



The Two-Factor Structure of the Parent Cognitive Error Questionnaire: A Measure of Parental Cognitive Errors in Relation to Child Problems

Yuanyuan Jiang^{1,2} · Kevin Delucchi³ · Nina Kaiser³ · Stephen P. Hinshaw^{3,4} · Keith McBurnett³ · Linda J. Piffner³

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Abstract

This study evaluated the factor structure of the scores from a parent rating scale, the Parent Cognitive Error Questionnaire (PCEQ), which measures parents' attributions of child misbehavior and problems. The factor structure of the scores of the PCEQ was examined among 199 children (ages 7–11; mean age: 8.64 years, 58.30% boys, 53.80% White) with Attention-Deficit/Hyperactivity Disorder (ADHD), Predominantly Inattentive Presentation. Reliability and validity of the factors were assessed. Two factors emerged from this sample: (1) parent-specific cognitive errors (self-blame for child problems), and (2) child-specific cognitive errors (child-blame for child problems). Both were related to parent-rated parental depression, parenting satisfaction, parenting self-efficacy, and child ADHD and Oppositional Defiant Disorder (ODD) symptoms. After adjusting for child-specific cognitive errors, parent-specific errors were related to parent-rated parent depressive symptoms, and after adjustment for parent-specific cognitive errors, child-specific cognitive errors were related to parent-rated child ADHD and ODD symptoms. A two-factor structure for the PCEQ scores from this sample was found with evidence of reliability and validity of factors, showing promise for measuring sources of parental attributions regarding child problems.

Keywords Parent Cognitive Error Questionnaire · Attention-Deficit/Hyperactivity Disorder · ADHD · Parent cognitions · Child attributions

Introduction

Attention-Deficit/Hyperactivity Disorder (ADHD) is the most common neurodevelopmental disorder of childhood with a worldwide prevalence rate of 5–7% in elementary school-aged children (American Psychiatric Association, 2013). The Predominantly Inattentive Presentation of

ADHD (ADHD-I) is one of the most widespread child psychological disorders encountered in the community (Willcutt, 2012). In addition to the detrimental impact of ADHD on children themselves (American Psychiatric Association, 2013), parents of children with ADHD experience significantly more parenting stress than parents of children without ADHD (e.g., Gordon & Hinshaw, 2017). Parents

✉ Yuanyuan Jiang
yjiang@ustpaul.ca

Kevin Delucchi
kevin.delucchi@ucsf.edu

Nina Kaiser
nina@practicesanfrancisco.com

Stephen P. Hinshaw
stephen.hinshaw@ucsf.edu; hinshaw@berkeley.edu

Keith McBurnett
keith.mcburnett@ucsf.edu

Linda J. Piffner

linda.piffner@ucsf.edu

¹ School of Counselling, Psychotherapy, and Spirituality, Saint Paul University, 223 Main Street, K1S 1C4 Ottawa, Ontario, Canada

² Department of Educational Psychology, University of Alberta, 11210 87 Ave., T6G 2G5 Edmonton, Alberta, Canada

³ Department of Psychiatry, University of California, San Francisco, 401 Parnassus Ave., 94143 San Francisco, California, United States

⁴ Department of Psychology, University of California, Berkeley, 2121 Berkeley Way, 94720 Berkeley, California, United States

of children with ADHD are also more likely than those of typically-developing children to report lower levels of self-efficacy regarding their parenting and higher perceptions of child blame for their children's misbehavior (e.g., Johnston & Mash, 2001; Johnston & Ohan, 2005). Such parent cognitions are essential to understand and may be important aspects of ADHD assessment (e.g., Haack et al., 2017), and treatment (e.g., Mash & Johnston, 2008; Jiang et al., 2018).

Parent Cognitive Errors

Parent cognitive errors include negative and hopeless views regarding one's parenting and children (e.g., Johnston et al., 1998). Compared to parents of typically developing children, parents of children with ADHD are more likely to view their child's behavior with such cognitive errors (e.g., Johnston & Freeman, 1997) and are more likely to experience depressive symptoms (e.g., Chronis et al., 2006). The broader literature highlights the importance of understanding such cognitive errors (more specifically, attributions) given their significance in relation to other constructs of interest and their potential role in hampering progress in evidence-based treatments (Jacobs et al., 2017). Parent-specific and child-specific cognitive errors are related to parent depressive symptoms, low parenting satisfaction, low self-efficacy, and child ADHD and Oppositional Defiant Disorder (ODD) symptoms. Specific to child attributions, Chi & Hinshaw (2002) and Haack et al. (2017) found evidence that parents with higher depressive symptoms have more negative schemas regarding their child. Parents with high depressive symptoms and low mood are more likely to make negative internal, stable, and global attributions about their children's problem behavior (Bolton et al., 2003; Geller & Johnston, 1995).

There is also a link between negative child-specific attributions and low parent satisfaction about parenting. Parents who make negative child attributions are likely to have low parent-child relationship satisfaction (Sacco & Murray, 1997). In their meta-analytic review, Joiner & Wagner (1996) conclude that negative attributions of their children made by parents increase the risk for parental dissatisfaction. Although less research has been conducted on the association between negative self-attributions and low parent satisfaction, existing research shows that parents who are more likely to self-blame have lower satisfaction with their parental role (Márk-Ribiczey et al., 2016). In addition, the substantial literature underscoring the significant associations between negative child-specific attributions and child maltreatment provide evidence for the link between such attributions and parenting satisfaction, as low parenting satisfaction is related to parental use of harsh discipline

and parental maltreatment of children (e.g., Carpenter & Donahue, 2006).

