ORIGINAL CONTRIBUTION

The role of child and parental mentalizing for the development of conduct problems over time

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Abstract The current study aimed to investigate the role of parental and child mentalizing in the development of conduct problems over time in a community sample of 7- to 11-year-olds ($N = 659$). To measure child mentalizing, children were asked to complete a social vignettes task at baseline as a measure of distorted mentalizing. Parents (primarily mothers) were asked to complete the same task, guessing their child's responses in the social scenarios as a measure of maternal mentalizing. Conduct problems were evaluated using repeated measures from multi-informant (self-, teacher-, and parent-report) questionnaires completed at baseline and 1-year follow-up. As expected, children who had an overly positive mentalizing style were more likely to be reported by teachers as having conduct problems at 1-year follow-up. These findings held when controlling for baseline conduct problems, IQ, SES, and sex. Findings for maternal mentalizing were significant for follow-up parent-report conduct problem symptoms at the bivariate level of analyses, but not at the multivariate level when controlling for baseline conduct problems and age. These findings extend previous reports by providing predictive validity for distorted mentalizing in the development of conduct problems.

Keywords Conduct problems · Social cognition · Distorted mentalizing · Parental mentalizing · Child mentalizing

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Introduction

Research examining conduct problems in early childhood have provided evidence for the stability of these problems into adolescence and adulthood [13, 14, 35]. Children with persistent conduct problems are at greater risk for developing problems in adolescence and adulthood such as personality disorders, substance use disorders, and criminality [2, 10, 15, 36, 40]. Defining characteristics of conduct problems include aggressive, defiant, and antisocial behaviors which violate the rights of others or major social norms [3].

Various risk factors have been identified in association with ongoing conduct problems including temperamental difficulties, family stress, socioeconomic status, cognitive deficits [14, 30], and insecure attachment relations [28, 32]. Biases in social cognitive processes have also been identified in children with conduct problems [52], primarily in the area of social information processing [17]. Researchers have described a variety of maladaptive social information processes which play a role in the development and maintenance of conduct problems including biased attention and encoding of hostile stimuli, intention-cue detection errors, hostile-attributional biases, inadequate response search and problem solving, and biased response evaluation in ambiguous social situations [11, 17, 41]. Another important factor in the development and maintenance of conduct problems in children is parenting. For instance, a longitudinal study of early developmental precursors for externalizing problems found that parental perceptions of their child predicted ongoing behavior problems in later adolescence [39].

Recent ethological and neuroscientific approaches to understanding impairments in social interaction have relied on the concept of theory of mind [4] or mentalizing [23] to

operationalize social cognition. The construct of mentalizing is defined as an individual's ability to understand or reflect on the context of, or the causes of, self and others' thoughts and feelings [21]. Mentalizing provides children with the ability to attribute mental states to self and others and to take on various perspectives in understanding the thoughts, feelings, and intentions of others.

Parent–child interaction is central to the development of child mentalizing capacities [47]. Early interactions provide the attachment environment in which the child may develop his/her capacity to reflect on the mental states of self and others. The extent to which the parent treats the child as a psychological agent, reflecting their child's experience and attributing intentionality to the child provides the foundation for secure attachment which in turn, provides the opportunity for the child's own development of mentalizing ability [19, 47]. In other words, children are more likely to develop secure attachment in an environment where caregivers have well-developed mentalizing capacities [20, 22]. Thus, factors such as maternal mind-mindedness [33], parental reflective function [50], and maternal accuracy [48] play a crucial role in the development of positive psychosocial outcomes in children. Maternal mind-mindedness is operationalized as the mother's ability to engage with her child at a mental level and treat her child as a psychological agent [33, 34], parental reflective function refers to a parent's capacity to reflect on her own child's experience [22], and maternal accuracy or parental mentalizing is defined as the appropriateness by which a mother reads her child's mental state [28, 48]. In a longitudinal study, researchers [43] demonstrated a relationship between mothers' use of mental state language and the development of theory of mind in toddlers even when controlling for language ability, age, mothers' education, and the toddler's own use of mental state language.

In our previous work, we examined the cross-sectional relation between conduct problems and distorted mentalizing [46]. Children with conduct problems are more likely to engage in an overly positive mentalizing style [46]. We also examined the cross-sectional relationship between parental mentalizing (maternal accuracy) and conduct problems in these children, and showed that children with conduct problems were more likely to have mothers who displayed significantly reduced maternal accuracy [48]. Taken together, our previous work has shown that an overly positive mentalizing style in the child (distorted mentalizing) and poor parental mentalizing (maternal accuracy) are both predictive of concurrent conduct problems in children. As of yet, the etiological status of these variables in the onset and development of conduct problems remain unknown. Against this background, the aim of the current study was to determine whether distorted mentalizing in children and poor mentalizing capacity in mothers would predict the development of conduct problems one year after baseline, controlling for other variables known to associate with both mentalizing and conduct problems (SES, IQ, age, and sex).

