



Adaptability and cohesion in youth at clinical high-risk for psychosis: A multi-informant approach

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ABSTRACT

Background: Families can play a critical role in the development of psychosis. Adaptability (i.e., flexibility) and cohesion (i.e., emotional bonding) are important markers of family functioning, but have rarely been studied in youth at clinical high risk for developing psychosis (CHR), especially not from a multi-informant perspective.

Methods: The current study examined adaptability and cohesion (using youth and mother reports) and clinical symptoms (in youth) among 75 youth at CHR and their mothers ($N = 48$) and 79 matched healthy controls and their mothers ($N = 42$).

Results: Findings showed that (1) youth at CHR and their mothers reported lower adaptability and cohesion than their healthy control counterparts. (2) All youth reported lower adaptability than mothers, but only youth at CHR (not control youth) reported lower cohesion than their mothers. (3) There were no significant links between CHR youth and mother reports of adaptability and cohesion and clinical symptoms.

Conclusions: Findings support existing literature that families with a youth at CHR are at risk for poorer functioning and demonstrate pronounced youth-mother discrepancies with youth at CHR (but not controls) reporting lower emotional bonding than their mothers. Future studies may further probe multi-informant perspectives of family environment as a clinical marker in the clinical high risk state.

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1. Introduction

Family environment can play an important role in the development of psychosis in adolescence and young adulthood. Early studies pointed to the critical role of family environment in schizophrenia, highlighting how expressed emotion (i.e., criticism/hostility, overinvolvement) contributes to the emergence and severity of schizophrenia (Cechnicki et al., 2013; Tienari et al., 1994). More recent evidence indicates that family environment also has ramifications for youth at clinical high risk (CHRs) for developing psychosis (Koutra et al., 2014; Wang et al., 2015). However, to date, empirical evidence is sparse in ways that ultimately limit our knowledge of the ways in which family impacts this illness. First, two critical aspects of family functioning, adaptability (i.e., defined as flexibility) and cohesion (i.e., defined as emotional bonding) have been neglected in the CHR literature. Second, available studies focus on a single perspective. For example, studies measuring expressed emotion only measure parents' reports (Linszen et al., 1997), while other family environment studies look only at youth reports (Weiser et al., 2008). In this study, we sought to examine family

adaptability and cohesion from both the youth and mother perspective. We also modeled discrepancies in perspective and examined links with clinical phenomenology, given evidence that differences in perspective in family functioning can yield meaningful and clinically relevant information (Achenbach, 2006; De Los Reyes et al., 2019; De Los Reyes and Kazdin, 2005; De Los Reyes and Ohannessian, 2016). Taken together, the investigation yields insight into possible protective factors related to family environment in CHR groups, which could inform prevention and intervention efforts.

Family environment has been implicated in the development of psychosis symptoms (Lukoff et al., 1984). For example, adverse family environments can shape development and progression of schizophrenia (Tienari et al., 2004; Vaughn et al., 1984) and can extend even into the efficacy of interventions and treatments for schizophrenia (Pitschel-Walz et al., 2001). Conversely, in individuals with first-episode psychosis, positive aspects of the family environment can act as a protective factor even after accounting for family history of psychosis (González-Pinto et al., 2011). Effects of the family environment have also been observed among youth at clinical high risk for psychosis, where aspects of family environment predict increased psychosis risk and symptoms (O'Brien et al., 2006; Schlosser et al., 2010; Weiser et al., 2008).

Two aspects of the family environment that have received more attention in the clinical world (Cumsille and Epstein, 1994; Pritchett et al.,