The general link between self-efficacy and self-attributions is longstanding. According to Bandura's social cognitive theory (1986), self-attributions are formed based in part on cognitions of self-efficacy. In the context of parenting, there is little research that directly links the two constructs, although strong indirect support for their association exists. For instance, considerable research exists on the link between low parenting self-efficacy and parental depression, as well as support for the association between negative self- and child-attributions and parental depression (e.g., Howell et al., 2009). This literature suggests at least an indirect link between self-efficacy and self-attributions.

Parent and child attributions are also associated with child ADHD and ODD symptoms. Parents of children with ADHD and ODD are more likely to have negative attributions of their child's misbehavior (e.g., Johnston & Freeman 1997; Johnston & Ohan, 2005). Although research on the direct relations between child ADHD and ODD symptoms and parental self-blame is limited, extant studies support such a link (e.g., Moses, 2010). Parents of children with such challenges are also more likely to experience depression (Kashdan et al., 2004), low parenting satisfaction, and low parenting self-efficacy (Johnston & Mash, 2001; Harrison & Sofronoff, 2002), which increase susceptibility for parental self-blame (Kashdan et al., 2004).

A great deal of research exists on the association between high parental depressive symptoms and negative parental perceptions of child behavior (e.g., Haack et al., 2017; Fox & Gelfand, 1994). Yet little is known about the ways in which parents' self-attributions and child-specific attributions are individually related to parent and child characteristics. The existing literature on both parent and child negative attributions reveals that these two kinds of attributions are related to parental depressive symptoms among clinical samples of children (e.g., Bolton et al., 2003). However, this research does not typically adjust for the association between parent-specific attributions and parental depressive symptoms. One might expect that parents' thinking of themselves as the cause of child misbehavior may have different correlates from parents' believing children to be responsible for their own misbehavior—and that parent-specific attributions may be directly related to proximal parental characteristics, such as parental depression, when covarying for child-specific attributions.

Additionally, parent-specific attributions may not be directly related to child characteristics such as ADHD and ODD symptoms. The literature demonstrates a significant association between parent-specific attributions and parental constructs (e.g., parent self-efficacy) linked to child ADHD and ODD symptoms (e.g., Heath et al., 2015), but

no studies of which we are aware examine a direct link between parent-specific attributions and child symptoms. Parent-specific attributions may be most strongly related to proximal parent characteristics; child-specific attributions may be most strongly and directly related to proximal child characteristics. To validate parent- and child-specific cognitive errors as separate constructs, their correlates should be assessed independently after adjusting for their joint association.

Measures of Parent Cognitive Errors

A handful of questionnaires have been developed to examine parent cognitive errors, which include parents' attributions of themselves and their children (e.g., Parental Locus of Control scale (Campis et al., 1986), Written Analogue Questionnaire (Johnston & Freeman, 1997), Parent Attributions for Child's Behavior Measure (Pidgeon & Sanders, 2002), Parent Cognitions Scale (Snarr et al., 2009), Parent Attribution Measure (Sawrikar et al., 2019). Because cognitive errors can be fleeting (e.g., Kladnitski et al., 2018), a challenge for self-report questionnaires has been to capture parents' automatic and uncontrolled thoughts that occur in real life (e.g., Johnston et al., 2017). Phrasing of questions may be important. For instance, rather than having a brief sentence to describe the specific child misbehavior or problems, the use of detailed scenarios may lead to greater consistency in interpretation across respondents (e.g., Johnston & Freeman, 1997). The format of questions may also affect how respondents process their responses. Some measures ask parents to consider multiple perspectives after reading a scenario, such that parents' eventual ratings of their own attributions of the scenario reflect less automatic and more deliberate processing (e.g., Andersen et al., 2007). Introducing deliberation may bias responses in a way that fails to fully capture in-the-moment automatic thinking.

Kaiser and Pfflner (2010) created the Parent Cognitive Errors Questionnaire (PCEQ) based on expert consensus via clinical and research experience among the developers, who are both academics and clinical psychologists working with families. This questionnaire is composed of 24 items that provide vignettes of child-related misbehavior or problems and a particular type of parental thinking, along with a 5-point Likert scale for parents to rate how strongly the type of thinking presented is consistent with how the parent would think in the particular situation. The attributions assessed by the PCEQ can broadly be characterized as internal, global and/or stable with respect to the parent or the child, demonstrating negative and helpless attributions. Prior literature indicates that parents of children with ADHD are more likely to have such attributions. This measure was therefore used in a Randomized Clinical

Trial (RCT) involving children with the Primarily Inattentive Presentation of ADHD (ADHD-I), as it was expected that parents of children with this particular presentation of ADHD would hold such attributions.