Method

Participants

This study is part of a larger study (the Child Behavior Study) on the social-cognitive and emotional correlates of antisocial behavior conducted in a community sample of 7- to 11-year-old children in Cambridgeshire, England. Parents of 2,950, 7- to 11-year-olds of 16 primary schools in Cambridgeshire, England, were asked to participate. An average of 20% (response rates for individual schools ranged from 14 to 40%) of parents volunteered their children to take part in the study ($N = 659$; 319 boys and 340 girls). Despite the low response rate typically associated with community studies of this kind where invitation letters to participate in research are sent home with children [49], two procedures were employed to determine whether the low response rate introduced a bias into the recruitment procedure. First, teachers of one of the schools were asked to complete a child behavior measure (the Strengths and Difficulties Questionnaire; SDQ) [24–26] on all the children in the school. Children whose families volunteered could then be compared with children whose parents did not volunteer. Non-parametric sample t-tests (Mann–Whitney) at significance levels of 0.05 showed no significant differences between the volunteers ($n = 61$) and non-volunteers ($n = 232$) on all five scales of the SDQ (Hyperactivity, Emotional Symptoms, Conduct Problems, Peer Problems, Prosocial). Second, comparison of socio-demographic characteristics also revealed no evidence of participation bias. The ethnic distribution in the sample was in line with regional statistics [38] for eastern England. Ninety-seven percent of participants were white, 2% of middle-eastern origin, 0.5% black, and 0.5% Asian. To determine SES, a geodemographic tool called ACORN (http://www.caci.co.uk/acorn/default.asp) was used (description in Measures section). The sample comprises of the offspring of 40% wealthy achievers, 9% urban prosperous, 28% comfortable well-off, 9% moderate means, and 14% hard pressed, as expected for eastern UK.

In total, parents of 659 children (319 boys and 340 girls) consented for participation. Out of the 659 subjects, seven children did not have complete data and were removed from the analyses; therefore, the final sample size was $n = 652$. Due to ethical considerations, subjects were not forced to complete all questionnaires, and they were not required to explain why they opted not to complete any one

particular questionnaire. The mean age of the sample was 9 years 5 months (SD = 1 year 2 months). The mean IQ of the sample was 104.40 (SD = 17.06). However, a 100% response rate on all questionnaire measures was not obtained (see Table 1 for response rates).

Measures

Parent- and teacher-reported conduct problems

To assess parent- and teacher-reported conduct problems, the Strengths and Difficulties Questionnaire [24–26] was used. The SDQ is a brief screening measure used to assess for psychiatric disorders in community samples and has been shown to identify individuals with psychiatric diagnosis with a specificity of 94.6% (95% CI 94.1–95.1%) and a sensitivity of 63.3% (59.7–66.9%) [26]. Sensitivity for the SDQ has been demonstrated to be especially good (70–90%) for the identification of conduct-oppositional disorders and hyperactivity disorders. The questionnaire consists of 25 items rated on a Likertscale ranging from "not true, somewhat true, or certainly true". Five subscales are generated for emotional symptoms, conduct problems, hyperactivity-inattention, peer problems, and prosocial behavior. The SDQ has been translated into several languages and used in many different countries [1, 57]. Adequate support for the original five-factor structure in both clinical and community samples has been reported [9, 42]. For this study, we used a continuous summary score of conduct problems as reported by parents and teachers. A higher score indicated a higher level of symptoms.

Self-reported conduct problems

Self-reported conduct problems were investigated with 11 self-report questions on current disruptive behavior derived from the DSM-IV criteria for conduct disorder. In a community ascertained random sample of 1,153 adolescents participating in the ROOTS study [27] aged 14 years, the items on this checklist showed good internal reliability ($\alpha = 0.76$). The ROOTS study sample was assessed again at 17 years of age with the same measure and acceptable alpha was demonstrated again ($\alpha = 0.76$). A higher score on this measure indicated a higher level of conduct problems.

Child mentalizing (distorted mentalizing)

To assess child mentalizing style, the Distorted Mentalizing Task, which shows good psychometric properties [46] was used. The Distorted Mentalizing Task was developed with the aim of tapping into cognitive, off-line, and explicit mentalizing in the peer context. It is a combination of self-other mentalizing in that it asks the child to reflect on the minds of others in relation to the self. Children are each presented with a set of 15 vignettes containing potentially distressing social scenarios, drawing from themes that may cause unhappiness or distress by depicting emotional and/or physical hurt and social conflict. Themes center around loneliness, ridicule, being singled out, under-achievement in sport, physical size, moving to a new school, physical disability, social embarrassment, experiencing divorce, poverty, and peer rejection. Children were presented with three response options that were derived from a pilot study in which children were asked open-ended questions about their

Table 1 Descriptive statistics of main study variables

Main study variables					
Baseline	*n*	Mean (SD)	Follow-up	*n*	Mean (SD)
Conduct problems			Conduct problems		
Self-report	649	1.49 (2.58)	Self-report	439	0.68 (1.40)
Parent-report	570	2.63 (1.24)	Parent-report	442	1.88 (1.90)
Teacher-report	617	0.91 (1.56)	Teacher-report	388	2.88 (3.11)
Age	659	9.56 (1.2)	Age	659	10.57 (1.2)
IQ	652	104.40 (17.06)	–	–	–
Maternal accuracy	354	6.52 (2.38)	–	–	–
	n	%			
Distorted mentalizing	647		–	–	–
Overly negative	240	37.1%			
Rational	243	37.6%			
Overly positive	164	25.3%			

thoughts in response to the same peer-related scenarios [45]. The three response options do not lie on a continuous metric but rather reflect one of three mutually exclusive categories: (1) an unrealistic and positive bias with strong self-reference (e.g. They would think I'm cool not to play silly games with the rest of the kids), (2) a negative bias with strong self-reference (They would think nobody likes me) or (3) a neutral/rational/adaptive option devoid of a global, internal and stable self-attribution (They would think I'm just sitting down to have a think and a rest). Full details on the development, administration, and internal validity of the attributional task, including examples of stimuli with associated cartoons, are available from the second author.

