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Parent–child mentalizing in pediatric epilepsy

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ABSTRACT

Background: Child psychopathology involves inappropriate or biased attributions of others' mental states (mentalizing), and parents' assessment of their children's mentalizing significantly predicts the latter's psychosocial outcomes. Behavioral difficulties are frequent in children with epilepsy (CWE) yet biased mentalizing and parental accuracy in understanding their child's mental states reasoning have not been addressed.
Methods: This study compared the performance of 34 CWE aged 9 to 16 years with 67 language age-matched controls on a biased mentalizing task. The task required children to infer on the mental states of peers in stories involving social scenarios. Responses were scored as positive, negative, or rational mentalizing attributions. To measure parental accuracy, a parent version was administered in the patient group that required a parent to identify their child's responses correctly. Relationships with the child's cognitive, behavioral, and epilepsy-related factors were examined.
Results: Patients made greater negative mental states attributions compared with control children. This negative mentalizing bias was accurately identified by parents and was associated with children's behavioral problems. Parental accuracy was reduced for patients with lower cognitive abilities. Parents did not accurately identify an overly positive (OP) bias in their child's mental states attributions. Children's positive response bias correlated with their lower executive function (EF) skills. Epilepsy factors predicted cognitive deficits but not biased mentalizing or behavioral problems.
Conclusion: Biased mentalizing characterizes social cognition in CWE with behavioral problems. Further investigation of the mentalizing biases and parental awareness of children's mental states reasoning is required to fully understand the greater psychosocial and behavioral difficulties found in CWE.

1. Introduction

Mentalizing is the ability to recognize and think about the cause of one's own or another's thoughts, feelings, and intentions [1]. Biased mentalizing occurs when an individual misconstrues the motives of an event or misinterprets the feelings of others toward themselves in a social situation and characterizes the social cognitive reasoning processes observed in child and adult psychiatric disorders [2].

Learning difficulties, psychiatric disorders, and behavioral problems are frequently observed in children with epilepsy (CWE) and are known determinants of adverse social outcomes in adulthood [3]. Research on social cognition in childhood onset epilepsies provides evidence of lower performance in patients compared with controls in verbal and nonverbal tasks [4–6]. Social perceptual and social cognitive deficits in CWE are associated with Intelligence Quotient (IQ), language and communication, attention problems [5] and, more recently, parental report of child executive function (EF) [7,8]. Children with epilepsy also show aberrant attention toward social cues of gaze and emotion, particularly fear that predicts anxiety problems, independent of global cognition or the continued presence of seizures [6]. Children with epilepsy, therefore, show lower-order attentional biases toward social stimuli — an attribute that predicts psychiatric problems. Research has not yet, however, addressed whether biases in higher-order mental state attributions also form part of the social cognitive profiles of CWE. Research suggests that a negative biased mentalizing style is likely to be consistent with the negative attentional and interpretive biases observed in anxiety and depressive disorders [9]. Conversely, positive attributional biases have been observed in attention deficit hyperactivity disorder (ADHD) [10], as well as childhood aggression and externalizing disorders [2,10,11]. There are high rates of internalizing and externalizing problems in CWE that have been shown to have different epilepsy-related, neuroanatomical, and neurocognitive correlates [12,13]. Therefore, biases in mentalizing may further differentiate the two broadband profiles in CWE.

The strongest cognitive correlates of Theory of Mind (ToM) skills in young typically developing children are EF and language [14,15]. Executive function skills are proposed to underpin the mental flexibility required for perspective shifting when mentalizing [16,17]. Language

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skills also play a critical role in social adjustment in early childhood [18], and verbal abilities continue to contribute to social understanding and peer relations into adolescence [19]. It is, therefore, important to assess these domains and compare performance between patients and controls.

