorganized attachment. This could counter stereotypes and should be kept in mind by clinicians and social services in contact with these families.

Strengths and limitations

This is the first study to assess childhood attachment with the SSAP in a familial high-risk cohort. The assessment of a large cohort of children at the same age is advantageous when studying development. Due to the cross-sectional nature of the study, we were not able to determine the direction of causality between attachment and mental disorders and level of daily functioning. As these factors were measured simultaneously, they could be affected by the same recent circumstances. Similarly, it is uncertain whether the attachment representations observed in our study were reflections of early attachment, or whether they were also affected by recent circumstances and relationships or perhaps partly consequences or expressions of mental disorders. The internal consistency of the SSAP was acceptable in the current study, yet thorough evaluation of its psychometric properties is lacking. Results on the SSAP attachment constructs have, to our knowledge, been reported in only a few other studies, overall showing that maltreated and institutionalized children show more insecure and disorganized attachment and less security than controls (Hillman *et al.*, 2020; Hillman, Cross & Anderson, 2020; Román, Palacios, Moreno & López, 2012). Residual confounding from factors not examined in the current study, such as child maltreatment, is possible, and, as described, severity of parental mental illness may also affect child outcomes. Future follow-ups in the current cohort should examine predictors of attachment beyond a history of parental mental illness per se. In addition, to extend knowledge on the significance of attachment in familial high-risk populations, future follow-ups in the current cohort should examine attachment as a mediator between parental mental illness and child outcomes. A recent review concluded that there is a lack of evidence for measures of attachment in middle childhood and adolescence with good measurement properties and that the Child Attachment Interview has the best psychometric properties (Jewell *et al.*, 2019). We cannot rule out that our findings were affected by a lack of appropriate measurement properties of the SSAP. Examination of the sensitivity of the SSAP and correlations with other measures and classifications of attachment is necessary, and we encourage validation of this method against validated measures such as the Child Attachment Interview (Shmueli-Goetz, Target, Fonagy & Datta, 2008). Moreover, the cross-cultural validity of the SSAP is unknown, and differential rearing practices and norms in

Denmark and in the UK, where the SSAP was developed, may have affected the children's enactments and the interpretation of the themes. As a relatively low number of cases were coded for reliability, estimates of reliability are somewhat uncertain. In spite of extensive training, we did not reach a satisfactory interrater reliability on the Defensive Avoidance construct, and therefore these data could not be analyzed. Retention of these data could potentially have yielded further insights into associations between familial risk, attachment, and child outcomes. Future studies in the current cohort should strive to include such analyses. Moreover, behavioral observations of the child and the ill parent to assess attachment would have allowed for examination of this specific attachment relationship. Considering the potential limitations of the method, the current findings require independent replication in future studies. Finally, while this study examined associations between attachment and categorical mental disorders, a dimensional approach to psychopathology could also be relevant to capture those who do not meet criteria for a mental disorder but may still be impaired or at higher risk of future mental disorders. Future follow-ups should include such measures.

CONCLUSION

The current study shows that parental psychopathology is not directly associated with less secure or more insecure or disorganized offspring attachment at age 7 measured with the SSAP. The findings point to an association between insecure and disorganized attachment and mental disorders in childhood and to secure attachment as a potential protective factor for children at FHR-SZ. Follow-up in the current cohort is important to establish temporality between attachment and mental disorders and to delineate developmental trajectories of attachment and their clinical correlates. Additionally, future studies are warranted to validate the method and to further explore associations between attachment and psychological functioning in children at FHR-SZ and FHR-BP. Intervention studies should examine whether improving attachment quality could lower the risk of psychopathology in these populations.

DATA AVAILABILITY STATEMENT

The author elects to not share data. Research data are not shared.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article:

Resource S1 Attachment constructs in the Story Stem Assessment Profile in the Danish High Risk and Resilience Study–VIA 7.