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RESEARCH ARTICLE

Imagining your child's mind: Psychosocial adjustment and mothers' ability to predict their children's attributional response styles

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The role of parent-child interaction for the development of children's mentalistic understanding has recently become the focus of attention and debate (Carpendale & Lewis, 2004). For instance, family talk about mental states (Cutting & Dunn, 1999; Happé, 1995), *maternal mind-mindedness* (Meins, 1997), *mentalization* (Fonagy, 1991; Fonagy, Gergely, Jurist, & Target, 2002) and *reflective function* (Fonagy & Target, 1997) have been shown to be important factors in explaining variation in children's understanding of mind. Whilst these concepts show subtle but distinct differences in the way they are operationalised (see definitions below), they all have in common that a distinction is made between interacting with a child in response to physical or emotional needs on the one hand and engagement with the child at a mental level on the other hand. The current study extends findings for the role of treating one's child as a mental

agent by operationalising this notion in a sample of middle school-aged children and by investigating its relationship with psychosocial adjustment and the child's own attributional style.

Maternal mind-mindedness refers to a mother's proclivity to treat her child as a psychological being - an individual with a mind, rather than a mere creature with needs that must be satisfied (Meins, 1997). As such, maternal mind-mindedness is operationalised through recording the mother's behaviour towards her child, e.g. the use of mental state language to reflect the child's psychological states. Mentalisation is defined as the capacity for psychological or mentalistic insight into another's intentions, desires, emotions and beliefs (Frith, Leslie & Morton, 1991; Fonagy, 1991; Frith & Frith, 2003) and is often operationalised through the use of theory of mind tasks. Fonagy and co-workers consider this capacity to be grounded in our relationship history (Fonagy & Target, 1997), and developed the concept of reflective function to refer to a mother's mentalisation capacity in the context of her attachment style (Fonagy, et al., 2002).

The development of the constructs of maternal mind-mindedness and maternal reflective function was in part prompted by the recognition that a 'transmission gap' existed in the documented relationship between a mother's own representation of her attachment security measured even before her baby was born, and the subsequent attachment security displayed by her child during the Strange Situation procedure (Benoit & Parker, 1994; Fonagy, Steele, & Steele, 1991; Van IJzendoorn, 1995). This relationship is accounted for by the hypothesis that a mother with a secure attachment representation will tend to treat her baby as a mental agent who has thoughts and feelings which can be reflected back to the infant. In so doing, the infant develops a

representation of being understood and cared for emotionally. A secure attachment style is thus facilitated in the child, which goes hand in hand with a child's own proclivity to treat others as mental agents (for a detailed discussion of this argument, see Fonagy, 2004).

As predicted, the presence or quality of maternal mind-mindedness and reflective function has been shown to affect both attachment style in the Strange Situation procedure and social-cognitive development in preschoolers. For instance, mothers of securely attached infants have been shown to be more likely than insecurely attached infants to attribute meaning to their children's early vocalizations, which, in turn, have been shown to affect the infants' language development (Meins, 1998). Mothers' ability to accurately read the mental states governing infant behaviour at 6 months has also been shown to predict attachment security at 12 months (Meins, Fernyhough, Fradley & Tuckey, 2001). Similarly, securely attached infants have been shown to be advanced in their theory of mind abilities (Fonagy, Steele, Steele, & Holder, 1997; Meins & Fernyhough, 1999).

While these studies have been intriguing, they have mostly taken place in the context of infant attachment, with the aim of demonstrating (primarily through observational methods) that poor maternal reflective function relates to insecure attachment (Fonagy, Steele, Moran, Steele, & Higgitt, 1991; Fonagy, Steele, & Steele, 1991; Fonagy, Steele, Steele, Higgitt, & Target, 1994) and that poor maternal mind-mindedness predicts reduced mentalising/theory of mind ability in the child (Meins, Fernyhough, Russell, & Clark-Carter, 1998). One issue that remains unclear is whether maternal engagement with the child at a mental level has a continuing influence on the

child's psychosocial adjustment throughout childhood. If so, how can it be operationalised? In their earlier work, Meins and co-workers have taken the frequency and/or presence of the mother's use of mental state language in her interaction with her infant to index maternal mind-mindedness. In later work, they have expanded the construct to include the accuracy or appropriateness by which a mother reads her child's psychological state (Meins, Fernyhough, Fradley & Tuckey, 2001).