Child social development is influenced by the shared understanding of internal mental and emotional states within the parent–child relationship [20,21]. Extant research on parental understanding of a child's mentalizing or 'maternal mind-mindedness' has observed individual differences in parents' ability to make appropriate mind-related versus 'nonattuned' comments about the internal states of their infants and preschoolers. In particular, poor maternal mind-mindedness has been shown to predict insecure attachments and poorer perspective-taking abilities in young children [22], increased problem behaviors in young infants [23] and in preadolescents [24]. In childhood epilepsies, a special emphasis is placed on the quality of the parent–child dyad when considering predictors of risk and resilience to psychopathology [25–27]. Discrepancies are known to exist between parents and CWE in their perceptions of the child's cognitive and socioemotional functioning [28,29]. For older children, such differences can become greater in the domain of interpersonal functioning [29]. Parents have also been found to report relatively poorer outcomes for CWE compared with child self-report [28]. It is, therefore, important to understand the degree of disparity between the perspectives of parent and child and its relationship to the child's neurocognitive status and behavioral problems. As yet, there is no research that has explicitly addressed parental understanding of children's mentalizing styles in childhood epilepsies.

The aims of the study were to (1) investigate if attributional biases exist in the mentalizing of CWE compared with controls and assess links to language and EF, (2) assess parental accuracy in understanding mentalizing of CWE, and (3) assess relationships with epilepsy factors, neurocognitive functions, and behavioral problems. The study is the first to investigate mentalizing styles in CWE. This has implications for understanding if social cognitive biases exist in patients with behavioral problems, and if they are similar or different to those observed in child psychiatric disorders. Furthermore, therapeutic interventions that address parental and child mentalization are effective in the treatment of a broad spectrum of child psychiatric disorders [9]. The study's findings, therefore, have possible implications for the clinical management of CWE.

2. Material and methods

2.1. Participants

The study involved 34 CWE and their primary caregivers (mothers). Inclusion criteria were CWE aged between 8 and 16 years old with presumed genetic or unknown etiology and who attend a mainstream school. Exclusion criteria were cases of epilepsy with an identifiable structural or metabolic etiology. The recruitment strategy and epilepsy classifications have been previously described [5]. The sample of children who continued to participate in research included seven children (16%) who met the criteria for an epilepsy syndrome (1 childhood absence epilepsy (CAE), 6 benign epilepsy with centro-temporal spikes (BECTS)). The remaining participants were grouped by the mode of seizure onset (generalized = 10, focal = 13, features of both = 5, or indeterminate: 1). Full details of the classifications are reported in Table S1 (supplementary online materials). Information on epilepsy developmental variables (age at onset, duration), the presence of a seizure in the prior six months, and number of current medications was derived from clinical records at study entry and updated by parents at participation in the study described here. Eleven CWE (32%) had a full-scale IQ < 80 (3 were in the range of 60 to 69). A total of 74 control children aged 9 to 12 years old were recruited to provide language age-matched comparison data for responses on the child version of the biased mentalizing task. The control group was recruited from two mainstream schools in the south of England. None of the patients or controls had undergone assessment for a psychiatric or neurodevelopmental disorder at the time of participation. The National Health Service Research Ethics Committee reviewed and approved the study before commencement. Table 1 displays the demographic and neuropsychological information for patients and controls. Table 2 displays epilepsy-related information and reported behavioral problems in the patient group.

2.2. Measures

2.2.1. Language and executive function

Receptive and expressive language ability was measured with the Word Classes 2 subtest from the Clinical Evaluation of Language Fundamentals IV-UK [30]. This assesses children's ability to identify the correct pairing (receptive) and their explanation of the relationship (expressive) of word classes. The Word Classes 2 Total score was used in the study. The test age equivalents are only available for the expressive subscale and were used to estimate language age. Executive function was measured with a subtest from the Delis–Kaplan Executive Function System™ [31] that measured response inhibition (Color-Word Interference (CWI)). The number of errors committed in the CWI task was selected for the study. The language and EF tests yield a standard score of 10 at the 50th percentile and a standard deviation (SD) of 3.