Current Study

The factor structure emerging from the scores of the Parent Cognitive Error Questionnaire (PCEQ) within our sample of parents of children with ADHD-I was examined. In particular, we investigated the reliability and validity of these emerging factors from the PCEQ. We expected that the application of an a priori two-factor model to the items on the PCEQ would yield a parent-specific cognitive errors factor and a child-specific cognitive errors factor, with acceptable internal consistencies and validity. We also expected higher scores on parent-specific and child-specific cognitive errors factors to be associated with higher levels of parent depressive symptoms, child ADHD and child ODD symptoms, and lower levels of parenting satisfaction and parenting self-efficacy. The parent-specific cognitive errors factor was predicted to have a positive unique association with parental depressive symptoms, whereas the child-specific cognitive errors factor was expected to not be uniquely associated with parental depressive symptoms. In contrast, the child-specific cognitive errors factor was predicted to have a positive unique association with child ADHD and ODD symptoms, whereas the parent-specific cognitive error factor was predicted to not be uniquely associated with ADHD and ODD symptoms. No predictions were made about the unique associations of parent-specific errors and child-specific errors with the more distal parenting constructs of parenting satisfaction and self-efficacy.

Methods

Participants

One hundred and ninety-nine children participated across two sites (University of California, San Francisco and University of California, Berkeley). They were recruited via pediatricians, mental health providers, school principals, learning specialists, online parent networks or professional associations, and word of mouth in the community. Participating children needed to have a primary DSM-IV diagnosis of ADHD-I, which was confirmed via diagnostic interview; Full Scale IQ > 80; age between 7 and 11 years (grades 2–5); school proximity within 45 min of study site to allow for the clinician to conduct school meetings; the ability to participate in scheduled groups; and teacher

consent to participate in school-based treatment. Participating children were required to be residing with at least one parent for the past year and to be attending a regular classroom full-time at school. Participants who were excluded included those with a developmental disability or neurological illness, those who were in the process of initiating or changing medication in the near future, and those taking non-stimulant psychoactive medication (given the inability to withhold medication to confirm their diagnosis for the study). The total household income of participants was below \$50,000 (14% of families), \$50,000–100,000 (27% of families), \$100,000–\$150,000 (28% of families), and more than \$150,000 (31% of families). For further details on child and family demographics, please see Table 1. One hundred and sixty-seven primary parents were biological mothers, 13 primary parents were biological fathers, 10 were adoptive mothers, 3 were adoptive fathers, 2 were stepmothers, 1 was a grandmother, and 3 were other caregivers. Fewer than 5% of children were taking ADHD medication at the start of the study.

Procedure

Parents of participating children provided written informed consent, and children provided written assent, approved by the Committee on Human Research at University of California, San Francisco and University of California, Berkeley. There were three stages for screening and diagnosis: (1) telephone screening with parents and teachers, (2) parent and teacher ratings on the Child Symptom Inventory (CSI-4; Gadow & Sprafkin, 2002) and Impairment Rating Scale (IRS; Fabiano et al., 2006), and (3) comprehensive diagnostic interviews using the Kiddie Schedule for Affective Disorders and Schizophrenia for School-Age Children (K-SADS-PL; Kaufman et al., 1997), completed by a licensed clinical psychologist. The Wechsler Intelligence Scale for Children-IV (WISC-IV; Wechsler 2003) was also completed by children. Parents received an assessment report, and teachers received compensation for completing measures (\$50). For the RCT, six cohorts participated ($M=33$ children per cohort; range of 24–43), and children were randomized to the Collaborative Life and Attention Skills Treatment (CLAS; Pfflner et

al., 2014), Parent Focused Treatment (PFT), and Treatment as Usual (TAU). Measures used in this study were collected prior to intervention. See Pfflner et al., (2014) for further details.

Measures

Parent Cognitive Error Questionnaire (PCEQ; Kaiser & Pfflner, 2010). The PCEQ is a 24-item parent-report questionnaire measuring cognitive errors referring to negative attributions of child behavior and problems. The response scale ranges from 5 (*Not at all like I would think*) to 1 (*Almost exactly like I would think*). The sum of item scores for the child-specific and parent-specific cognitive error factors was used in this study. Items were reverse-scored for analyses and results to increase interpretability, so that higher scores represent higher cognitive errors. See Table 2 for specific question items of the PCEQ.

Parenting Sense of Competence Scale (PSOC; Johnston & Mash, 1989). The PSOC is a parent-report measure composed of 16 items that yields subscales tapping into parenting Satisfaction and Efficacy. For this study, both the Satisfaction and Efficacy subscales were used, which includes 9 items measuring parenting satisfaction and 7 items measuring parenting self-efficacy. This scale has been found to be internally consistent, with demonstrated convergent and divergent validity among parents of elementary school-aged children (Johnston & Mash, 1989; Johnston et al., 2010; Ohan et al., 2000). Parents rate their responses to statements on a 6-point scale ranging from *strongly disagree* to *strongly agree*, with higher scores indicating higher satisfaction or efficacy. Subscale item scores were summed for use in this study. Internal consistency was adequate, with Cronbach's alphas of 0.77 for Satisfaction and 0.77 for Efficacy.

Adult Self-Report (ASR; Achenbach & Rescorla, 2003). The ASR is a 126-item scale that examines adaptive and maladaptive functioning in adults between the ages of 18 and 59. Items assess behavioral, emotional, and social difficulties, and ratings are made on a 3-point scale (*not true, somewhat or sometimes true, very true or often true*). Scores are compared to a normative sample to determine *T*-scores. The Depressive Problems *T*-score was used in this study, with higher scores indicating more maladaptive functioning. The ASR has demonstrated internal consistency and validity among adult samples (e.g., Achenbach & Rescorla, 2003).