To determine the overall child attributional style across all 15 scenarios latent class analyses (LCA) [55] was used. LCA is a statistical method for finding groups in multivariate categorical data. The analyses were carried out in LEM [54]. Children did indeed separate into these three groups. The fitness of the model was good with the bootstrap p value (from 1,000 replications) non-significant ($p > 0.05$). Thus, we were able to assign children to one of three classes summarizing their overall attributional style: overly positive with strong self-reference (positive), overly negative with strong self-reference (negative), and neutral/rational without strong self-reference (rational).

Administration of the task involved 10–15 min individual sessions with a researcher who read each vignette aloud to the child.

Parent mentalizing (maternal accuracy)

To assess the extent to which mothers were able to predict the actual attributions their children made, we explained to mothers that we had presented a set of social scenarios to their children where they had to choose one of three answers. We presented the same experimental stimuli to mothers and asked them to guess which response option their child chose for each scenario. It was emphasized to mothers that they should keep in mind, at all times, that they select the option they imagined their child had chosen. The same three response options were made available to mothers. To create a variable for maternal accuracy (the 'agreement variable'), we added the number of scenarios out of 15 on which the mother–child dyad agreed upon. The higher the number of scenarios that the mother and child agreed upon indicated higher maternal accuracy.

In addition, and similar to the child data, we employed LCA to derive a summary score of the overall attributional style across all 15 scenarios that mothers attributed to their children. Like the child data a three-class provided a good fit for the data with a non-significant bootstrap p value ($p > 0.05$). Thus, we were able to assign mothers to one of three classes summarizing the overall attributional style

that they predicted for their children: overly positive with strong self-reference (positive), overly negative with strong self-reference (negative), and neutral/rational without strong self-reference (rational). Having derived a summary score for the maternal data as described here we were able to calculate the number (out of 15) of scenarios that mothers and their children agreed on. It is this variable that we have used for all subsequent analyses.

IQ

The Vocabulary and Block Design of the WISC [56] was individually administered to children. Sattler [44] has validated this shortened method as an adequate measure of IQ. Sattler's scoring guidelines were followed for this study.

Socio-economic status

To calculate socio-economic status, ACORN was used. This geodemographic tool categorizes all 1.9 million UK postal codes, which have been described using more than 125 demographic statistics within England, Scotland, Wales, and Northern Ireland, and 287 lifestyle variables, making it a powerful discriminator for social class. For this study, we used ACORN's five-class system to determine membership to one of the following: 0 for wealthy achievers, 1 for urban prosperity, 2 for comfortably well-off, 3 for moderate means, and 4 for hard pressed. A dichotomous variable was formed for a high (moderate to wealthy means; $n = 565$) and low SES group (hard-pressed; $n = 94$) in order to control for SES in examining the main study hypotheses.

Procedures

The study was approved by the local ethics board. After school principals had consented for their school to participate, invitation letters were sent home with children to obtain positive consent from parents. Parents were informed that part of the consent implied that their child's class teacher would complete measures of psychopathology. All measures were administered through individual or small group assessments with the children at school. At 1 year after baseline, teachers, parents, and children were asked to complete the psychopathology measures by mail. To increase retention rates, parents or head teachers were phoned twice if follow-up questionnaires were not returned within 2 weeks of posting.

Data analytic strategy

We first examined descriptive statistics of the main study variables (see Table 1). Next, we conducted one-way

ANOVAs' to test for differences between children with different distorted mentalizing styles for IQ, age, SES, and multiple informant ratings of conduct problems at follow-up. Tukey tests were used to investigate differences between mentalizing classes. To investigate the relationship between mentalizing style and sex, chi-square analyses were conducted. Finally, we ran hierarchical regression analyses to examine whether distorted mentalizing independently predicted conduct problems at follow-up when controlling for the effects of IQ, sex, age, SES, and baseline conduct problems.

Correlational analyses were used to examine the relationship of parental mentalizing (maternal accuracy) with multi-informant reports of conduct problems at follow-up. Sex differences were examined using independent samples t-test with maternal accuracy. A hierarchical linear regression analyses was then conducted to examine whether parental mentalizing uniquely predicted conduct problems at follow-up when controlling for the effects of IQ, sex, age, SES, and baseline conduct problems. Data analyses were conducted using SPSS-Version 17.0 [51].

Results

Response rates and attrition analyses

The response rates for self-report conduct problems at baseline was 99% ($n = 649$) and 67% ($n = 439$) at 1-year follow-up. Response rates for parent-reported conduct problems at baseline were 87% ($n = 570$) and 67% ($n = 442$) at follow-up. For teacher-report conduct problems at baseline, response rates were at 94% ($n = 617$) and 59% ($n = 388$) for 1-year follow-up.