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2011), but that are often overlooked in psychosis samples are adaptability and cohesion. Adaptability and cohesion are two dimensions developed to describe a family system as part of the Circumplex Model of Marital and Family Systems (Olson et al., 1979). Adaptability reflects a family's ability to generate new solutions and shift roles and processes to changing circumstances, while cohesion captures the level of emotional bonding in a family (Olson et al., 1980). While the original intention of the circumplex model combined both dimensions to categorize family functioning, clinical studies have found utility in using the dimensions separately to describe each element of functioning separately (Rodick et al., 1986). A diverse array of studies has demonstrated lower levels of both adaptability and cohesion in families caring for a member with schizophrenia, first-episode psychosis, or youth at CHR, compared to control families (Koutra et al., 2014; Phillips et al., 1998; Wang et al., 2015). Despite these differences in levels of adaptability and cohesion (and emergent, though limited evidence in CHR groups), clinical correlates of both in clinical-high risk samples have largely been overlooked. However, studies with other clinical populations suggest that adaptability and cohesion are closely related to clinical phenomenology. For example, lower levels of adaptability and cohesion are tied to higher levels of depression and conduct disorder, alcohol and other drug use, as well as decreased treatment efficacy in adolescents at risk for emotional disturbances and those diagnosed with anxiety, such as generalized anxiety disorder or social phobia (Knight et al., 1994; Prange et al., 1992; Victor et al., 2007). Lower levels of adaptability in youth are additionally tied to depression and behavior problems in clinical populations, as well as suicidal ideation (Baker et al., 2011; Garrison et al., 1991; Prange et al., 1992). Within samples with a psychosis syndrome, lower levels of adaptability and cohesion in caregivers of an individual with first-episode psychosis predict more severe psychosis symptoms (Koutra et al., 2016). Taken together, these findings suggest that adaptability and cohesion may be (a) lower in CHR families as compared to control families and (b) predict clinical symptomatology in CHR youth.

While family environment can impact clinical phenomenology, youth and parents may not always share the same perceptions of the family environment (De Los Reyes et al., 2019; De Los Reyes and Ohannessian, 2016). Reports on shared environments are often only modestly correlated between youth and parents (Demo et al., 1987; Phares et al., 1989; Schwarz et al., 1985; Tein et al., 1994) and these discrepancies extend to views of the youth-parent relationship itself (Demo et al., 1987). While discrepancies between youth and parent perspectives on family environment may be the norm rather than the exception, this discrepancy in perspectives may become an important clinical marker in a CHR context. Over-perception of conflict (e.g., in youth) or, conversely, failing to perceive the existence of conflict (e.g., in parents) may exacerbate or be the result of existing vulnerabilities in the relationship (cf. Silva et al., 2015; Otero et al., 2011) and, in turn, could contribute to clinical symptomatology. Overall, youth appear to have more negative perceptions of their family environments compared to parents (Alessandri and Wozniak, 1989) and this difference may be particularly pronounced in CHR families. In fact, an emerging literature (see review in De Los Reyes et al., 2019) has documented that when youth report particularly low levels of family functioning compared to their parents, youth's risk for maladjustment increases (Human et al., 2016). Taken together, these findings suggest that discrepancies in youth and parent views of family adaptability and cohesion may (a) take the form of youth reporting lower levels than parent and (b) predict clinical symptoms in CHR youth.

This study used self-reports of adaptability and cohesion from youth at CHR and their mothers, as well as control youth and their mothers to examine the following aims: 1) Determine differences in adaptability and cohesion in CHR youth-mother dyads compared to control youth-mother dyads. Reports of lower adaptability and cohesion in families caring for a member with schizophrenia and first episode psychosis (Koutra et al., 2014; Phillips et al., 1998) led us to predict that CHR

youth and mothers would report less adaptability and cohesion than control youth and mothers. 2) Explore differences between youth and mother reports of adaptability and cohesion in CHR and control dyads. Findings documenting youths' higher perceptions of negative family environments compared to parents (Alessandri and Wozniak, 1989) led us to hypothesize that youth would perceive less adaptability and cohesion than mothers in CHR and control youth-mother dyads. 3) Describe clinical correlates of adaptability and cohesion in CHR youth. Findings regarding depression and other clinical outcomes (Garrison et al., 1991; Koutra et al., 2016) led us to expect that lower levels of adaptability and cohesion as well as greater discrepancies between youth and mothers in adaptability and cohesion reports would be associated with higher levels of clinical symptoms in youth at CHR.