Whilst this paradigm can certainly be applied to older children and their mothers, we aimed to take this one step further. Meins, et al. (2001) determined maternal accuracy in reading a child's psychological state by evaluating the mother's reading against that of an independent coder. An advantage of using an older sample of children such as the current study, is that the independent coder can be sidestepped because children can report on the psychological content of their own minds. Based on this notion, we developed a forced-choice social-cognitive paradigm to assess mothers' insights into their children's attributional style in social situations. Children were confronted with potentially distressing peer-related scenarios and were asked to report on what they think their classmates would think of them in that situation. Next, we presented the same peer-related child scenarios to mothers and asked them to guess what their children's responses had been. In doing so, mothers were asked to put themselves in the shoes or minds of their children in order to predict their attributional styles, which could then be compared with children's actual attributional styles. This process of keeping the child's mind in mind is seen as an example of maternal reflective function reflecting the mother's mentalising capacity towards her child. Similarly, Meins' concept of maternal mind-mindedness can be seen as also indexing maternal reflective

function. Whilst there are no obvious parallels to the paradigm described here for operationalising maternal reflective function, work on infants by Tronick and Cohn (1989) demonstrated that 'good interaction' as indexed by 'coordinated interaction' occurs only about 30% of the time in face-to-face interaction between mothers and infants. We therefore expected mothers to be accurate a third or half of the time, but above chance in their prediction of their children's attributional styles.

A second way in which maternal mind-mindedness and maternal reflective function studies have fallen short is by directly exploring the hypothesis that the capacity to treat the specific child as a psychological being with thoughts and feelings will be reflected in the child's general psychosocial adjustment. Generally, attachment quality has been seen as index of child psychosocial adjustment. The question of how engagement with the child on a mental level relates to child psychopathology has not yet been addressed. Is maternal accuracy positively related to child psychosocial outcome?

Clues as to what one might expect with regards to this question come from the work of Gottman and colleagues. By investigating parents' beliefs about their own and their children's emotions, they demonstrated that parental cognitions influence children's emotional adjustment (Gottman, Katz, & Hooven, 1996; Katz & Gottman, 1997). Katz and Gottman (1997) showed that parents' 'meta-emotion philosophy' (a differentiated awareness of their own emotions and those of their children) buffered children against the negative effects of marital distress or dissolution. In the same vein, Fonagy and co-workers have suggested that parents who are able to mentalise effectively and accurately with respect to their children's minds may provide them with

an environment that instills better coping with adversity, which, in turn, promotes psychological adjustment (Fonagy et al., 1994). We therefore examined the possibility that a mother's accuracy and insight into her child's attributional style regarding peers might be associated with the child's emotional well-being. Instead of focusing on attachment quality as an indicator of social development (as has been done in other studies of maternal mind-mindedness and maternal reflective function) we investigated the relationship between maternal accuracy and a broader definition of child psychosocial adjustment as indexed by child psychopathology measures.

Due to evidence that suggests variation in rates of psychopathology according to the nature of the informant (Hay, et al., 1999), we used teacher- parent-, and self-report measures of psychopathology to determine psychosocial adjustment. We predicted mothers who displayed low accuracy to have children with higher scores on psychopathology measures, compared to mothers who display medium or high accuracy. We furthermore predicted that maternal accuracy would be associated with child psychosocial outcome even when considering the effect of other predictor variables usually associated with child psychopathology (sex, and IQ). These variables have been shown to be powerful predictors for both externalising (Hill, 2002) and internalising (Goodyer & Sharp, 2005) problems. Since verbal and non-verbal IQ seem to be differentially correlated with child psychopathology (e.g. Moffit, Caspi, Rutter & Silva, 2001) we included both in our analyses.

While past studies have shown that the child's mentalising ability is predicted by attachment security in the mother-infant relationship (Fonagy, Redfern, & Charman, 1997; Fonagy, et al., 1997; Meins, 1997, 1998; Meins & Fernyhough, 1999) the child's

mentalisation in the context of other social relationships was inferred rather than directly examined. In the present investigation we examine this more directly by asking children to attribute thoughts to their peers in potentially distressing peer interaction scenarios. This enabled us to examine the relationship between maternal accuracy and the attributional style the child engaged in.

Previous work has demonstrated that children who attributed unrealistic and positive cognitions to their peers in distressing scenarios are more often rated by their teachers as having significant mental health problems on Goodman's (1997) Strengths and Difficulties Questionnaire (Sharp, Croudace, & Goodyer, under revision; Sharp, 2000). These children were also rated by teachers as less prosocial and by their parents as above cut-off on the Conduct scale of the same population screen. Children who attributed neutral, rational or negative thoughts to their peers, in contrast, were more likely to be below cut-off on the screen.