Child Symptom Inventory 4 (CSI-4; Gadow & Sprafkin, 2002). The CSI-4 includes child symptoms of ADHD and ODD, and parent-ratings are made on a 4-point scale (*never, sometimes, often, or very often*). Symptom scores were summed to create severity scores for ADHD and ODD, such that higher scores indicate greater severity.

Table 1 Child and parent demographic variables

	<i>M</i> (<i>SD</i>)		%
Child age	8.64 (1.16)	Child sex (% boys)	58.30
Child ethnicity	%	Child grade	
White	53.80	2nd to 3rd	56.80
African-American	5.00	3rd to 4th	43.20
Hispanic-Latino	16.60	Parent college graduates	80.00
Asian/Pacific Islander	8.00	Single-parent household	12.60
Mixed	16.60	Parent sex (% mothers)	90.00

Note. $N=199$

Table 2 Questionnaire items of the PCEQ**Parent-Specific Cognitive Error Items**

3. You take your child to the park, and he/she misbehaves, getting into an argument with another child about whose turn it is on the swings. You think to yourself, “It’s really my fault that he/she has these problems.”
7. You go to parent-teacher conferences, and your child’s teacher comments that your child seems to be a little behind his classmates in terms of his/her reading skills. You think to yourself, “It’s probably because I’m not spending enough time reading with my child.”
11. You take your child grocery shopping. At the checkout, your child begins to whine more and more loudly about wanting a candy bar. You think to yourself, “If I were doing a better job being a parent right now, my child wouldn’t be whining.”
15. Your child acts up while you are out in public, and you notice other people turning to see what is going on. You think to yourself, “If I had disciplined my child better, he/she would not be acting like this.”
23. Your child brings home his/her report card, and he/she received a poor grade in math. You think to yourself, “My child got a bad grade in math because I did not supervise him/her closely enough while he/she was doing homework.”

Child-Specific Cognitive Error Items

1. You are helping your child with his/her homework, and you have to provide your child with multiple reminders to stay on-task and complete the assignment. You think to yourself, “My child is never going to be able to do his/her homework on his/her own.”
2. Your child expresses interest in playing on the soccer team with his/her friends. You’d like to give your child the chance to play, but you remember when you signed him/her up for baseball/softball and he/she gave up and wanted to quit after the first week. You think to yourself, “My child didn’t really want to play baseball/softball, so I don’t think there’s any point in signing him/her up to play soccer.”
4. Your child has done well with completing his/her morning routine all week. On Friday morning, your child has a meltdown while getting ready for school and the whole family is late. You think to yourself, “Wow, can’t my child ever get ready on time?”
6. Your family goes to the zoo. Although often your child does well, he/she has a temper tantrum while you are visiting the elephants because he/she wants to visit the gift shop and get a toy. You think to yourself, “No more family outings, they never work.”
9. Your child comes home from school and sits down to do his/her homework. Usually, your child is prepared with his/her homework planner, but this afternoon, your child realizes that he/she has forgotten the planner at school and does not know what his/her assignments are for the next day. You think to yourself, “It’s all falling apart now, I bet it’s going to be a tough year.”
10. You invite another child over to play with your child, and the two children get into an argument at the end of the afternoon about whose turn it is in the game that they are playing. At the end of the afternoon, you think to yourself, “No more playdates, they just don’t work.”
12. You and your family go out to a fancy restaurant. Toward the end of the meal, your child becomes restless and knocks over his/her glass of water. You think to yourself, “Another meal ruined by my child’s behavior.”
18. You bring home a special dessert for your child and he/she immediately begins to complain about how much he/she received. You think to yourself, “There is no point in ever doing anything nice for my child; he/she won’t appreciate it anyway.”
20. You are working with your child at home to improve his/her spelling skills. When your child brings home his/her next spelling test, he/she has gotten eight words correct but missed the two most difficult words. You think, “It was a waste of time to work with my child on this.”
21. One morning when it is time to leave for school, your child realizes that he/she cannot find his/her homework folder with assignments that are due. You think to yourself, “My child will never manage to be independent, even as an adult.”
22. Your family sits down to watch TV together, and your child starts to argue about which program the family should watch. You think to yourself, “My child always manages to spoil any time we spend together as a family.”

Items Without Convergent and Discriminant Validity

5. Your child breaks a household rule, and you are trying to decide what to do about it. You think, “If I punish my child, he/she will feel badly and it will ruin our relationship.”
8. Your child usually does very well in school. Last week, he/she brought home a worksheet on which he/she had done incorrectly and needed to re-do. You think to yourself, “This is awful. Now he/she is struggling in school.”
13. Your child has a hard time getting along with some of the other kids in his/her class one day at recess. When you hear about this from the teacher, you think to yourself, “Oh, no, now none of the other kids are going to want to play with my child anymore.”
14. You tell your child to put away his/her backpack and then come to the dinner table right away. Your child disappears into his/her bedroom. After 10 min, you sigh to yourself and think, “My child never does anything he/she is supposed to do.”
16. You are working on keeping your cool around your child. At the end of the day and after your child displays a couple of different negative behaviors, you get upset. You think to yourself, “I am really bad at keeping my cool with my child.”
17. When you go to pick up your child from after-care, one of the staff tells you that the child broke a rule on the playground that afternoon. You think to yourself, “Great, now they have labeled my child as a troublemaker.”
19. While your child is playing a videogame, you tell him/her that it is time to clean his/her room. Your child does not move. You think to yourself, “My child would have turned off the game and gone to his/her room right away if I had taught him/her how to behave right.”
24. You tell your child to turn off the TV, pick up the Legos, and come into the kitchen for breakfast. Your child does turn off the TV and pick up the Legos, but then disappears into the bathroom. You think to yourself, “My child never listens to me.”