2.2.2. Biased mentalizing task: child and parent versions

The 'Social Stories' biased mentalizing task [2] presents children with fifteen short vignettes, each accompanied by a cartoon. There are two sets of the child version (boys, girls), with only one set selected to match the protagonist and participant on gender. Each of the 15 vignettes describes a child protagonist in mildly distressing social contexts that include being singled out, social embarrassment, and peer rejection. All story contexts have been previously described [2]. The participant is required to read or listen to the vignettes and then to select one of three answers. The participant is told to select their answer on the basis of what they believe the protagonist infers the other children in the story will think of the protagonist, given the social context. The three forced-choice answers are compiled to reflect three response styles: overly positive (OP), overly negative (ON), and rational/neutral (R). A latent class analysis on 659 children aged 7–11 years old assessed internal construct validity of the task, and a three-class latent model was found to fit the responses [2]. The parent version of the task required parents to read the vignettes and to guess the child's answer. It was stressed that the answer should not reflect their own choice, but rather the choice they thought the child had made.

2.2.3. Behavioral problems

The Child Behavior Checklist (CBCL, 6–18 years) [32] is a standardized parent report questionnaire that assesses a wide range of behavioral domains. The CBCL has been used extensively in prior research with CWE [12,13,26,27]. The CBCL includes three broadband indices of Internalizing, Externalizing, and Total Problems and eight narrowband scales; Anxious/Depressed, Withdrawn/Depressed, Somatic, Social Problems, Thought Problems, Attention Problems, Rule Breaking. The Internalizing broadband scale is a composite of Anxious and Withdrawn Depressed and Somatic complaints. The Externalizing broadband scale includes Rule Breaking and Aggressive Behavior. Total Problems comprised of the Social, Thought, and Attention problems scales plus any other items. The scales have standardized T scores with a mean of 50 and a SD of 10. The borderline clinical range is scores above 60 for the broadband scales and scores above 65 for the narrowband scales. The CBCL was administered in the patient group. No psychiatric interview was performed as ethical approval was given on the basis that participants would receive treatment as usual.

The relationship between lower parental accuracy in child mentalizing and increased child behavioral problems has previously been addressed in a large representative sample of UK families [33].

Table 1
Participant information.

N = 101		Children with epilepsy (n = 34)	Controls (n = 67)	*p*-Value
Patients and controls				
Demographics	Age years (SD)	**12.0 (2.5)**	**10.3 (0.9)**	**0.001**
	Male (%)	13 (38%)	37 (56%)[a]	0.09
Neuropsychological	Language age (SD)	10.2 (3.4)	10.9 (2.7)	0.24
	Word Classes 2 Total scores (SD)	**6.6 (3.5)**	**10.3 (2.4)**	**0.001**
	Color-Word Interference errors (SD)	8.3 (3.6)	8.9 (3.3)	0.34

[a] Pearson Chi-square test used to test for gender differences. Independent samples t-tests for all other variables. Significant differences in bold.

2.3. Statistical analyses

Seven control children had language scores 2 SDs above the mean and were excluded. Independent samples t and chi-square tests assessed differences between patients and controls on demographics, language measures, and EF. The child version of the biased mentalizing task was analyzed with a repeated measures generalized linear model (GLM) with group (patients, controls) as a main effect in order to test for differences in the number of positive (P), negative (N), and rational (R) responses endorsed by children. As all respondents answered all 15 questions, only the effects related to variability in the three response types, that is the main effect of type, and the group × type interaction were of interest. The Greenhouse Geisser correction was applied where appropriate, and all pairwise comparisons were Bonferroni adjusted. The relationships with age, language scores, and EF were examined using multivariate GLMs in patients and controls with neurocognitive measures entered as predictors and the best fitting model retained. This approach was used formally to test for different relationships between EF, language, and mentalizing skills in controls versus CWE. The same analytic approach with repeated measures GLMs was used to test for differences in parent and child response type patterns with respondent (mother, child) as a main effect. The relationships with patients' cognition and the CBCL broadband behavioral problems were examined using multivariate GLM in patients and parents. The analyses were followed with partial correlations to assess the relationships between mentalizing responses and narrowband scales in parents and patients. Epilepsy factors were added to the multivariate GLMs and included only age at onset, duration, and seizure in the last six months, as these factors have been shown previously to predict social cognition [5]. Evidence for a relationship between epilepsy and cognition is more consistent than with behavior problems [34], and therefore, epilepsy factors were only entered after cognition and behavior in the models to test if they explained any additional variance.