These findings were interpreted in the following way: A neutral/rational style is a coping style, akin to helpful or functional automatic thoughts discussed in cognitive-behaviour therapy literature (Beck, 1995; Wells, 1997) and does not necessarily relate to the truth. Even if you happen to get the lowest score on a test in your class (one of the scenarios in the test battery) it is good for you, when attributing thoughts to others, to engage in what could be referred to as 'rational' or 'helpful' thinking, characterised by a non self-referent (external), unstable type attribution (e.g. *They would think I might have better luck next time*). Similarly, poor psychosocial adjustment is unrelated to a realistic expectation that other children would think you are stupid when failing a test (e.g. *They would think I'm stupid*), as long as you know yourself that you are not stupid.

In contrast, poor psychosocial outcome is associated with attributing unrealistic and globally positive thoughts to the self when mindreading (e.g. *They would think I'm still the best in the class*), as these may set you up for disappointment when evidence contrary to your belief become apparent. In line with some recent models of cognitive bias and psychopathology (Baumeister, Smart, & Boden, 1996, 1999), making self-attributions that are positive in situations where the implications for self are ambiguous may be a liability for mental health, and hence, may be seen as maladaptive or dysfunctional.

The tendency of hard-to-manage children to show positive biases in aspects of social cognition was also demonstrated by Hughes and colleagues (Hughes, Cavell, & Grossman, 1997; Hughes, Cavell, & Prasad Gaur, 2001) who noted a tendency for aggressive children to idealise and inflate ratings of competence and relationship quality. Aggressive and peer-rejected children have been found to have positively distorted perceptions of their social and behavioural competencies, whereas rejected, non-aggressive children show accurate self-perceptions (David & Kistner, 2000; Hymel, Bowker, & Woody, 1993; Kupersmidt, Burchinal, & Patterson, 1995).

Against this background, our third aim was to test the hypothesis that mothers who were less accurate in predicting their children's attributions would be more likely to have children who were less effective in their interpersonal attributions. We expected that low maternal accuracy would be associated with an unrealistic and positive bias in the attributional style employed by the child indicating difficulties experienced by the young person in the same domain. We predicted that mothers of children who engaged in neutral/rational or negative attributional styles would be more accurate in guessing

these styles, based on the simple model that parents who are aware of their children's thoughts would assist them better to develop the ability to construct effective social-cognitive strategies. In contrast, we expected the parents of children who imputed unrealistic and positive attributions to their peers to be poor at predicting their children's mentalising styles.

To summarise, the aims of the current study included: (1) Investigating whether mothers had insight into the contents of their children's minds as evidenced by the accuracy with which they were able to predict the attributional style their children engaged in when faced with distressing peer-related scenarios. We expected this to be a specific capacity which dyads display in varying degrees. (2) Examining the relationship between maternal accuracy and child psychosocial adjustment as indexed by self-, teacher- and parent-reported psychopathology measures. Here, we expected a negative correlation – the lower maternal accuracy, the higher frequency of psychopathology symptoms. (3) Investigating the relationship between low maternal accuracy and child attributional style. Since previous work has shown an association between child psychopathology and an unrealistic or positive child attributional style, we predicted a relationship between the latter and low maternal accuracy.

Method

Participants

The current study is part of a larger scale study of the social-cognitive and emotional correlates of emotional-behaviour problems in middle-school aged community children (the Child Behaviour Study). Parents of 2950 7-11 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 ($n=649$). No evidence for participation bias was found for the sample. Details of this investigation and reasons for the low response rate from parents are discussed elsewhere (Sharp, Van Goozen, & Goodyer, in press; Sharp, Croudace, Goodyer, & Amtmann, 2005).

The mean age of the sample was 9 years 3 months ($SD = 1$ year 2 months), mean IQ was 105 ($SD = 15$) and there were 319 boys (48%) and 340 girls (52%). We asked the parents of randomly selected children (aiming for 50% of the sample, but selecting 60% of the sample in predicting possible non-responses) to participate in this part of the study. Non-response or incomplete questionnaires were followed up with a phone call and a second invitation to complete the questionnaire. Twenty-three parents did not respond and 12 questionnaires had to be excluded due to missing data. We therefore had social-cognitive data for 354 parent-child dyads (boys = 176; girls = 178). Similarly, when other measures were not fully completed (e.g. teacher-, parent-, or child psychopathology) they were excluded from analyses. These cases were so few that an analysis of complete vs. incomplete cases was not warranted. 'Parents' here refers overwhelmingly to mothers. Only six fathers completed the measures: two were stay-home dads and four were single fathers. Because we considered these fathers to be primary caregivers of their children we felt that they should be included in the analyses.