Note. Response scales are *Almost exactly like I would think*, *A lot like I would think*, *Somewhat like I would think*, *A little like I would think*, *Not at all like I would think*

These scales have shown reliability and validity among elementary school-aged children (Gadow & Sprafkin, 2002),

and internal consistency for parents was 0.90 (ADHD symptoms) and 0.92 (ODD symptoms).

Results

The first analysis applied a two-factor a priori model with cross-loadings to the PCEQ items using Mplus software (Asparouhov & Muthén, 2009; Becker et al., 2020; Marsh et al., 2013; Molina et al., 2020), with items treated as categorical indicators (WLSMV estimator). Global model fit was assessed using the Comparative Fit Index (CFI: acceptable fit > 0.90, Bentler, 1990), Root Mean Square Error of Approximation (RMSEA: acceptable fit < 0.08, Steiger, 1990), and Standardized Root Mean Square Residual (SRMR: acceptable fit < 0.08, Hu & Bentler, 1999). An item was retained as a unique factor indicator if it significantly loaded on one factor and not on the other. Using IBM SPSS software, the second analysis examined the correlations of the parent-specific and child-specific cognitive errors factors with outcome measures (i.e., parent depression, parenting satisfaction, parenting self-efficacy, child ADHD symptoms, child ODD symptoms). The third analysis used Mplus software to regress the manifest variable outcome measures (i.e., parent depression, parenting satisfaction, parenting self-efficacy, child ADHD symptoms, child ODD symptoms) on parent-specific and child-specific cognitive errors, yielding the unique associations of the two factors with the outcome measures.

Factor Structure

See Table 3 for all factor loadings. The CFI was 0.86, the RMSEA was 0.06, and the SRMR was 0.06. Items 3, 7, 11, 15, and 23 loaded on the parent-specific factor, and items 1, 2, 4, 6, 9, 10, 12, 18, 20, 21, and 22 loaded on the child-specific factor. Items 5, 8, 13, 14, 16, 17, 19, and 24 loaded on both factors, and did not distinguish between either factor. Thus, these items were taken out of the parent and child factors. Therefore, the parent factor was composed of 5 items and the child factor was composed of 11 items, which were involved in subsequent analyses. The internal consistency of the items emerging from the two factors was calculated using Cronbach's alpha. The parent factor items demonstrated an internal consistency of 0.73, with the child factor items yielding 0.83. The correlation between the child and parent factors indicated acceptable differentiation between factors, $r = .48$, $p < .001$ (Brown, 2015).

Correlations of Parent-Specific and Child-Specific Cognitive Errors Factors with Outcome Measures

Table 4 shows the correlations of the parent-specific and child-specific cognitive error factors with the manifest variables of child ADHD symptoms, child ODD symptoms, parent depressive symptoms, parenting satisfaction, and

Table 3 Standardized primary and secondary factor loadings of the Parent Specific Cognitive Errors items and the Child Specific Cognitive Errors items on the Parent Specific Cognitive Errors and Child Specific Cognitive Errors factors

PCEQ Item	Parent-Specific Factor		Child-Specific Factor	
	β	SE	β	SE
3	0.55***	0.08	0.04	0.08
7	0.56***	0.09	-0.08	0.09
11	0.61***	0.07	0.01	0.06
15	0.81***	0.05	-0.01	0.03
23	0.49***	0.09	0.01	0.08
1	0.02	0.11	0.42***	0.10
2	0.14	0.10	0.30**	0.09
4	0.05	0.09	0.51***	0.08
6	-0.13	0.08	0.69***	0.07
9	0.15	0.09	0.57***	0.07
10	-0.04	0.08	0.73***	0.07
12	0.002	0.05	0.62***	0.06
18	0.005	0.05	0.66***	0.05
20	0.23	0.23	0.68***	0.13
21	0.03	0.09	0.62***	0.07
22	-0.02	0.09	0.72***	0.07
5	0.29***	0.08	0.14*	0.07
8	0.28**	0.09	0.28**	0.08
13	0.34***	0.08	0.32***	0.07
14	0.23*	0.09	0.54***	0.08
16	0.33**	0.10	0.40***	0.09
17	0.33***	0.08	0.34***	0.07
19	0.49***	0.08	0.21**	0.07
24	-0.19*	0.09	0.64***	0.08

Note. PCEQ = Parent Cognitive Error Questionnaire. * $p < .05$; ** $p < .01$; *** $p < .001$

parenting self-efficacy. Higher scores on the parent-specific and child-specific cognitive errors factors were associated with significantly higher scores on child ADHD symptoms, child ODD symptoms, and parent depressive symptoms and significantly lower scores on parenting satisfaction and parenting self-efficacy.