Teacher-report conduct problems were used to examine possible attrition effects. Completers ($n = 388$) were defined as children for whom 1-year follow-up teacher data existed. Non-completers ($n = 271$) were defined as children for whom 1-year follow-up teacher data did not exist. No significant relationship was found between completers and non-completers in child reported mentalizing (distorted mentalizing; $\chi^2 = 0.48$; $df = 2$; $p = 0.79$), or with follow-up self-reported conduct problems ($t = -1.82$, $p = 0.07$). Completers and non-completers differed significantly on follow-up parent-reported conduct problems ($t = -3.03$, $p = 0.003$) with completers scoring higher at follow-up (mean = 2.10) than non-completers (mean = 1.54). We also found a significant difference for parent mentalizing (maternal accuracy; $t = 2.4$, $p = 0.02$) with completers having lower scores (mean = 6.23) on maternal accuracy than non-completers (mean = 6.84). Furthermore, there was no significant relationship between completers and non-completers in terms of IQ, age, SES, or in terms of the

amount of boys and girls who completed the study compared with those who did not.

Preliminary analyses

Descriptive statistics for main study variables are reported in Table 1. Chi-square analyses on cross-tabulations were conducted to investigate the relationship between mentalizing style and sex. A significant association was found ($\chi^2 = 7.32$; $df = 2$; $p = 0.03$). Inspection of the adjusted residuals [18] for each cell of the 2×3 cross tabulation identified an excess (more than expected under the null hypothesis) of boys who were in the rational mentalizing style group ($z = 2.6$).

Cross-informant agreement for conduct problems in our study was comparable to previously reported results in a community sample of Finnish school-age children [31]. Self-report conduct problems were modestly and positively related to teacher- ($r = 0.240$, $p < 0.001$) and parent-reported conduct problems ($r = 0.104$, $p = 0.014$). The highest inter-correlation was between teacher- and parent-reported conduct problems ($r = 0.331$, $p < 0.001$).

To examine whether there were significant differences for baseline and follow-up conduct problems, we conducted a paired samples t-test with multi-informant baseline and follow-up conduct problems. There was a significant difference between baseline and follow-up self- ($t = 6.51$; $p > 0.001$) parent- ($t = 8.01$; $p < 0.001$), and teacher-reported ($t = -12.71$; $p < 0.001$) conduct problems. Parents and children reported lower conduct problem scores at follow-up when compared with baseline, while teachers reported higher conduct problem scores at follow-up than they did at baseline (see Table 1).

Distorted mentalizing and conduct problems at 1-year follow-up

At baseline, one-way ANOVA's revealed that all three child mentalizing styles were significantly associated with conduct problems at the bivariate level at $p < 0.01$ as reported by self $F(2,642) = 9.92$ and parents $F(2,562) = 9.92$, and at $p = 0.02$ for teachers $F(2,604) = 3.92$.

Bivariate analyses of follow-up variables were conducted using one-way ANOVAs with mentalzing style (ON, R, OP) as the independent variable and follow-up self-, teacher-, and parent-reported conduct problems as dependent variable revealed a significant difference at the $p < 0.01$ level for the three mentalizing styles with only teacher-reported conduct-problems $F(2,378) = 9.61$. Post hoc Tukey tests revealed that the significant difference was between rational and overly positive response styles ($p < 0.01$). At follow-up, children with an overly positive mentalizing style were reported by teachers to have more

conduct problems than children with rational or overly negative mentalizing styles. This was not the case for self- or parent-reported conduct problems. The negative finding here is likely due to the low base rates of self-and parent-reported conduct problems (see Table 1).

The effects of gender, age, SES, and IQ on 1-year follow-up conduct problems

Independent sample t tests revealed significant differences between boys and girls on self-reported conduct problems ($t = 3.49$; $p = 0.001$); and teacher- reported conduct problems ($t = 5.84$; $p < 0.01$) at follow-up; with boys scoring significantly higher than girls. However, we did not find a significant difference in follow-up parent-report conduct problems between boys and girls ($t = 1.81$; $p = 0.07$). Bivariate analyses showed that IQ was significantly negatively correlated with teacher-reported conduct problems ($r = -0.31$; $p < 0.01$), self-reported conduct problems ($r = -0.11$; $p = 0.02$), and parent-reported conduct problems ($r = -0.11$; $p = 0.02$). Age did not have a significant effect on follow-up conduct problems as reported by self, parent, or teachers at the bivariate level. A chi-square analysis confirmed that there was no significant relationship ($\chi^2 = 2.23$; $df = 2$; $p = 0.33$) between SES and child mentalizing (distorted mentalizing). In addition, independent sample t tests did not reveal significant differences between SES with parent mentalizing, or with baseline conduct problems, and follow-up self- and parent- reported conduct problems. However, significant differences were found between children high and low on SES and teacher ratings of follow-up conduct problems, with children in the hard-pressed group rated by their teachers as higher on conduct problems ($t = -1.42$; $p = 0.018$).

To further investigate the relationship between baseline distorted mentalizing and follow-up conduct problems, we carried out a hierarchical linear regression with child-report distorted mentalizing, SES, IQ, sex, and baseline teacher-reported conduct problems as predictors and follow-up teacher-reported conduct problems as the outcome variable. Findings are summarized in Table 2. Distorted mentalizing (overly positive) remained a significant independent predictor of teacher-reported conduct problems at follow-up ($p = 0.001$). Results from the hierarchical linear regression demonstrated a moderately strong overall relationship between the predictor variables and conduct problems, which was significantly improved by adding distorted mentalizing to the equation (R^2 change = 3%, $F = 29.13$, $p < 0.01$). Together, predictor variables accounted for 29% of the variation in conduct scores (R^2). Distorted mentalizing was independently associated with conduct problems, alongside sex, IQ, and baseline teacher-reported conduct problems (see Table 2).