Nevertheless, all analyses were run twice: (i) mothers only, and (ii) mothers and fathers. The overall findings were unchanged and therefore we included the data from the six fathers. Throughout the text, however, we refer only to 'mothers' to more accurately capture the nature of the sample.

Measures

Maternal accuracy paradigm

The assessment of child attributional style. In order to determine how well mothers were in tune with their children's thinking about social situations, we first presented children individually with cartoon-stories containing potentially distressing social scenarios. The task is a forced-choice task and consists of 15 peer-related scenarios with themes that draw on typical life experiences that may cause unhappiness or distress by depicting emotional and/or physical hurt and social conflict. They include loneliness, ridicule, being singled out, under-achievement in sport, having an accident, experiencing loss, social exclusion, academic under-achievement, physical size, moving to a new school, physical disability, social embarrassment, experiencing divorce, poverty and peer rejection. For example: *One day Peter went to school and during break he went out to the playground. A lot of other kids went out to the playground too, but Peter was the only one sitting alone by the tree. Nobody was sitting or playing with him. If you were Peter, what do you think the other kids would be thinking about you?*

Children were presented with three response options that were derived from a pilot study in which children were asked open-ended questions about their thoughts in response to the same peer-related scenarios (Sharp, 2000). 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) an 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 first author.

To determine the overall child attributional style across all 15 scenarios we had to develop a way of deriving a 'summary score' for the task as a whole. One option was to impose arbitrary thresholds on the data (for instance, if a child had 10 or more out of 15 positive responses, the child would be assigned to the positive class etc.). However, a more rigorous approach to data reduction that takes into account all datapoints is to employ latent class modelling techniques (latent class analyses – LCA).

LCA (Vermunt & Magidson, 2000) is a statistical method for finding groups in multivariate categorical data. The classes are categories of a latent variable that underpin responses to test items (in this case attributional response style). The analyses were carried out in LEM (Vermunt, 1997), a statistical package that is freely available on the internet. Parametric bootstrapping to provide an exact p-value for chi-square tests of model fit was performed using Latent Gold 3.0 (Vermunt & Magidson,

2000). Here, we used LCA with three classes to identify groups of children with similar response styles on 15 social scenarios. We tested the hypothesis that three subgroups (positive self-referent, negative self-referent, neutral, non-self-referent) represented distinct (latent) classes of attributional style underlying the 15 items of the attributional task.

Children did indeed separate into these 3 groups. The bootstrap p-value (from 1000 replications) was non-significant at the designate significance cut-off ($\alpha < 0.01$), thereby indicating a good fit. Thus, we were able to assign children to one of three classes summarising 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).

The assessment of maternal accuracy. To assess the extent to which mothers were able to anticipate the actual attributions their children were likely to have 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 emphasised to mothers that they should keep in mind, at all times, that they should respond to the scenarios in the way they imagined their child responded. The same three response options were made available to parents. 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, the higher the 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 ($p > 0.01$). Thus, we were able to assign mothers to one of three classes summarising 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 also for the maternal data we had two variables to determine agreement between: (1) a child's overall attributional response style across all 15 scenarios as derived through their own responses and (2) a child's overall attributional response style across all 15 scenarios based on their mothers' predictions of their responses to the social scenarios.

Child psychopathology measures as index of psychosocial adjustment

Self-reported psychopathology. (1) The Mood and Feelings Questionnaire (MFQ) is a widely used 33-item self-report questionnaire designed to cover the symptom areas specified by the DSM-III-R (American Psychiatric Association, 1987) for major depressive disorder (Costello & Angold, 1988). The child form has good test retest reliability (Pearsons $r = 0.78$) (Wood, Kroll, Moore, & Harrington, 1995). (2) The Revised Manifest Anxiety Scale is a well-respected 37-item self-report questionnaire of current anxiety in children (Reynolds & Richmond, 1997). It produces a total score which is used in the present study. Test-retest reliability in primary school children has ranged from 0.98 over 3 weeks (Pela & Reynolds, 1982) to 0.68 over 9 months

(Reynolds & Paget, 1981). (3) Disruptive behaviour was investigated with ten self-report questions on current disruptive behaviour derived from the DSM-IV criteria for conduct disorder. The alpha coefficient for this measure was shown to be 0.75 (Kelvin, Goodyer, Teasdale, & Brechin, 1999). For all the self-report measures, the higher score implied poorer psychosocial outcome.