Table 4 Correlations of Parent Specific and Child Specific Cognitive Errors factors with outcome measures

Dependent Variables	Parent-Specific Factor	Child-Specific Factor
CSI - ADHD symptoms	0.19*	0.21**
CSI - ODD symptoms	0.15*	0.25***
ASR - Depressive symptoms	0.33***	0.18*
PSOC - Satisfaction	-0.33***	-0.44***
PSOC - Efficacy	-0.17*	-0.24***

Note. CSI = Child Symptom Inventory; ADHD = Attention-Deficit/Hyperactivity Disorder; ODD = Oppositional Defiant Disorder; ASR = Adult Self-Report; PSOC = Parenting Sense of Competence Scale. * $p < .05$; ** $p < .01$; *** $p < .001$. $N = 188-193$

Unique Associations of Parent-Specific and Child-Specific Cognitive Errors Factors with Child and Parent Outcome Measures

Table 5 shows the standardized partial regression coefficients from the regression of parenting efficacy, parenting satisfaction, parent depressive symptoms, child ADHD symptoms, and child ODD symptoms on parent-specific and child-specific cognitive errors factors. Firstly, higher scores on the child-specific factor were uniquely associated with higher scores on the ADHD and ODD manifest variables, whereas the parent-specific factor did not show unique associations with the ADHD and ODD variables. Secondly, higher scores on the parent-specific factor were uniquely associated with higher scores on the parent depressive symptoms manifest variable whereas the child-specific factor was not uniquely associated with parent depressive symptoms. Higher child-specific cognitive errors, and not parent-specific cognitive errors, was significantly associated with lower parenting self-efficacy. Both higher parent-specific and child-specific cognitive errors were independently associated with lower parent satisfaction.

Discussion

Findings from this sample showed evidence of a two-factor structure, with acceptable reliability and validity. Parent-specific cognitive errors were associated with parent-rated parent depressive symptoms, and child ADHD and ODD symptoms, and related to parenting satisfaction, and parenting self-efficacy. Child-specific cognitive errors were associated with parent depressive symptoms and child ADHD and ODD symptoms, and related to parenting satisfaction and parenting self-efficacy. Parent-specific cognitive errors were uniquely related to parent depressive symptoms but not with child ADHD or ODD symptoms. Child-specific cognitive errors were uniquely positively related to child

ADHD and ODD symptoms. Both parent- and child-specific cognitive errors were negatively associated with parenting satisfaction, and child-specific cognitive errors were negatively associated with parenting self-efficacy.

Factor Structure of PCEQ

The PCEQ parent factor was composed of five items, the child factor was composed of 11 items, and eight items loaded on both the parent and child factors. Notably, the child factor comprised more than half of the number of items of the parent factor. Interestingly, the items that loaded on both parent and child factors included items of parental self-attributions (e.g., “I am really bad at keeping my cool with my child”). It may be that more of the items reflecting parent self-attributions loaded as well on child attributions because parents were more likely to view such interpretations as due to both themselves and their child. Therefore, a cognition of self-blame such as “I am really bad at keeping my cool” may also involve an element of child-blame, such that “I am really bad at keeping my cool” is in context of “with my child”. Such an explanation may mean that parents in this study were less likely to interpret the PCEQ scenarios as only due to themselves and more likely to include their child in their cognitions. The items that loaded only on the parent factor may thus be especially salient in assessing parental self-blame.

Parent Factor in Relation to Parental Depressive Symptoms

Demonstrating validity, parent-specific cognitive errors, after covarying child-specific cognitive errors, were related to parent-rated parental depressive symptoms. This finding is consistent with prior literature, which describes negative internal, stable, and global attributions as conducive to depression (Liu et al., 2015). Thus, thoughts related to blaming oneself for parenting difficulties may be distinctly related to parent-rated parental depressive symptoms and not to parent-rated child difficulties per se. Negative attributional styles toward one’s own parenting may be a subset of the overall negative attributional style characteristic of depression. In addition to being more likely to blame themselves for problems in general, parents with high depressive symptoms may be more likely to blame themselves for child difficulties, irrespective of their perceptions about the child’s level of problems.

Given that these results were found with the PCEQ scores specific to the sample of children with ADHD-I, it is important to understand the association between parent-specific cognitive errors and depressive symptoms in relation to this population. Parents assigning responsibility to themselves

Table 5 Partial standardized regression coefficients for the associations of Parent Specific and Child Specific Cognitive Error factors with manifest variable outcome measures

Dependent Variables	Parent-Specific Factor		Child-Specific Factor	
	β	SE	β	SE
PSOC - Efficacy	-0.08	0.08	-0.20*	0.08
PSOC - Satisfaction	-0.15*	0.07	-0.37***	0.07
ASR - Depressive symptoms	0.32***	0.07	0.03	0.08
CSI - ADHD symptoms	0.11	0.08	0.17*	0.08
CSI - ODD symptoms	0.05	0.08	0.23**	0.08

Note. PSOC=Parenting Sense of Competence Scale; ASR=Adult Self-Report; CSI=Child Symptom Inventory; ADHD=Attention-Deficit/Hyperactivity Disorder; ODD=Oppositional Defiant Disorder. * $p < .05$; ** $p < .01$; *** $p < .001$

for child difficulties may be especially related to parental depression in this population for a variety of reasons. For instance, compared to parents without ADHD, parents of children with ADHD are more likely to have lower self-efficacy, more negative attributions of their children, and increased parenting stress, family dysfunction, and parental psychopathology (Johnston & Mash, 2001). They are also more likely to have ADHD themselves and its associated cognitive, self-regulation, and motivational deficits (Johnston et al., 2012). It is possible that such parental challenges unique to ADHD may make it more likely that parents' own depressive symptoms relate to them blaming themselves for their children's problems as opposed to their children, whereas for parents of typically-developing children, parents may be less likely to assign responsibility to themselves and more likely to assign such responsibility to their children for child misbehaviour when experiencing depression.