2. Materials and methods

2.1. Participants

2.1.1. Youth

Seventy-five adolescent and young adults at CHR and 79 matched healthy control participants between 13 and 21 years ($M = 18.42$, $SD = 2.24$) were recruited to the Adolescent Development and Preventive Treatment (ADAPT) research program using internet, newspaper, and public transportation advertisements, email postings, and community professional referrals. Individuals at CHR in the present study met SIPS criteria for a psychosis risk syndrome, defined by at least one of the following criteria: 1) moderate to severe but not psychotic levels of positive symptoms (rated from 3 to 5 on a six-point scale), 2) a decline in global functioning accompanying the presence of schizotypal personality disorder, 3) a family history (i.e., first-degree relative) of psychosis (Miller et al., 2003). Family history of psychosis was attained by asking participants if any first-degree family members had been diagnosed with a psychotic disorder. In most cases, family history was corroborated with another family member of the participant. Participants with a first-degree relative with a psychotic disorder, but without moderate to severe positive symptoms could still qualify if they experienced an accompanying drop in function. Note that for long-standing symptoms, there must have been an increase in SIPS symptoms in the recent year. Exclusion criteria for individuals at CHR included head injury, presence of a neurological disorder, lifetime substance dependence as well as the presence or lifetime history of an Axis I psychotic disorder at baseline. Healthy controls were recruited from the community via email, newspaper advertisements, and Craigslist. Exclusion criteria for healthy controls included head injury, presence of a neurological disorder, lifetime substance dependence as well as the presence of a psychotic disorder in a first-degree relative or any Axis I disorder. Healthy controls were matched on age. There were no statistical differences in gender, age, ethnicity, or years of education between youth at CHR and control youth. See Table 1 for demographic information broken down by group for youth for age, sex, education, and ethnicity.

2.1.2. Mothers

All mothers of CHR and control youth were invited to participate in completing a measure of family adaptability and cohesion. Forty-seven mothers of youth at CHR and 42 mothers of control youth agreed to complete the questionnaire. Of the mothers who agreed to participate, mothers of youth at CHR had an average of 15.77 years of education ($SD = 2.36$), while mothers of control youth had an average of 16.14 years of education ($SD = 3.15$). There was no significant difference between education of mothers of youth at CHR compared to mothers of control youth either within the entire sample ($t(151) = -0.42$, $p > .05$), or between the two groups of mothers including only those who completed the additional questionnaire ($t(87) = -0.64$, $p > .05$). There was also no difference in education between the mothers who completed the additional questionnaire and mothers who did not complete the questionnaire ($t(151) = 0.72$, $p > .05$). The researchers

Table 1
Demographics, family environment, and symptoms in the sample.

	CHR	Control	Total
Demographics			
Age mean (SD)	18.65 (1.77)	18.19 (2.61)	18.42 (2.24)
Biological sex (counts)			
Male	45	34	79
Female	30	45	75
Total	75	79	156
Ethnicity			
First Nations	4	0	4
East Asian	3	6	9
Southeast Asian	0	2	2
Black	1	2	3
Central/South American	12	17	29
West/Central Asian	1	2	3
White	51	48	99
Interracial	3	2	5
Total	75	79	156
Youth education (years) mean (SD)	12.41 (1.76)	12.22 (2.48)	12.31 (2.15)
Mother education (years) mean (SD)	15.72 (2.34)	15.90 (2.98)	15.81 (2.68)
Family environment			
Youth adaptability mean (SD)	23.82 (6.67)	28.99 (7.58)	26.42 (7.57)
Youth cohesion mean (SD)	43.52 (11.65)	54.93 (10.52)	49.27 (12.45)
Mother adaptability mean (SD)	37.70 (5.68)	40.85 (6.97)	39.10 (6.50)
Mother cohesion mean (SD)	55.43 (8.34)	60.14 (7.50)	57.53 (8.28)
Symptoms			
Positive symptoms total (SD)	12.03 (4.51)	0.59 (1.30)	6.16 (6.60)
Negative symptoms total (SD)	10.25 (7.15)	0.42 (0.96)	5.21 (7.04)
Anxiety mean (SD)	18.55 (11.19)	4.99 (6.03)	11.54 (11.18)
Depression mean (SD)	17.67 (11.69)	3.99 (4.88)	10.56 (11.16)

Note: Youth adaptability and cohesion scores are based on the entire sample of available youth ($N = 154$).

were unable to collect additional demographic information about mothers, including age and ethnicity.