Table 2 Hierarchical linear regression examining the independent contribution of distorted mentalizing with teacher-report conduct problems at follow-up while controlling for the effect of baseline conduct problems, IQ, SES, and sex

| | T2 teacher-report conduct problems | | |
| | $n = 358$ | | |
	B	SE(B)	β
Distorted mentalizing	1.20	0.33	0.17**
T1 teacher-report conduct problems	0.52	0.10	0.26**
Sex	−1.68	0.28	−0.27**
SES	0.244	0.392	0.029
IQ	−0.04	0.01	−0.24**

SES socioeconomic status, $R^2 = 0.29$

** $p < 0.001$

The association between maternal accuracy and conduct problems at 1-year follow-up

Maternal accuracy showed significant negative correlation with parent-reported conduct problems at baseline ($r = -0.22$; $p < 0.001$) and for follow-up ($r = -0.14$; $p = 0.05$). However, pearson correlation coefficients for baseline maternal accuracy and self- and teacher-reported conduct problems at 1-year follow-up were all non-significant. Maternal accuracy was significantly associated with age ($r = 0.15$; $p = 0.01$) and IQ ($r = 0.16$; $p < 0.01$), but not with sex ($t = 0.90$; $p = 0.37$) or with SES ($t = 0.08$; $p = 0.51$). However, a hierarchical linear regression analysis with maternal accuracy, IQ, age, and baseline conduct problems, as predictor variables and follow-up conduct problems as outcome variable showed no significance for maternal accuracy. Findings are summarized in Table 3. The effects were washed out by the significance of baseline conduct-problems. Although maternal accuracy was concurrently related to conduct problems, it did not remain a significant predictor of conduct problems.

Given this negative finding, and the fact that the response rate for maternal accuracy data was lower than other measures, we examined whether patterns existed in the missing data. Children who had data for maternal accuracy were grouped as responders, and non-responders were children with missing data for maternal accuracy. Results revealed significant differences between responders and non-responders for maternal accuracy in age ($t = 3.65$; $p < 0.001$), and with parent-reported conduct problems ($t = 2.09$; $p = 0.04$). No significant difference was found between responders and non-responders for maternal accuracy and self-reported conduct problems ($t = 1.83$; $p = 0.07$), or teacher-reported conduct problems ($t = -1.87$; $p = 0.06$). There was significantly more response

Table 3 Hierarchical linear regression examining the independent contribution of parent mentalizing with parent-report conduct problems at follow-up while controlling for the effect of baseline conduct problems, IQ, and age

	T2 parent-report conduct problems		
	$n = 414$		
	B	SE(B)	β
Maternal accuracy	−0.05	0.05	−0.05
T1 Parent-report conduct problems	0.58	0.10	0.33**
IQ	−0.003	0.007	−0.02
Age	−0.002	0.009	−0.01

$R^2 = 0.12$

** $p < 0.001$

from mothers who had younger children (mean = 9.4), and children whose parent-reported conduct problems (mean = 1.75) were lower. Chi-square analyses revealed no significant relation between responders and non-responders in sex ($\chi^2 = 0.53$; $df = 1$; $p = 0.47$) or in terms of SES ($\chi^2 = 2.8$; $df = 1$; $p = 0.09$).

Discussion

The current study aimed to investigate the prospective and predictive validity of child (distorted) mentalizing and parental mentalizing (maternal accuracy) for the development of conduct problems. Our previous work has shown that children who attribute unrealistic, overly positive cognitions to peers in distressing scenarios are more likely to have concurrent conduct problems [46]. In addition, children whose mothers display reduced maternal accuracy are more likely to suffer from conduct problems [48]. Against this background, the aims of the current study were to examine the roles of child and parent mentalizing, independently, in the onset and development of conduct problems in a community sample of 7- to 11-year-old children. As expected, distorted mentalizing (overly positive bias) in children significantly predicted the development of conduct problems 1 year after baseline, even when controlling for SES, IQ, sex, and baseline conduct problems.

This is the first study to provide evidence of a prospective relationship between child mentalizing (distorted mentalizing) and the development of conduct problems over 1-year follow-up. Children who engage in this reality-distorting mentalization process are more likely to develop future conduct problems a year later as reported by teachers. In line with previous research on overly positive biases in association with behavior problems [7, 8, 12, 16, 29]),

our study supports the notion that children that mentalize through inflating views of themselves may, in time, feel threatened when confronted with more realistic feedback, which, in turn, may lead to acting out. As such, distorted mentalizing can be characterized as more than a mere epiphenomenon of psychopathology.

Our findings for the role of maternal accuracy in the development of conduct problems over and above the existence of concurrent conduct problems were less compelling. Even though poor maternal accuracy appears to be concurrently related to conduct problems [48], it did not significantly predict the development of conduct problems at 1-year follow-up when controlling for baseline conduct problems and age. An obvious methodological explanation for this negative finding may be the fact that mothers who completed the maternal accuracy measure were more likely to have children with lower conduct problems scores, resulting in reduced variability of follow-up conduct problems in relation to maternal accuracy. Beyond methodological findings, several possible substantive explanations exist for this negative finding. First, it may be that parent mentalizing as indexed by maternal accuracy is not a stable characteristic of the parent [48]. Instead, parental mentalizing (of the child's mind) may be a function of the relationship with the child and may change over the course of time within the dynamic context of mother–child interaction. In contrast, the child's mentalization of peers' minds in relation to the self may be more a stable characteristic of the child and therefore may have stronger predictive power over time.