Child Factor in Relation to Parent-Rated Child ADHD and ODD Symptoms

Child-specific cognitive errors were independently related to parent-rated child ADHD and ODD symptoms, such that the greater the severity of child symptoms, the higher the likelihood of parental cognitive errors specific to the child, rather than about themselves as parents. This finding makes sense in light of research showing that parents are more likely to make internal, global, and stable child-specific attributions of misbehavior for children with ADHD (Johnston & Freeman, 1997) and are less likely to attribute their children's positive behaviors in such ways (i.e., internally and stably). Such findings are corroborated by the study of Collett & Gimpel (2004) and the meta-analysis of Joiner & Wagner (1996). Similarly, Harrison & Sofronoff (2002) have found that child behavioral severity was positively associated with parents' internal child attributions of causality. It is possible that the extent of parents' negative attributions of child misbehavior increases with the severity of behavior.

Interpreting these findings in context of children with ADHD-I, it may be that parents of children with ADHD-I are more likely to assign responsibility to their children when their child exhibits higher ADHD and ODD symptoms. Such an explanation is consistent with the literature indicating that compared to parents of typically-developing children, parents of children with ADHD are more likely to make negative attributions about their child's behaviour, a cognitive bias that becomes more pronounced when the child experiences co-occurring ADHD and ODD (Johnston et al., 2012). Parents may be less likely to explain their child's misbehavior in terms of their own parenting when their child experiences higher intensity of symptoms, which is consistent with research showing greater parental attitudes

of stigma toward children with ADHD-related behaviours and an ADHD diagnosis (Ohan et al., 2013). Such a tendency may be less likely to occur in the typically-developing population, given the stigma particularly associated with having a mental health diagnosis of ADHD (Nguyen & Hinshaw, 2020).

Child Factor in Relation to Parenting Self-Efficacy

Parent ratings of child-specific cognitive errors, and not parent-specific cognitive errors, were independently related to parent-rated parenting self-efficacy, such that higher child cognitive errors were related to lower parenting self-efficacy. The associations between child attributions and parenting self-efficacy are consistent with prior research (Harrison & Sofronoff, 2002). The lack of a link between parent ratings of parent-specific cognitive errors and parenting self-efficacy seems counterintuitive given that parental depression is related to lower parenting self-efficacy and parent-specific cognitive errors are positively related to parental depression. One explanation is that when a parent exhibits cognitive errors specific to their child rather than themselves, they may exhibit an external locus of control and may lack self-efficacy regarding their own ability to respond to child problems.

In context of the sample in this study, parents of children with ADHD-I may be more likely to have child-specific cognitive errors rather than parent-specific cognitive errors when they experience low parenting self-efficacy. This association is consistent with the ADHD literature demonstrating that parents of children with ADHD are more likely to have negative attributions of their children, which lead to more emotional parental responses to child misbehavior and more harsh and negative parenting (Dix & Lochman, 1990; Smith & O'Leary, 1995). Given that the locus of control for these parents is more likely to be external to themselves, they may have lower self-efficacy and a sense of learned helplessness regarding their child's difficulties. Indeed, research with parents of children with ADHD indicates that they are more likely to make causal attributions of their child with respect to ADHD-related child behaviour and have lower parental perceptions of control over such behaviour, thereby leading to increased parental stress (Harrison & Sofronoff, 2002). Such higher levels of parental stress are associated with more emotional, harsh parenting responses in reaction to the child (Smith & O'Leary, 1995).

Parent and Child Factors in Relation to Parenting Satisfaction

Child-specific and parent-specific cognitive errors are individually related to parent-rated parenting satisfaction.

Higher parent-specific cognitive errors were related to lower parent-rated parenting satisfaction. Parenting satisfaction relates to being able to derive pleasure from the act of parenting. A relation may exist where high levels of blame of oneself impedes one's parenting satisfaction. As well, high levels of self-blame may be related to lower parenting satisfaction due to a third variable, such as parental depression. Although there is little research linking parenting satisfaction with parental depression, Headey et al. (1993) found a strong relation between general life satisfaction and depression, such that one is unlikely to be both depressed and satisfied. Although there is less research on parent self-blame and parent depression, extant investigations show that parental self-blame is related to more negative psychological well-being (Moses, 2010) and higher depressive levels (Hingley-Jones, 2005). In the broader literature, a strong association exists between depression and self-blame (Abramson & Sackheim, 1977).

Higher child-specific cognitive errors were related to lower parent-rated parenting satisfaction. A direct causal relation may be present such that child-specific attributions lead to lower parenting satisfaction. Sacco & Murray (1997) found that child causal attributions contributed independently to parent-child relationship satisfaction. Another, non-mutually-exclusive explanation may be that more negative child-specific attributions are associated with lower parenting satisfaction through the third variable of general negative affect. Indeed, parents with more negative child-specific attributions are more likely to have higher expressed emotion and more negative emotional reactions to child misbehavior (e.g., Bolton et al., 2003). Such negative affect is related to parenting satisfaction (e.g., Goetting, 1986).