Table 2
Patient information.

Patients only (N = 34)		
Epilepsy factors	Age at onset years (SD)	6.3 (2.6)
	Duration years (SD)	4.2 (3.0)
	Seizure in prior 6 months (Yes/No)	13/21
	None/mono/polytherapy	7/23/4
WISV-IV	Estimated Full Scale IQ (SD)	88.2 (15.3)
CBCL broadband scales	Internalizing (SD)	53.2 (14.2)
	Borderline clinical range (%)	14 (41%)
	Externalizing (SD)	52.1 (12.2)
	Borderline clinical range n	9 (27%)
	Total problems	54.3 (14.1)
	Borderline clinical range N	13 (38%)
CBCL narrowband scales	Anxious/Depressed (SD)	57.0 (8.8)
	Borderline clinical range (%)	7 (21%)
	Withdrawn/Depressed (SD)	65.0 (19.1)
	Borderline clinical range n	13 (38%)
	Somatic Complaints	66.2 (19.5)
	Borderline clinical range N	12 (35%)
	Social Problems	58.8 (10.2)
	Borderline clinical range N	10 (29%)
	Thought Problems	57.2 (8.4)
	Borderline clinical range N	7 (21%)
	Attention Problems	61.5 (13.7)
	Borderline clinical range N	11 (32%)
	Rule Breaking Behavior	55.4 (7.4)
	Borderline clinical range N	7 (21%)
	Aggressive Behavior	57.4 (9.2)
	Borderline clinical range N	8 (24%)

3. Results

3.1. Group comparisons

Table 1 displays the results of comparisons on the child measures. Patients were significantly older than controls and had significantly lower Word Classes 2 total language scores. The two groups did not differ in language, age or CWI (EF) scores.

3.2. Child biased mentalizing

The repeated measures GLM on the response patterns demonstrated a significant main effect of response type $F\,(1.73, 183.7) = 97.90$, $p = <0.001$, $\eta_p^2 = 0.48$ that was qualified by a significant group × response type interaction $F\,(1.73, 183.7) = 22.04$, $p = <0.001$, $\eta_p^2 = 0.17$. Fig. 1a displays the mean (SE) number of positive, negative, and rational responses made by patients and controls. Patients made significantly more negative mental states attributions ($p < 0.001$) and significantly fewer rational attributions ($p = <0.001$) than controls. The multivariate analyses in the control group found that a higher language age significantly predicted a reduced number of negative attributions $F\,(1, 71) = 6.63$, $p = 0.01$, $\eta_p^2 = 0.09$ and, conversely, an increase in number of rational attributions $F\,(1, 71) = 9.05$, $p = <0.01$, $\eta_p^2 = 0.11$. In the patient group, lower EF scores significantly predicted an increased number of positive mental states attributions $F\,(1, 31) = 5.73$, $p = <0.02$, $\eta_p^2 = 0.16$. No effects of age were found (Table S2).

3.3. Parent and child biased mentalizing

A preliminary analysis of parental accuracy found no significant differences between the mothers of patients in this study compared with the standardization sample (supplementary data). The results of the repeated measures GLM on parent and child responses demonstrated a significant main effect of response type $F\,(1.49, 49.2) = 28.52$, $p = <0.001$, $\eta_p^2 = 0.46$ with a significant linear contrast (positive < negative < rational) $F\,(1, 33) = 95.32$, $p = <0.001$, $\eta_p^2 = 0.74$. There was no main effect of respondent $F\,(1, 33) = 1.00$, $p = 0.32$, $\eta_p^2 = 0.03$ and no significant 2-way interaction for response type × respondent $F\,(1.65, 54.4) = 0.38$, $p = 0.67$, $\eta_p^2 = 0.011$. Fig. 1b displays the mean (SE) number of positive, negative, and rational responses made by mothers and CWE.