2.2. Measures

2.2.1. Clinical symptoms

Clinical interviews were administered to youth by expert raters trained to reliability standards ($\alpha > 0.80$). The Structured Interview for Psychosis risk Syndromes (SIPS) was administered at baseline to diagnose a clinical high risk syndrome and assess for positive and negative symptoms (McGlashan et al., 2010; Miller et al., 2003). Youth at CHR in the present study met SIPS criteria for a high-risk syndrome, defined by moderate to severe but not psychotic levels of positive symptoms (rated from 3 to 5 on a six-point scale) and/or a decline in global functioning accompanying the presence of schizotypal personality disorder and/or a family history of schizophrenia. A total sum score for the positive, negative, and disorganized symptom domains were used as an indicator of the respective dimensions of symptomatology. Family history of psychosis was attained by asking participants if any first-degree family members had been diagnosed with a psychotic disorder. In most cases, family history was corroborated with another family member of the participant.

Depression and anxiety were assessed using the Beck Depression (21 items; $\alpha = 0.94$; BDI; Beck et al., 1996), and Anxiety Inventories (21 items; $\alpha = 0.90$; BAI; Beck et al., 1988). Each inventory used 21 items to create a total measure of depression and anxiety, respectively.

2.2.2. Family environment

Youth and their mothers each completed the Family Adaptability and Cohesion Evaluation Scale II in order to measure the family environment (Olson et al., 1982). The FACES II scales have high reliability, with Cronbach's alphas of 0.78 for adaptability, and 0.87 for cohesion. All 30 items were rated on a scale of 1 (almost never) – 5 (almost always). Overall, 14 items measured adaptability as the family's ability to change roles and structures to fit situational needs (e.g. "When problems arise, we compromise,"; $\alpha = 0.77$ for youth at CHR, 0.81 for control youth, and 0.71 for mothers of a youth at CHR, and 0.70 for mothers of a control

youth; see Table 1 for means). The adaptability subscale is comparable to the balanced family flexibility subscale in the newest version (FACES IV) of the scale (Olson et al., 2004). The other 16 items assessed cohesion as the emotional bond between family members (e.g. "Family members are supportive of each other during difficult times,"; $\alpha = 0.85$ for youth at CHR, 0.82 for control youth, 0.77 for mothers of a CHR youth, and 0.75 for mothers of control youth). The cohesion subscale of FACES II is comparable to the balanced family cohesion subscale of FACES IV (Olson et al., 2004). The FACES II version of the scale was selected over the newer version of the scale as the second version has been verified for use in assessing family structure in clinical settings, including families with a member who is schizophrenic (Phillips et al., 1998; Place et al., 2005). A previous investigation found evidence of equivalence of the scale factor structure across family members (Edwards, 1991). Mothers and youth meeting CHR criteria were administered the same scales. Since the scores were on the same scale, measuring equivalent constructs, raw scores were utilized for analyses (Kim & Ferree, 1981).

2.3. Data analytic strategy

Group differences between youth at CHR and controls were analyzed using independent samples *t*-tests. Differences between youth and mothers were analyzed using paired samples *t*-tests. Although adaptability and cohesion were normally distributed, clinical variables including the positive and negative aspects of the SIPS, as well as anxiety and depression all violated the Shapiro-Wilk test of normality ($p < .05$). As a result, Spearman correlations were used in analyses involving clinical symptom, such as looking at the relationship between family environment variables and symptoms in the group at CHR. All other correlations not involving clinical variables were conducted using a Pearson correlation. A difference score was created to measure the amount of discrepancy between reporter types by subtracting youth scores from mother scores for cohesion and adaptability, respectively. These difference scores were used to investigate how differences in reports of the family environment differed between the CHR and control groups in *t*-tests, and then how these differences in reports related to

symptoms with spearman correlations. When examining correlations with symptoms, only the group at CHR was analyzed given low reports of positive and negative symptoms in the control group and to reduce number of tests. Within each set of these correlations, the Benjamini-Hochberg correction procedure was used in addition to control for multiple correlations (Benjamini and Hochberg, 1995). Across analyses, we included all available participants to maximize statistical power, resulting in $N = 154$ (individuals) for all analyses involving youth only, $n = 89$ (dyads) for analyses involving youth and mothers, and $n = 47$ (dyads) for analyses involving CHR youth and mothers.