Teacher- and parent- reported psychopathology. In addition to self-report measures of psychopathology, parents and teachers completed the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997, 2001; Goodman, Ford, Simmons, Gatward, & Meltzer, 2000). The SDQ is a widely used UK measure of child psychopathology that has been translated into 40 languages and for which validity data exists for seven countries. It was specifically designed to screen for psychiatric disorders in community samples. SDQ predictions and independent psychiatric diagnoses were compared in a community sample of 7984 children (aged 5-15 yrs) from the 1999 British Child Mental Health Survey and was 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%; (Goodman, et al., 2000). The informant-rated SDQ has been shown to perform comparably to the Child Behavior Check List (Achenbach, 1991), despite being considerably faster to administer (Goodman & Scott, 1999).

The questionnaire consists of 25 items that form five sub-scales of five items each. Sub-scale scores include emotional symptoms, conduct problems, hyperactivity-inattention, peer problems and prosocial behaviour. The most commonly used summary score is the SDQ Total Difficulties: the sum of all items in the first four scales, which is

used in the current study as a continuous variable – the higher the score, the poorer the psychosocial adjustment.

IQ

A shortened version (Vocabulary and Block Design) of the Wechsler Intelligence Scale for Children (Wechsler, 1992), was carried out. It was individually administered and scored using Sattler's (1988) guidelines. The standardised scores for verbal and non-verbal IQ were used.

Results

Maternal accuracy

Exploratory analyses suggested maternal accuracy to be normally distributed. The Normal Q-Q plot displayed a relatively straight line and there was no clustering of points around the zero line. Descriptive analyses showed a median of 6, mean of 6.52 ($SD = 2.38$), a minimum of 2 and a maximum of 14. Maternal accuracy therefore appears to be normally distributed with most mothers falling within the middle range in the accuracy by which they predict their children's attributional styles.

We imposed quartiles as cut-offs to derive three levels of maternal accuracy: mothers who predicted up to 4 (25th percentile) scenarios correctly were designated to the low accuracy group ($n = 78$); mothers who predicted between 5-8 scenarios correctly

(between 25th and 75th percentile) were assigned to the medium accuracy group ($n = 201$); and mothers who predicted above 9 (above the 75th percentile) scenarios correctly were labeled as the high accuracy group ($n = 75$). Thus, 56% of mothers (between the 25th and 75th percentiles) were accurate in their prediction for around half of the scenarios.

Whilst the 'agreement variable' indicates the number of scenarios on which each mother-child dyad agreed upon, it does not assist in answering the question whether mothers *as a group* were above chance in their prediction of their children's overall attributional styles. We approached this issue by cross-tabulating the two variables we derived through the LCA: (1) a child's overall attributional response style across all 15 scenarios as derived through their own responses and (2) a child's overall attributional response style across all 15 scenarios based on their mothers' predictions of their responses to the social scenarios. Of the 38% children who were classified by their own responses with a negative response style (i.e. were classified by the model in the negative class) 48% were classed on the basis of their mothers' responses with the same response style (negative); of those classed as rational on the basis of child report (36%), 46% were classed rational on the basis of parent report; and of the 26% who were classed as positive, 22% were also classed as positive by their parents.

Next, we calculated a Kappa statistic to investigate the ordinal agreement between child and parent assigned classes. These returned low values ($\chi = 0.09$; $p < 0.05$), but were statistically robust at a significance level of 0.05. Mothers were therefore above chance in the accuracy by which they predicted the overall attributional style their children would engage in.

Maternal accuracy and concurrent psychosocial adjustment

Table 1 summarises descriptive statistics which showed that self-reported mood (MFQ) and anxiety (RCMAS) scores and parent-reported SDQ total difficulties scores were normally distributed. Children's self-report of DSM-IV conduct disorder symptoms and teacher-reported SDQ total difficulties scores were significantly positively skewed.