3.4. Cognition and behavioral problems

The results of the multivariate analyses on patients and mothers' responses are reported in Tables 3a, 3b. As stated above, in CWE, lower EF predicted increased positive attributions, whereas mothers endorsed

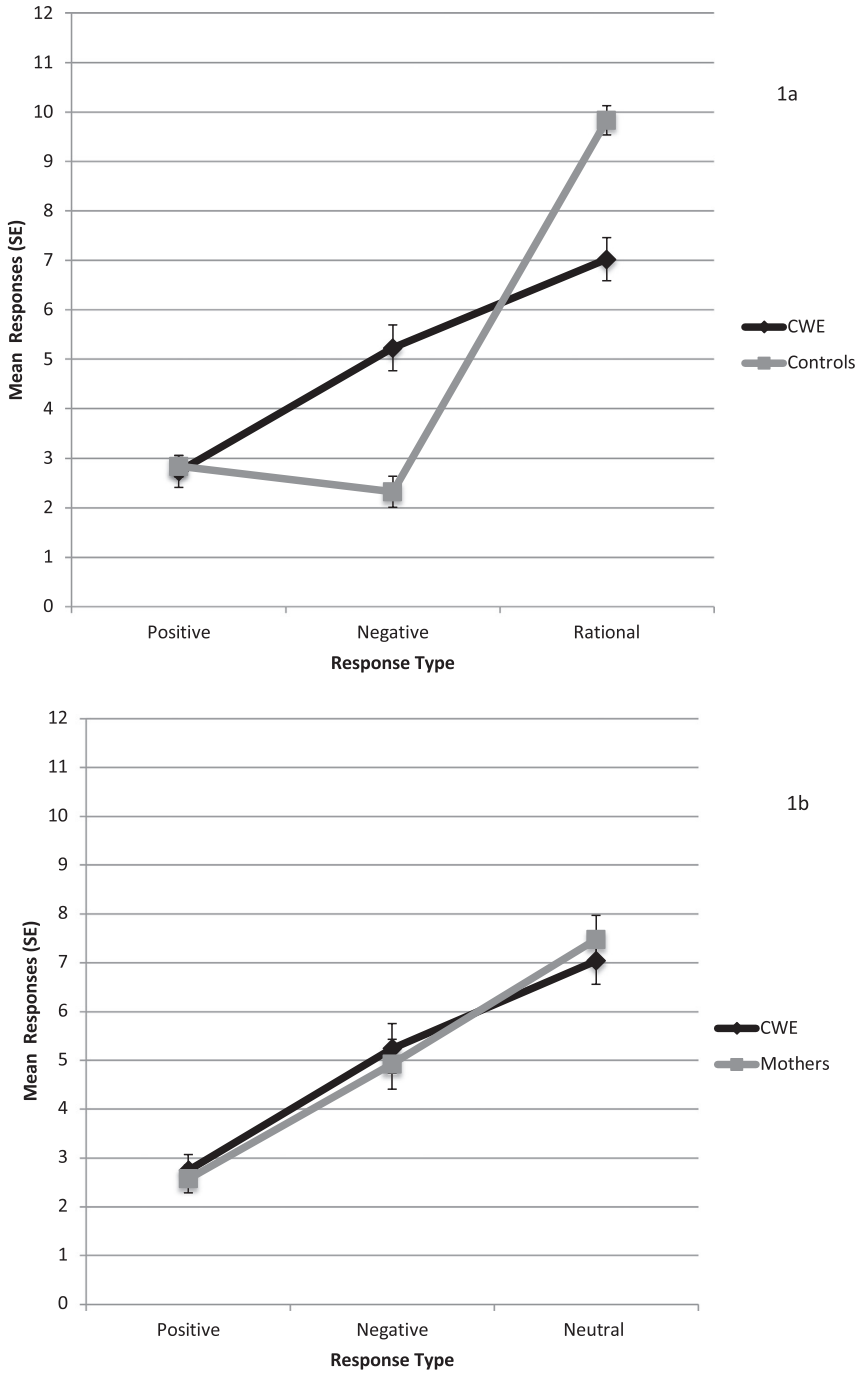

Fig. 1. (a) Mean (SE) number of positive, negative, and rational responses endorsed by CWE and Controls on the social stories biased mentalizing task. (b) Mean number of positive, negative, and rational responses endorsed by CWE and Mothers on the social stories biased mentalizing task.