In light of the sample of parents of children with ADHD-I, the link between cognitive errors and parenting satisfaction may be more pronounced than with parents of typically-developing children. Indeed, the literature has demonstrated that parents of children with ADHD are more likely to make cognitive errors and misattributions (specifically, child-specific cognitive errors) regarding their child's behaviour (Harrison & Sofronoff, 2002). Parents of children with ADHD are also more likely to experience higher parenting stress and lower parenting satisfaction than those of children without ADHD (Podolski & Nigg, 2001). Therefore, the link between child misattributions (or child-specific cognitive errors) and lower parenting satisfaction is consistent with prior research. However, the negative association between parent-specific cognitive errors and parenting satisfaction is less established in the ADHD literature, though it is also understandable how parental self-blame leads to reduced satisfaction in the parenting role. Such an association is consistent with research showing that parents

of children with ADHD have feelings of guilt and thoughts of self-blame (Peters & Jackson, 2009).

Implications for ADHD Assessment and Treatment

Evidence-based assessment of the differential extent to which parents assign responsibility to themselves as opposed to their children may aid in determining areas to prioritize in treatment. Current evidence-based treatments for ADHD emphasize behavioural approaches (American Academy of Pediatrics, 2019), and integrating a focus on reducing cognitive errors related to the child or parent may help optimize psychosocial treatment for this population (e.g., Chronis et al., 2004). Understanding cognitive errors may also reduce barriers to treatment and increase treatment engagement, two challenges related to uptake of Parent Management Training, one of the evidence-based treatments of ADHD (Chacko et al., 2017). For instance, understanding the perspectives of parents regarding the cause of a child's difficulties may allow for tailoring the treatment to make it more relevant as well as allow for complementary initial treatment components that can, for example, target the cognitive errors that may be making it hard for parents to engage in treatment (Johnston et al., 2010).

Limitations and Future Directions

The PCEQ and dependent variables are all parent-report questionnaires, and shared method variance must be considered. Given that both independent and dependent variables originated from parents, parental response styles may be responsible for results. However, the finding that parent perceptions of cognitive errors were differentially related to expected parent and child variables suggests that at the very least, the two subscales of the PCEQ are differentially measuring parent perceptions of parent and child constructs. These independent associations suggest that the PCEQ subscales are different from each other at least in terms of parental perceptions. In addition, it is challenging to find a more valid way of measuring parent cognitive errors, parenting satisfaction, and parenting self-efficacy, because these constructs are by their nature subjective. As well, in support of the value of parent-ratings of child symptoms, child ADHD and ODD assessments typically include parent-ratings of child symptoms, which are considered valid instruments (e.g., Hommersen et al., 2006; Pelham et al., 2005).

It is important to note that the psychometric properties found in this study emerged from the scores of the PCEQ in the particular sample of children diagnosed with ADHD-I. Future research would do well to examine the PCEQ in parents of children with other ADHD presentations and psychological disorders. Such studies could address whether

attributional patterns measured by the PCEQ vary based on child symptom severity and impairment. The present sample also had generally low levels of co-occurring ODD symptoms on average, and thus the generalizability of the results to children with high ODD symptoms has not been evaluated. There may be stronger correlations between the PCEQ subscales and ODD symptoms in clinical populations of children with ODD, given the strong association between negative child attributions and child ODD (e.g., Johnston et al., 2009). Further, the study sample size precludes meaningful analysis that includes covariates and examines differences in results based on variables such as age, sex, and child and parent psychopathology. Future studies should include greater sample sizes to conduct these sub-analyses.

It is unknown whether parents in this sample were diagnosed with depression. Mean levels of ASR parent-ratings were, however, between non-clinical to over three standard deviations above the mean. Thus, the study probably included parents who had clinical levels of depressive symptoms. Future studies could include a clinical sample of parents with depression. The majority of this sample was of White background and college-educated. Future studies should examine these associations with families with diverse ethnic backgrounds and socioeconomic status. Most parents in this sample were biological mothers, and future research could examine these associations among fathers and other adult caregivers to increase the generalizability of these results. This study included many girls with ADHD, an understudied population compared to boys with ADHD. Future studies should examine these research questions among gender-expansive youth. Future use of this measure should also use the words “my child” in place of “he/she” and “their” instead of “his/her” when referring to the child.

Conclusions

Findings contribute evidence for the partial independence of the child-specific and parent-specific subscales of the PCEQ from the scores emerging from this sample. Given that parents experience challenges in choosing an evidence-based ADHD treatment for their children and are using alternative treatments (e.g., Jiang & Johnston, 2010; Johnston et al., 2005), enhancements to treatments are needed (Chronis et al., 2004). Research into potential mediators of ADHD treatment highlight the importance of parent cognitions (Mah & Johnston, 2008), and a more nuanced understanding of the multifaceted nature of parent cognitions may improve treatment (e.g., Haack et al., 2017; Johnston & Ohan, 2005; Kaiser et al., 2009). This research differentiates between specific subscales of the PCEQ in the scores of this

sample in measuring types of parent cognitions, which may improve treatment and aid in future research.

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Availability of Data and Statistical Coding Dataset and code used are available on request.

Compliance with Ethical Standards

Conflict of Interest Dr. McBurnett has received research support from Akili Interactive and Shire Pharmaceuticals. All other authors report no potential conflicts of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all participants in the study.

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