Maternal accuracy and self-reported psychopathology. The mean levels of self-reported psychopathology for low, medium and high maternal accuracy are presented visually in Figure 1. One-way ANOVAs with maternal accuracy (low, medium, high) as the independent variable and self-reported child psychopathology as dependent variables showed clear differences between means for different levels of maternal accuracy and self-reported mood scores ($F = 5.90$; $df = 2$; $p < 0.01$). Post-hoc Tukey tests revealed the most significant difference to be between low and high maternal accuracy ($p < 0.01$), rather than medium and high accuracy levels ($p > 0.01$). Differences between means for self-reported anxiety scores were also significant ($F = 4.52$; $df = 2$; $p < 0.01$). Post-hoc Tukey tests showed the differences between low and high to be highly significant ($p < 0.01$), whilst the difference between medium and high was non-significant ($p > 0.01$). No effect for self-reported conduct scores were found ($F = 1.30$; $df = 2$; $p > 0.01$).

Figure 1 about here

Maternal accuracy and parent- and teacher-reported psychopathology. The mean levels of teacher-and parent-reported psychopathology for low, medium and high maternal accuracy are presented visually in Figure 1. One-way ANOVAs with maternal accuracy (low, medium, high) as the independent variable and teacher- and parent-reported psychopathology as dependent variables showed a clear relationship between maternal accuracy and the parent-reported SDQ Total Difficulties score ($F = 4.69$, $df = 2$; $p < 0.01$). Post-hoc Tukey tests revealed that the difference between means was again most pertinent for the difference between low and high maternal accuracy ($p < 0.1$). The difference between medium and high levels of maternal accuracy were non-significant ($p > 0.01$). Findings suggested no differences in means for teacher-rated SDQ Total Difficulties scores ($F = 1.88$; $df=1$; $p > 0.01$).

The effect of maternal accuracy while controlling for the effect of verbal- and non-verbal IQ and sex. Univariate analyses showed that verbal IQ was negatively correlated with parent-reported SDQ Total Difficulties scores ($r = -0.15$; $p < 0.01$) and self-reported mood scores ($r = -0.16$; $p < 0.01$) but uncorrelated with self-reported anxiety scores ($r = -0.08$; $p > 0.01$). Non-verbal IQ also correlated negatively with parent reported SDQ Total Difficulties scores ($r = -0.13$; $p < 0.01$), self-reported mood scores ($r = -0.08$; $p = 0.03$), but not with self-reported anxiety scores ($r = -0.07$; $p > 0.01$).

Independent sample t-tests found no differences in means between boys and girls for self-reported mood scores ($t = -1.62$; $df = 353$; $p > 0.01$), parent-reported SDQ Total Difficulties ($t = 0.42$; $df = 353$; $p > 0.01$) or self-reported anxiety scores were significant ($t = -1.94$; $df = 353$; $p > 0.01$).

We carried out a series of linear regressions with maternal accuracy, verbal IQ, non-verbal IQ and sex as predictors and each of the psychopathology measures that showed promise in the univariate analyses as outcome variables (self-reported mood and parent-reported SDQ Total Difficulties). Given the fact that differences between medium and high levels of maternal accuracy were less compelling than those between levels of high and low accuracy we recoded this variable so that low maternal accuracy formed the first category and medium/high maternal accuracy together formed the second.

Findings are summarised in Table 2. It is clear that maternal accuracy is a significant and independent predictor of both self-reported depression and parent-reported child psychopathology. Beta values for maternal accuracy suggested that with low maternal accuracy mood scores increased by 0.09 standard deviations, and parent-reported psychopathology increased by 0.21 standard deviations. Verbal IQ was also shown to be highly predictive of both self-reported mood and parent reported psychopathology. Both non-verbal IQ and sex lost their predictive power in the regression analyses.

The relationship between maternal accuracy and child attributional style

So far, we have established that maternal accuracy is normally distributed with around half of the mothers being accurate about half of the time in their prediction of their children's individual responses. We have also shown that mothers as a group were above chance in their prediction of the overall attributional style their children engaged in across all 15 scenarios. Furthermore, maternal accuracy was found to predict psychosocial adjustment even when considering the effect of sex and IQ. Our last aim was to examine whether low maternal accuracy was related to ineffective social-cognitive reasoning as indexed by an unrealistic and positive child attributional style.