fewer positive responses when their child had a lower IQ. Note that IQ and EF were strongly correlated in CWE, $r\ (34) = 0.50$, $p = 0.003$. Mothers identified the increased number of negative attributions in CWE. The CBCL scale with the highest mean score and number of patients in the borderline clinical range was the internalizing broadband scale (Table 2). In the multivariate analyses, increased internalizing scores predicted the higher negative mental states attributions in both patients and mothers. Only in mothers were fewer rational responses related to lower reported internalizing problems. The same pattern of findings was observed for externalizing and for the total problems scores. The three CBCL broadband scales were significantly correlated with one another (all $p < 0.001$) with 8 of the 14 patients in the

Table 3a
Multivariate tests of cognitive and behavioral measures on responses to the biased mentalizing task by CWE patients and mothers.

		Multivariate test	Value	F	df	Error df	Sig.
Patients	CWI executive function	Wilks' λ	0.80	3.71	2	30	0.04
	Internalizing	Wilks' λ	0.64	8.42	2	30	0.001
Mothers	IQ	Wilks' λ	0.86	1.52	3	29	0.23
	Internalizing	Wilks' λ	0.73	3.54	3	29	0.03

Table 3b
Results of the subsequent univariate tests.

		df	F	Sig.	η_p^2
CWE					
Executive function	**Positive**	**(1, 31)**	**7.64**	**0.01**	**0.20**
	Negative	(1, 31)	0.22	0.64	0.01
	Rational	(1, 31)	1.78	0.19	0.05
Internalizing	Positive	(1, 31)	0.96	0.34	0.03
	Negative	**(1, 31)**	**4.47**	**0.04**	**0.13**
	Rational	(1, 31)	2.75	0.11	0.08
Mothers of CWE					
IQ	**Positive**	**(1, 31)**	**4.08**	**0.05**	**0.12**
	Negative	(1, 31)	0.00	0.98	0.00
	Rational	(1, 31)	1.64	0.21	0.05
Internalizing	Positive	(1, 31)	1.42	0.24	0.04
	Negative	**(1, 31)**	**10.94**	**0.001**	**0.26**
	Rational	**(1, 31)**	**6.65**	**0.02**	**0.18**

Note: Significant effects are highlighted in bold.

borderline clinical range for internalizing also in this range for both externalizing and total problems.

Table 4 displays the results of the follow-up partial correlations between the CBCL narrowband scales and the mentalizing task responses, controlling for EF in patients and IQ in parents. The pattern of significant correlations indicates that only the Social Problems and the Aggressive Behavior narrowband scales reliably predicted the increased negative responses observed in both CWE patients and mothers.

3.5. Epilepsy factors

Factors related to epilepsy did not explain any additional variance in the child or parent mentalizing task. A younger age at onset predicted lower IQ $F(1,30) = 4.38$, $p = 0.05$, $\eta_p^2 = 0.13$ and lower Word Classes 2 Total scores $F(1,30) = 4.08$, $p = 0.05$, $\eta_p^2 = 0.12$, with a trend toward lower EF skills associated with the presence of seizure in the prior 6 months $F(1,30) = 3.35$, $p = 0.08$, $\eta_p^2 = 0.10$. The full multivariate results are reported in Table S3.

4. Discussion

Children with epilepsy, when asked to infer the thoughts and feelings of peers in social scenarios, showed a negative attributional bias not observed in the language age-matched control group. Mothers of patients accurately endorsed a higher number of negative items when asked to predict their child's most likely response to the social scenarios. The negative attributional bias predicted greater behavioral problems, and this negative mentalizing style could not be explained by lower IQ, language, or inhibitory control in CWE. There was preliminary evidence that mothers of CWE with the lowest IQ failed to identify an OP response bias, linked to the child's impaired inhibitory control. Epilepsy factors predicted lower cognition and language but not mentalizing styles or behavioral problems.