Second, it may be that beyond the preschool years, where the predictive validity of maternal mind-mindedness has been firmly established [33], maternal engagement with the child at a mental level loses its etiological status to instead be more of a maintaining factor in conduct problems. Given that the interaction between children and their parents are ongoing and dynamic, it would make sense that as a child matures, the directional influences of factors like maternal mindedness become more complex so that such factors maintain disorder, rather than cause disorder.

Third, the findings for a concurrent relationship between maternal accuracy and conduct problems at the bivariate level could be explained by the parent's current psychopathology, which could have affected the parent's own mentalizing of their child. The current study cannot address these issues since we did not assess maternal psychopathology. Future studies could examine these relationships in children and their parents, as parental psychopathology may be a significant contributor to a parent's inclination or motivation to reflect the child's mind.

Analyses of baseline and follow-up conduct problems revealed significant difference between both time points in self-, parent-, and teacher-reports, possibly due to regression

toward the mean [37]. The disparity in direction of increase/decrease of conduct problems between parents and self-report on the one hand and teacher-report on the other hand, may indicate a true increase in teacher-reported conduct problems, given the developmental increase in conduct problems over time, and that teachers tend to observe externalizing problems more often in the school setting [53].

Although the present study did not assess for attachment style, given the possible mediating role of attachment in mentalizing and conduct problems, it is necessary for future studies to include measures of attachment. In addition, our results revealed significantly more boys classified as rational mentalizers compared with girls. This finding is interesting since females are generally considered to have superior social-cognitive skills. It should be noted, however, that few studies have investigated sex differences in distortions of mentalizing. While deficit approaches to measuring theory of mind and mentalizing have clearly shown superior skills for girls [5, 6], it is possible that distorted mentalzing is more often found in girls. Further limitations include, first, a bias revealed through attrition analyses. Children for whom teacher follow-up data existed scored higher in parent-reported conduct problems at follow-up. The bias in conduct problems works in our favor because it ensures an adequate range of conduct problems is retained at follow-up. Second, social cognition was not measured during real-time social interaction and conduct problems were measured continuously rather than examining the presence of a diagnosable behavior disorder. In addition, parent mentalizing was measured by maternal accuracy, as a majority of the parents who participated [48] were mothers. Thus far, the role of parental mentalizing remains unstudied, and should be a focus of future research. Finally, the current study did not include the assessment of child (distorted) mentalizing at follow-up, given the experimental nature of the task and postal follow-up. Including the assessment of child mentalizing at follow-up would have allowed the examination of the bi-directional relationship between child (distorted) mentalizing and conduct problems.

Despite these limitations, the findings reported here provide evidence supporting the significant role of child mentalizing in the development and maintenance of conduct problems in middle childhood. The most important finding is that distorted mentalzing (an overly positive bias) in children is predictive of conduct problems 1 year later. Our data suggest that distorted mentalizing plays a central role in the onset, maintenance, and exacerbation of conduct problems. More specifically, they demonstrate that dysfunctional mentalizing is associated with conduct problems at the cross-sectional level and then predict the onset and worsening of conduct problems over time. Therefore, the current study contributes to the large body of research pointing to the role of social cognition in the early identification and treatment of children at risk for the development of conduct problems to prevent the persistence of problems into adolescence and adulthood.

References

1. Achenbach TM, Becker A, Dopfner M, Heiervang E, Roessner V, Stenhausen HC, Rothenberger A (2008) Multicultural assessment of child and adolescent psychopathology with ASEBA and SDQ instruments: research findings, applications, and future directions. J Child Psychol Psych 49(3):251–275. doi:10.1111/j.1469-7610.2007.01867.x

2. Aguilar B, Sroufe LA, Egeland B, Carlson E (2000) Distinguishing the early-onset/persistent and adolescent-onset antisocial behavior types: from birth to 16 years. Dev Psychopathol 12:109–132. doi:10.1017/S0954579400002017

3. American Psychiatric Association (1994) Diagnostic and statistical manual for mental disorders, 4th edn. Author, Washington

4. Baron-Cohen S, Leslie AM, Frith U (1985) Does the autistic child have a 'theory of mind'? Cognition 21(1):37–46. doi:10.1016/0010-0277(85)90022-8

5. Baron-Cohen S, Jolliffe T, Mortimore C, Robertson M (1997) Another advanced test of theory of mind: evidence from very high functioning adults with autism or asperger syndrome. J Child Psychol Psych 38(7):813–822. Retrieved from http://web.me.com/deadgraham/Psycholand/Baron-Cohen_files/new%20Baron-Cohen%20for%20as.pdf

6. Baron-Cohen S, Wheelwright S (2004) The empathy quotient: an investigation of adults with Asperger syndrome or high functioning autism, and normal sex differences. J Autism Dev Disord 34(2):163–175. doi:10.1023/B:JADD.0000022607.19833.00

7. Baumeister RF, Smart L, Boden JM (1996) Relation of threatened egotism to violence and aggression: the dark side of high self-esteem. Psychol Rev 103(1):5–33. Retrieved from http://carmine.se.edu/cvonbergen/Dark%20Side%20of%20Self-esteem.pdf

8. Baumeister RF, Smart L, Boden JM (1999) Relation of threatened egotism to violence and aggression: the dark side of high self-esteem. In: Baumeister RF (ed) The self in social psychology. Key readings in social psychology. Psychology Press, Philadelphia, pp 240–284