3. Results

3.1. Differences in family environment in CHR vs. control youth and mothers

Independent samples t -tests showed that youth at CHR ($M = 23.82$, $SD = 6.67$) reported significantly less adaptability than control youth ($M = 28.99$, $SD = 7.58$; $t(147) = -4.41$, $p < .001$). The same pattern was found for youth's reports of cohesion (CHR: $M = 43.52$, $SD = 11.65$; Control: $M = 54.94$, $SD = 10.52$; $t(147) = -6.27$, $p < .001$). Mothers of youth at CHR ($M = 37.70$, $SD = 5.68$) also reported significantly less adaptability than mothers of control youth ($M = 40.85$, $SD = 6.97$; $t(88) = -2.47$, $p = .02$). The same pattern was found for mothers' reports of cohesion (CHR: $M = 55.43$, $SD = 8.34$; Control: $M = 60.14$, $SD = 7.50$; $t(88) = -2.91$, $p = .01$).

3.2. Differences in youth and mother reports of family environment

Paired samples t -tests showed that youth at CHR ($M = 24.32$, $SD = 7.06$) reported significantly less adaptability than their mothers ($M = 37.70$, $SD = 5.68$; $t(47) = 11.06$, $p < .001$; see Fig. 1). Control youth ($M = 28.86$, $SD = 6.85$) also reported significantly less adaptability than their mothers ($M = 40.85$, $SD = 6.97$; $t(41) = 9.71$, $p < .001$). In an independent samples t -test, youth-mother discrepancies in adaptability showed that CHR dyads ($M = 14.06$, $SD = 7.05$) did not significantly differ from control dyads ($M = 12.52$, $SD = 7.14$) in the amount of difference in adaptability between youth and mothers ($t(87) = 1.02$, $p = .31$).

For cohesion, youth at CHR ($M = 43.40$; $SD = 11.21$) reported significantly less cohesion than their mothers ($M = 55.43$; $SD = 8.34$; $t(46) = 8.74$, $p < .001$; see Fig. 1). Similarly, control youth ($M = 54.50$; $SD = 10.38$) reported less cohesion compared to their mothers ($M = 60.14$; $SD = 7.50$; $t(41) = 3.57$, $p = .001$). When comparing youth-mother discrepancies in cohesion, CHR dyads ($M = 12.71$; $SD = 8.46$) reported significantly more discrepancies in cohesion than control dyads ($M = 8.60$; $SD = 7.87$; $t(87) = 2.36$, $p = .02$).

3.3. Clinical correlates of family environment in CHR youth

Youth at CHR's reports of adaptability and cohesion were not significantly related to positive symptoms, negative symptoms, depression, or anxiety (see Table 2). Mothers' of youth at CHR's reports of cohesion and adaptability were also unrelated to both types of symptoms, as well as depression and anxiety.

Larger differences in youth-mother reports of adaptability were marginally related to more positive symptoms in CHR youth. These differences in youth-mother reports were not significantly related to negative symptoms, depression, or anxiety (see Table 2). Differences in youth-mother reports of family cohesion were not significantly related to positive symptoms, negative symptoms, anxiety, or depression. All results remained after correcting for multiple tests.

4. Discussion

The current study examined reports of family adaptability and cohesion in youth at CHR and their mothers as well as healthy controls and their mothers. Both CHR youth and their mothers reported less adaptability and cohesion than their healthy control counterparts. Thus, families with a youth at CHR reported less ability to adapt to changes in the environment and feeling less emotionally bonded to each other. This study also took a unique approach in leveraging simultaneous reports from youth and mothers and showed that youth reported less adaptability than mothers regardless of CHR status. However, youth at CHR reported less cohesion than their mothers, while control youth and mothers reported similar levels of cohesion. Thus, there were pronounced discrepancies in how youth and their mothers viewed their family environment with youth reporting lower levels of emotional bonding than their mothers as a CHR-specific risk factor. Contrary to hypotheses, neither youth nor mother reports of adaptability and cohesion were related to clinical phenomenology.