The negative mentalizing pattern observed in patients is consistent with the attentional and interpretive biases toward negative valenced information observed in youth with affective disorders [35]. This interpretation is consistent with the atypical social attentional responses to negative fearful stimuli that predicted anxiety problems also observed in this group of CWE [6].

However, negative attributions were only weakly correlated with the anxious and depressive narrowband scales, in contrast to the clear relationships with the social problems and aggressive behavior scales observed in both CWE and mothers. A negative bias may, therefore, be present in CWE without affective problems and could remain undetected by parents when there are fewer observable difficulties with social interactions. Such reasoning biases could reflect negative social experiences among peers, or perceptions of social rejection. Classroom observations of CWE found that they were less likely to be nominated as a best friend or to have their friend nominations reciprocated by classmates (who were unaware of their epilepsy diagnosis) [36]. It is clear from the findings, however, that children who had the greatest social behavioral difficulties, with clinically relevant social problems and reported aggressive behavior also endorsed the highest number of negative mental states attributions.

In controls, a reduction in the negative attributions and, conversely, greater endorsement of rational responses, were predicted by children's language age. The absence of an association with the significant language deficits observed in patients indicates that negative mentalizing may exist independent of language skills. It may be that the negative mentalizing bias in some CWE is a rational response to their social experiences with peers. The interplay between language deficits, social understanding, and social skills in CWE, and symptoms of psychopathology, remains to be fully elucidated [4,5].

Table 4
Partial correlations between CBCL narrowband scales and mentalizing task responses, controlling for EF in patients and IQ in parents.

	Mentalizing task responses						
		CWE patients			Mothers		
		Positive	Negative	Neutral	Positive	Negative	Neutral
Internalizing narrowband scales							
Anxious/Depressed	*r*	−0.09	0.26	−0.23	−0.15	**0.47**	**−0.42**
	p-Value	0.61	0.14	0.19	0.40	**0.01**	**0.02**
Withdrawn/Depressed	*r*	0.03	0.19	−0.24	−0.16	**0.37**	−0.28
	p-Value	0.87	0.28	0.19	0.36	**0.03**	0.11
Somatic Complaints	*r*	−0.13	0.20	−0.14	−0.06	0.32	−0.28
	p-Value	0.47	0.26	0.44	0.72	0.07	0.11
Externalizing narrowband scales							
Rule Breaking Behavior	*r*	0.18	0.31	**−0.46**	0.02	0.31	−0.33
	p-Value	0.33	0.08	**0.01**	0.91	0.08	0.06
Aggressive Behavior	*r*	0.03	**0.48**	**−0.56**	−0.03	**0.54**	**−0.55**
	p-Value	0.87	**0.01**	**0.001**	0.87	**0.001**	**0.001**
Total Problems narrowband scales							
Social Problems	*r*	−0.12	**0.42**	**−0.39**	−0.22	**0.52**	**−0.41**
	p-Value	0.50	**0.02**	**0.03**	0.23	**0.001**	**0.02**
Thought Problems	*r*	0.20	0.23	**−0.39**	0.01	0.30	−0.32
	p-Value	0.26	0.19	**0.02**	0.96	0.09	0.07
Attention Problems	*r*	0.07	0.29	**−0.37**	−0.16	0.33	−0.25
	p-Value	0.70	0.10	**0.04**	0.39	0.06	0.16

Note: Significant effects are highlighted in bold.

The theoretical proposal that a positive mentalizing bias would discriminate patients with more externalizing problems was not supported. The observed association between a higher number of positive mental states attributions and a greater frequency of inhibitory errors is consistent, however, with a positive attentional bias previously observed in children with attention disorders [10,37]. As there was no significant increase in positive attributions in the CWE compared with controls, this response type was confined to only a subgroup of patients. We reported previously that the subgroup of patients with chronic epilepsy was slower to disengage from positive (happy) facial stimuli in a social attention task [6]. The findings of the two studies combined indicate that epilepsy-related cognitive deficits are likely to extend to include aberrant mechanisms in core approach and avoidance motivational systems that could influence both lower-order social perception and attention and higher-order social cognition.