9. Becker A, Woerner W, Hasselhorn M, Banaschewski T, Rothenberger A (2004) Validation of the parent and teacher SDQ in a clinical sample. Eur Child Adoles Psy 13:II11-6. doi:10.1007/s00787-004-2003-5

10. Bernstein DP, Cohen P, Skodol A, Bezirganian S, Brook JS (1996) Childhood antecedents of adolescent personality disorders. Am J Psychiat 153(7):907–913. Retrieved from http://ajp.psychiatryonline.org/

11. Bogels SM, Zigterman D (2000) Dysfunctional cognitions in children with social phobia, separation anxiety disorder, and generalized anxiety disorder. J Abnorm Child Psych 28(2):205–211. doi:10.1023/A:1005179032470

12. Brendgen M, Vitaro F, Turgeon L, Poulin B, Wanner B (2004) Is there a dark side of positive illusions? Overestimation of social competence and subsequent adjustment in aggressive and non-aggressive children. J Abnorm Child Psych 32(3):305–320. doi:10.1023/B:JACP.0000026144.08470.cd

13. Campbell SB, Shaw DS, Gilliom M (2000) Early externalizing behavior problems: toddlers and preschoolers at risk for later maladjustment. Dev Psychopathol 12(3):467–488. doi:10.1017/S0954579400003114

14. Caspi A, Henry B, McGee RO, Moffitt T, Sylva PA (1995) Temperamental origins of child and adolescent behavior problems: from age three to age fifteen. Child Dev 66(1):55–68. doi:10.1111/j.1467-8624.1995.tb00855

15. Coie JD, Lochman JE, Terry R, Hyman C (1992) Predicting early adolescent disorder from childhood aggression and peer rejection. J Consult Clin Psych 60(5):783–792. Retrieved from http://www.apa.org/pubs/journals/ccp/

16. David CF, Kistner JA (2000) Do positive self-perceptions have a 'dark side'? Examination of the link between perceptual bias and aggression. J Abnorm Child Psych 28(4):327–337. doi:10.1023/A:1005164925300

17. Dodge KA (1993) Social-cognitive mechanisms in the development of conduct disorder and depression. Annu Rev Psychol 44:559–584. Retrieved from http://arjournals.annualreviews.org/loi/psych?cookieSet=1

18. Everitt BJ (1995) The analysis of repeated measures: a practical review with examples. Statistician 44(1):113–135. Retrieved from http://www.jstor.org/stable/2348622

19. Fonagy P, Target M (1997) Attachment and reflective function: their role in self-organization. Dev Psychopathol 9(4):697–700. doi:10.1017/S0954579497001399

20. Fonagy P, Leigh T, Steele M, Steele H, Kennedy R, Mattoon G, Target M, Gerber A (1996) The relation of attachment status, psychiatric classification, and response to psychotherapy. J Consult Clin Psych 64:22–31. doi:10.1037/0022-006X.64.1.22

21. Fonagy P, Steele H, Moran G, Steele M, Higgitt A (1991) The capacity for understanding mental states: the reflective self in parent and child and its significance for security of attachment. Inf Mental Hlth J 13(3):200–217. doi:10.1002/1097-0355

22. Fonagy P, Steele M, Steele H, Leigh T, Kennedy R, Mattoon G (1995) Attachment, the reflective self, and borderline states: the predictive validity of the adult attachment interview and pathological emotional development. In: Goldberg RS (ed) Attachment theory: social developmental and clinical perspectives. Analytic, New York, pp 233–278

23. Frith CD, Frith U (2006) The neural basis of mentalizing. Neuron 50(4):531–534. doi:10.1016/j.neuron.2006.05.001

24. Goodman R (1997) The strengths and difficulties questionnaire: a research note. J Child Psychol Psych 38(5):581–586. doi:10.1111/j.1469-7610.1997.tb01545

25. Goodman R (2001) Psychometric properties of the strengths and difficulties questionnaire. J Am Acad Child Psy 40(1):1337–1345. doi:10.1097/00004583-200111000-00015

26. Goodman R, Ford T, Simmons H, Gatward R, Meltzer H (2000) Using the strengths and difficulties questionnaire (SDQ) to screen for child psychiatric disorders in a community sample. Brit J Psychiat 177:534–539. Retrieved from http://bjp.rcpsych.org/

27. Goodyer IM, Croudace T, Dunn V, Herbert J, Jones PB (2009) Cohort profile: risk patterns and processes for psychopathology emerging during adolescence: the ROOTS project. Int J Epidemiol 39(2):361–369. doi:10.1093/ije/dyp173

28. Greenberg MT, Speltz ML, DeKlyen M (1993) The role of attachment in early development of disruptive behavior problems. Dev Psychopathol 5:191–213. doi:10.1017/S095457940000434X

29. Ha C, Petersen N, Sharp C (2008) Narcissism, self-esteem, and conduct problems: Evidence from a British community sample of 7–11 year olds. Eur Child Adoles Psy 17(7):406–413. doi:10.1007/s00787-008-0682-z

30. Kelvin RG, Goodyer IM, Teasdale JD, Brechin D (1999) Latent negative self-schema and high emotionality in well adolescents at risk for psychopathology. J Child Psychol Psychiatry 40(6):959–968. doi:10.1111/1469-7610.00513