In keeping with studies of families caring for a member with first episode psychosis (Koutra et al., 2014), youth at CHR and their mothers reported less adaptability and cohesion than control youth and their mothers. These findings also support a larger literature that family environments of youth at CHR have poorer functioning than the family environments of control youth (Schlosser et al., 2010; Wang et al., 2015). Previous studies incorporating the familial risk for psychosis literature have also found promising evidence for family environment serving as a protective factor. One study identified aspects of the family environment like warmth that served as a protective factor for youth at CHR (González-Pinto et al., 2011). Another showed that family cohesion and expressiveness were lower among youth at familial high risk (Walder et al., 2014). Given the early discrepancy in adaptability and cohesion between CHR and control youth and mothers, interventions

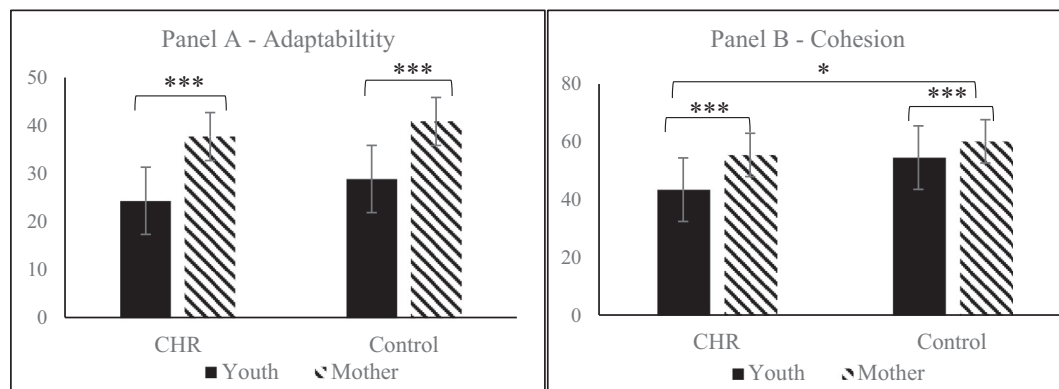


Fig. 1. Means of youth and mother reports of adaptability and cohesion in CHR and control dyads. Note: * indicates $p < .05$, *** indicates $p < .001$; Bars on graph represent standard deviation of each group; data are based on CHR and control youth and mothers ($N = 89$).

Table 2
Clinical Correlates of Family Environment: CHR Youth Reports, Mother Reports, and Discrepancies in Youth-Mother Reports.

	CHR youth		CHR mothers		CHR youth-mother discrepancy	
	Adaptability	Cohesion	Adaptability	Cohesion	Adaptability	Cohesion
Positive symptoms	0.13	0.08	−0.24	−0.02	0.27+	0.15
Negative symptoms	−0.04	−0.15	−0.07	−0.10	−0.04	−0.13
Anxiety	−0.08	−0.11	0.03	−0.13	−0.08	−0.14
Depression	−0.15	−0.21+	0.11	−0.18	−0.14	−0.03

Note: + indicates $p < .10$. Data are based on CHR youth and mothers ($N = 48$).

targeting these specific family environment aspects are important given their downstream effects on psychosis symptoms with first-episode and chronic psychosis (Koutra et al., 2016).

In both CHR and control dyads, youth reported less adaptability and cohesion than their mothers. Overall, these findings support previous literature that youth are more likely to report negative aspects of the family environment compared to parents (Alessandri and Wozniak, 1989). For reports of adaptability, discrepancy between youth and mothers seemed normative and, in fact, the present study did not reveal differences between CHR and control dyads. From a developmental perspective (Steinberg, 2005), this discrepancy may be more than a matter of subjective perception. Mothers may, in fact, possess (De Los Reyes and Kazdin, 2005; Richters, 1992) a richer repertoire of roles (e.g., parent, spouse) and resources (e.g., experience with conflict, social network) than their younger children that they can draw from to cope with situational and developmental needs.