Mothers of CWE were overall accurate in their ability to identify CWE's negative mental states attributional bias in the social stories task. The level of accuracy found in mothers in the present study is also similar to that reported for parents in the standardization sample taken from the general population [33]. A parent–child disparity emerged, however, in CWE with lower IQ and EF skills, whereby mothers endorsed fewer positive mentalizing attributions when inferring their child's responses. In the standardization sample, low maternal accuracy was similarly observed in children with an OP bias. This attribution style also predicted child psychopathology, independent of the child's IQ [2]. A further study also found, however, that a greater positive bias in children was associated with mothers who themselves showed less mentalizing [11]. The observed parent–child disparity may be the result of the epilepsy-related cognitive impairments, particularly deficits in inhibitory control that could be compounded further by lower maternal mind-mindedness. This low mind-mindedness in mothers is an additional predictive factor of child psychopathology in the wider population [9]. It is important, therefore, for future research to assess both parent and child mentalizing in new-onset epilepsy and prospectively to follow up on psychiatric outcomes.

Limitations of the study are that we did not include measures of parental cognition, mentalizing styles, or psychiatric disorders in the mothers of patients. The CWE in this sample also had higher scores on multiple items that comprised the broadband scales, with many scoring highly across the broadband scales. Although CWE may show mental states biases consistent with those seen in affective disorders, we did not establish a more specific link to depression or anxiety symptoms as reported on the narrowband scales. The CBCL is a screening tool and not a diagnostic instrument and, although it has been used extensively in childhood epilepsy research, it was not developed to assess behavioral problems in children with chronic conditions [26]. No psychiatric interviews were performed to corroborate parental reports, and this is a major limitation in the study. It was not possible to determine if behavioral problems or psychiatric disorders were antecedent to the diagnosis of epilepsy. Furthermore, parental anxiety is known to be associated with lower quality of life and increased adaptive problems in CWE [38], and the degree of shared psychopathology in the parent–child dyads in this study was unknown. There was also no direct measure of children's social functioning or peer relationships. The patient group was also heterogeneous in terms of epilepsy syndromes and seizure types, duration of illness, and medication status.

Overall, the pattern of findings suggests that CWE have a bias toward attributing negative mental states toward others, and this predicted higher behavioral problems, independent of cognition, language, or epilepsy factors. A population-based cohort study of adult outcomes of childhood epilepsy found that, independent of cognitive status, poor long-term outcomes were predicted by reported anxiety over acceptance by peers when aged 11 years [39]. Negative mentalizing could, therefore, be an important clinical marker of those CWE most at risk of adverse outcomes. Assessments of social cognition are increasingly routine in neuropsychological examinations [40], and these should include measures of mentalizing biases within social contexts. The study findings also suggest, however, that CWE without neuropsychological or psychiatric problems may also make negative mental states attributions. Other potential contributory factors could include a low self-concept, poor adjustment to an epilepsy diagnosis, or parental attitudes.

The study also found that parents of children with a broader range of deficits may particularly struggle to infer their child's understanding of the social world, and this will likely impact on that child's long-term psychosocial adjustment. A recent qualitative analysis of the experiences of parents and children with active epilepsy in the UK found that parents reported feeling poorly informed by clinicians about potential association between epilepsy and behavioral difficulties. Parents reported that managing difficulties with behavior was often more impactful on family functioning than the seizures, and parents were often unsure as to how to respond to their child's difficulties [41]. Future work that addresses family factors in childhood epilepsies needs to include measures of mind-mindedness and shared mental states understanding in parent–child dyads. There is a need for greater awareness by clinicians that a disparity between parent and child mentalizing may contribute to the increased emotional and behavioral difficulties observed in this population. Insights into the shared mentalizing of parents and children would be informative for both clinicians and families and helpful in reducing the significant burden of childhood onset epilepsy.

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Conflict of interest

There are no conflicts of interest to declare.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.yebeh.2019.03.052.

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