To this end, we carried out a chi-square analysis with low/high maternal accuracy and child attributional style (positive, negative and rational). Results are visually represented in Figure 2. The relationship between maternal accuracy and child attributional style was found to be highly significant ($\chi^2 = 23.90$; $df = 2$; $p < 0.01$). Cross-tabulations showed this difference to lie with a higher frequency of children engaging in an unrealistically positive response style for low maternal accuracy, and reduced frequency of children with a more realistically negative attributional style in the high maternal accuracy category. A higher frequency of children who engaged in a positive attributional style were found for mothers who displayed low maternal accuracy (44.9%), whilst a lower frequency of this group were found for mothers who displayed medium and high maternal accuracy (20.3%). Roughly equal percentages of children with a rational attributional style were distributed across the high (32.2%) and low maternal accuracy (33.2%). A higher frequency of children engaging in a negative style were found in the high maternal accuracy category (47.5%) and a lower frequency of these children were found in the low maternal accuracy category (21.8%).

Discussion

Psychosocial outcomes in children have been linked with several aspects of child rearing or parent-child interaction qualities, including maternal unresponsiveness, indiscriminate parenting, authoritarian parenting and negative parental control strategies (Brophy & Dunn, 2002). One class of parent-child interaction that has recently received more attention is the process of engaging with the child on a mental level, operationalised by Meins and colleagues through the concept of maternal mind-mindedness (Meins, 1997) and by Fonagy and colleagues through the constructs of reflective function (Fonagy & Target, 1997) and mentalising (Fonagy, 1991).

The current study follows this trend by first examining the variability in the accuracy by which mothers were able to guess their children's attributions during a social-cognitive task. We furthermore investigated whether mothers were above chance in their insight into their children's minds. Lastly, we investigated the implications of maternal accuracy for child psychosocial adjustment as indexed by measures of child psychopathology, and the relationship between maternal accuracy and child attributional style. As such, our study is the first to illustrate a link between maternal reflective function and child socio-emotional development in middle childhood. Whilst our effects were not strong, our community sample size was large and we found no evidence of participation bias for our sample. The findings summarised here may provide an inroad for future and more fine-grained experiments looking at the link

between a mother's (parent's) understanding of her child's mental life and the child's socio-emotional adjustment.

We found that maternal accuracy was normally distributed with 56% of mothers accurately identifying their child's mental state attributions about half of the time. As a group, mothers were also found to be above chance in predicting the overall attributional style their children engaged in across all scenarios. Maternal accuracy was found to predict child psychosocial outcome even when considering other predictors of psychopathology like IQ and sex. Finally, low maternal accuracy was found to be associated with an unrealistic and positive child attributional style.

The current findings have implications for our understanding of the intergenerational role of maternal insight into the contents of their children's minds for children's mental health and socio-emotional development. First, in line with the literature on mother-infant facial co-ordination (Tronick & Cohn, 1989), our findings suggest that relatively average maternal accuracy (about 50%) is all that is required for healthy development. By contrast, extremely poor maternal accuracy appears to be a risk factor linked to poor psychosocial adjustment for the child. Children whose mothers displayed low maternal accuracy were rated by their mothers as suffering from significantly more emotional-behaviour symptoms. The fact that these children rated themselves as higher on both depression and anxiety measures mitigates against interpreting this finding as an artifact of maternal report bias. Also striking was the fact that maternal accuracy remained significant when other variables were kept constant. It is often the case that sex differences or variation in IQ confound the relationship between social cognition and child psychopathology. This was not proven to be the

case here. Moreover, although our study was not designed to directly test for intergenerational transmission, the finding that low maternal accuracy is associated with ineffective attributional processes as evidenced by an unrealistically positive bias speaks to the possibility that poor social-cognitive skills in the mother (low maternal accuracy) may affect the development of ineffective social-cognitive strategies in the child. In other words, the mother's capacity to accurately reflect the child's internal psychological states may provide the necessary feedback to the child to develop his/her own effective social-cognitive strategies over the course of development. But if reduced, or even absent, the child may develop social-cognitive strategies characterised by patterns of interpretative biases – a kind of distorted mentalising.

Taken together, our findings are in line with the growing body of evidence suggesting a role for maternal reflective function in children's socio-emotional development. Fonagy and colleagues (Fonagy, Leigh, Steele, Steele, Kennedy, & Mattoon, 1996; Fonagy, Steele, Steele, Leigh, Kennedy, & Mattoon, 1995) have suggested that children are more likely to develop secure attachment if caregivers have well-developed mentalising abilities. The child's secure attachment, in turn, promotes the child's own capacity to mentalise accurately (Fonagy, Redfern, & Charman, 1997). Secure attachment in children has been shown to predict emotion understanding and theory of mind (de Rosnay & Harris, 2002; Greig & Howe, 2001; Repacholi & Trapolini, 2004; Symons & Clark, 2000). As such, attachment representation, which has been shown to often carry over into the next generation (Benoit & Parker, 1994; Fonagy, Steele, & Steele, 1991; Van IJzendoorn, 1995) may account for a transmission of mentalisation across generations.