At the same time, while discrepancies may be developmentally normative (De Los Reyes and Ohannessian, 2016), the present findings point to an area of family functioning where healthy youth and mothers were, in fact, very much aligned in perspective – emotional bonding within the family – unlike their CHR counterparts where youth at CHR reported significantly lower levels than their mothers. The different reports in cohesion may be contributing to the decreased reports of social support that youth at CHR report during this time (Robustelli et al., 2017). As such, adaptability and cohesion may both serve unique places for intervention in building more social support within the family for youth at CHR. At the same time, discrepancies in reports of emotional functioning in the family may serve as a more CHR-specific clinical marker, reminiscent of the early schizophrenia literature, which has long pointed to emotional dysfunction in the family (i.e., expressed emotion) as a risk factor (Cechnicki et al., 2013; Tienari et al., 1994). However, meta-analytic evidence has lent evidence toward emotional dysfunction in the family contributing to psychiatric relapse more broadly as well (Butzlaff and Hooley, 1998). Future studies will be needed in order to parse out whether emotional functioning in the family is particularly relevant to youth at CHR, or whether it is a predictor of psychiatric symptoms more generally. Incorporating help-seeking controls in future investigations will be critical in answering these questions regarding specificity to the CHR stage (Millman et al., 2019).

Despite previous literature showing that lack of adaptability and cohesion predicted psychosis symptoms in individuals with FEP and those with chronic psychosis (Koutra et al., 2016), the present study found that neither youth nor mother reports of adaptability and cohesion were significantly associated with symptoms in youth at CHR. It may be possible that the CHR stage is too early for these particular aspects of the family environment to directly affect symptom outcomes. Within the CHR stage, a lack of agreement about the family environment could pose additional risks beyond the lack of functioning itself. Over time, youth at CHR may come to perceive parents as failing to improve a negative family environment and this may serve to isolate them in an already constricted social network (Robustelli et al., 2017). Leveraging multiple reports of family environment simultaneously may provide a clearer picture of the complex family system as a whole that a single reporter's viewer might not capture. While future studies are needed to explore this process, the approach of using interrater agreement itself

as a clinical marker is promising in yielding unique information about the effects of the family environment above and beyond using each report independently. It is, of course, possible that larger sample sizes will be needed to detect smaller but important effects. While the present study was sufficiently powered to detect medium-sized effects when comparing CHR and control youth, and effects of this size have been observed in related studies (Baker et al., 2011; Knight et al., 1994), analyses involving youth and mothers were based on smaller samples and in these instances, we were underpowered to detect all but relatively large effects. As a result, significant findings should be replicated, and null findings should be re-evaluated in studies with larger samples. In addition to larger samples, the use of help-seeking controls could help clarify whether the family environment is particularly relevant to psychosis pathogenesis, or whether it serves as a broader risk factor across psychiatric disorders (Millman et al., 2019).

A number of mothers did not complete the family environment measure. It is possible that those who did see their family environment as less adaptable or cohesive were those who did not complete the measure. However, comparable numbers of mothers in both the CHR and control groups were unlikely to fill out the survey. Thus, both groups would be affected by a potential restricted range. When examining education levels, mothers also did not differ on education level when looking at those who did complete the additional questionnaire compared to mothers who did not. This study did not collect information surrounding other demographic information about mothers or mothers' current mental health. Mothers' mental health may account for some of the differences in perceptions of adaptability and cohesion between youth and mothers. It is important for future research to collect more information about mothers in order to obtain a fuller picture of how the mental health of mothers and youth contribute to the ways in which adaptability and cohesion are expressed and their potential to influence the mental health of youth at CHR. Additionally, the findings involving interfamilial agreement are limited to mothers. Future studies should ideally assess multiple parents', or siblings' perspectives in order to fully capture the complete family system. Relatedly, for the present study the same scale was administered for both mothers and youth. Though there is evidence of similar factor structure among family members (Edwards, 1991), future investigations will be crucial in further establishing measurement invariance of the scale across family respondents—in this regard, results should be considered preliminary. Further, the current study sought to extend the rich literature on family environment and CHR to factors that had remained relatively unexplored (adaptability and family cohesion). However, future investigations will benefit from a multi-pronged approach where information on many family environment factors is collected, as well as compared for differences in magnitude of relationships. The approach will aid in parsing out degrees of commonality and distinctness among family environment factors in youth meeting CHR criteria. Examining the dynamics of relationships within youth at CHR during this critical period is vital in understanding different points of intervention within the family system.

CRedit authorship contribution statement

Claire Yee conducted analyses and drafted the manuscript. Teresa Vargas assisted in drafting the manuscript and analysis. Vijay Mittal

aided in data analysis, result interpretation and drafting the manuscript. Claudia Haase aided in project conceptualization and drafting the manuscript.

Declaration of competing interest

There are no conflicts of interest.

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