31. Koskelainen M, Sourander A, Kaljonen A (2000) The Strengths and Difficulties Questionnaire among Finnish school-aged children and adolescents. Eur Child Adoles Psyc 9(4):277–284. doi:10.1007/s007870070031

32. Lyons-Ruth K (1996) Attachment relationships among children with aggressive behaviour problems: the role of disorganized early attachment patterns. J Consult Clin Psychol 64:64–73. doi:10.1037/0022-006X.64.1.64

33. Meins E (1997) Security of attachment and the social development of cognition. Psychology Press/Erlbaum (UK) Taylor and Francis, Hove

34. Meins E, Fernyhough C, Fradley E, Tuckey M (2001) Rethinking maternal sensitivity: mother's comments on infants' mental processes predict security of attachment at 12 months. J Child Psychol Psychiatry 42(5):637–648. doi:10.1111/1469-7610.00759

35. Moffitt TE (1990) Juvenile delinquency and attention deficit disorder: Boys' developmental trajectories from age 3 to age 15. Child Dev 61(3):893–910. doi:10.1111/j.1467-8624.1990.tb02830

36. Moffitt TE, Caspi A, Dickson N, Silva P, Stanton W (1996) Childhood-onset versus adolescent-onset antisocial conduct problems in males: natural history from ages 3–18 years. Dev Psychopathol 8:399–424. doi:10.1017/S0954579400007161

37. Nesselroade JR, Stigler SM, Baltes PB (1980) Regression toward the mean and the study of change. Psychol Bull 88:622–637. doi:10.1037/0033-2909.88.3.622

38. Office of National Statistics (1991) Retrieved from http://www.statistics.gov.uk/

39. Olson SL, Bates JE, Sandy JM, Lanthier R (2000) Early developmental precursors of externalizing behavior in middle childhood and adolescence. J Abnorm Child Psych 28(2):119–133. doi:10.1023/A:1005166629744

40. Patterson GR, Yoerger K (1997) A developmental model for late-onset delinquency. Nebr Sym Mot 44:119–177. Retrieved from http://www.springer.com/series/7596

41. Pettit GS, Polaha JA, Mize J (2001) Perceptual and attributional processes in aggression and conduct problems. In: Hill J, Maughan B (eds) Conduct disorders in childhood and adolescence. Cambridge University Press, New York, pp 292–319

42. Rothenberger A, Becker A, Erhart M, Wille N, Ravens-Sieberer U, BELLA study group (2008) Psychometric properties of the parent strengths and difficulties questionnaire in the general population of German children and adolescents: results of the BELA study. Eur Child Adoles Psy 17:99–105. doi:10.1007/s00787-008-1011-2

43. Ruffman T, Slade L, Crowe E (2002) The relation between children's and mothers' mental state language and theory-of-mind understanding. Child Dev 73(3):734. doi:10.1111/1467-8624.00435

44. Sattler JM (1988) Assessment of children. Sattler, San Diego

45. Sharp C (2000) Biased minds: theory of mind and emotional-behaviour disorders of middle childhood. Dissertation, University of Cambridge, UK

46. Sharp C, Croudace TJ, Goodyer IM (2007) Biased mentalizing in children aged seven to 11: latent class confirmation of response styles to social scenarios and associations with psychopathology. Soc Dev 16(1):181–202. doi:10.1111/j.1467-9507.2007.00378

47. Sharp C, Fonagy P (2008) Social cognition and attachment-related disorders. In: Sharp C, Fonagy P, Goodyer IM (eds) Social cognition and developmental psychopathology. Oxford University Press, Oxford, pp 269–302

48. Sharp C, Fonagy P, Goodyer IM (2006) Imaging your child's mind: Psychosocial adjustment and mothers' ability to predict their children's attributional response styles. Brit J Dev Psychol 24(1):197–214. doi:10.1348/026151005X82569

49. Sharp C, Van Goozen SHM, Goodyer IM (2006) Children's subjective emotional reactivity to affective pictures: gender differences and their antisocial correlates in an unselected sample of 7–11 year olds. J Child Psychol Psychiatry 47(2):143–150. doi:10.1111/j.1469-7610.2005.01464

50. Slade A (2005) Parental reflective functioning: an introduction. Att Hum Dev 7(3):269–281. doi:10.1080/14616730500245906

51. SPSS for Windows, Rel. 17.0.3. 2009. SPSS, Inc.,Chicago

52. Vasey MW, Dalgleish T, Silverman WK (2003) Research on information-processing factors in child and adolescent psychopathology: a critical commentary. J Clin Child Adolesc Psychol 32(1):81–93. doi:10.1207/S15374424JCCP3201_08

53. Verhulst FC, Koot HM, Van der Ende J (1994) Differential predictive value of parents' and teahers' reports of children's problem behaviors: a longitudinal study. J Abnorm Child Pscychol 22(5):531–546. doi:10.1007/BF02168936

54. Vermunt JK (1997) LEM: Log-linear and event history analysis with missing data. Tilberg University, Tilberg

55. Vermunt JK, Magidson J (2000) Latent class cluster analysis. In: Hagenaars JA, McCutcheon AL (eds) Advances in latent class models. Cambridge University Press, Cambridge

56. Wechsler D (1992) Wechsler Intelligence Scale for children (3rd UK edn). Psychological Corporation, London

57. Woerner W, Becker A, Rothenberger A (2004) Normative data and scale properties of the German parent SDQ. Eur Child Adoles Psy 13:II/3-II/10. doi:10.1007/s00787-004-2002-6