Meins et al. (2001) illuminated this issue further by their finding that appropriate mind-related comments on a child's behaviour represented the mental and emotional states of the infant. The capacity to accurately guess the thoughts of one's child is likely to relate to the processes involved in the formation and operation of the internal working model of attachment relationships (Bowlby, 1973, 1980). Meins et al. (2001) suggested that a mother's capacity to think of her child as a mental agent may be indicative of the mother's internal working model of self with child, just as the Adult Attachment Interview (George, Kaplan & Main, 1985) provides a measure of the mother's internal working model of self and parent. There is emerging evidence that maternal narrative descriptions of the child as mentalising is associated with security of attachment in both the parent and the child (Slade, Grienenberger, Bernbach, Levy, & Locker, in press).

It is important to highlight, however, that Meins and co-workers have used verbal comments by mothers in response to their children's behaviour to index maternal mind-mindedness. From a social-learning perspective, Dunn (1996) has suggested a role for conversation in social-cognitive and socio-emotional development. It is therefore reasonable to hypothesise that maternal accuracy would vary as a function of the amount of mental-state conversation taking place in the family, including, as suggested by Harris (1999), fathers and older siblings.

The current study can of course not speak to these issues directly. A future study would be able to address this by including measures and observations of the actual amount of thinking- and feeling-state conversation that occurs in mother-child dyads. These variables can then be investigated for their interaction with maternal accuracy to effect psychosocial adjustment. A future study would also include reports of current

maternal psychopathology as this may be a significant contributor to a mother's proclivity or motivation to have insight into her child's mind.

Other limitations of the current study deserve attention. From a theoretical perspective we have to accept that we have no definitive model as to why poor maternal accuracy predicts psychosocial adjustment. The data available from this study did not offer a testable model of the nature of the negative impact the lack of maternal accuracy might have on the development of the child. Further, maternal accuracy was defined operationally in this study as agreement with the child's self report. It is possible that lack of agreement did not in every case reflect inaccuracy on the part of the mother, but rather reflected the complexity of the relationship between internal states and self-report and highlighted the limitations of the child as an accurate reporter of internal states (Bolton & Hill, 1996; Nisbett & Ross, 1980).

Further, the categorical assessment of the levels of maternal accuracy through using quartiles as cut-offs was by necessity somewhat arbitrary. We have not yet developed a metric for this ability and categorical distinctions are crude. In addition, the use of questionnaire assessments of children's psychosocial adjustment using a range of sources, often as in this case, are in relatively poor agreement (Achenbach, Howell, McConaughy, & Stanger, 1995). It may be argued that positive mental health, rather than the presence of symptoms of disorder might have been a more appropriate outcome criteria as the model suggests maternal accuracy to favour healthy child development by enhancing resilience against stressful experiences (Fonagy et al., 1994). Finally, even in the domain of pathology we used a continuous set of measures of psychosocial adjustment rather than the presence of a diagnosable disorder. The

results do not make clear if poor maternal accuracy acted to increase the child's symptoms or actually increased the risk of diagnosable mental disorder. Nor do we know if the differences are correlates of parenting characteristics in relation to the specific child or are generally characteristic of the parent.

Notwithstanding these limitations, the investigation reported here is important in offering further evidence suggesting that maternal reflective function as indexed here by maternal accuracy may be an important correlate of reduced psychopathology symptoms in the child. The process of engaging with a child at a mental level may be part of the complex story of the emergence of poor psychosocial outcome. It further suggests a novel approach to studying maternal reflective function in older children. Further studies are needed to untangle how attachment quality translates into maternal accuracy through moderators like verbal and non-verbal conversation across all stages of child development.

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Table 1

Descriptives for measures of psychosocial adjustment (indexed by child psychopathology measures)

	Mean	SD	Range
Self-reported mood (MFQ)	19.42	9.60	54
Self-report anxiety (RCMAS)	21.66	11.05	18
Self-report conduct symptoms	1.49	2.58	56
T-SDQ Total Difficulties	6.89	6.29	33
P-SDQ Total Difficulties	13.65	3.83	24

MFQ = Mood and Feelings Questionnaire

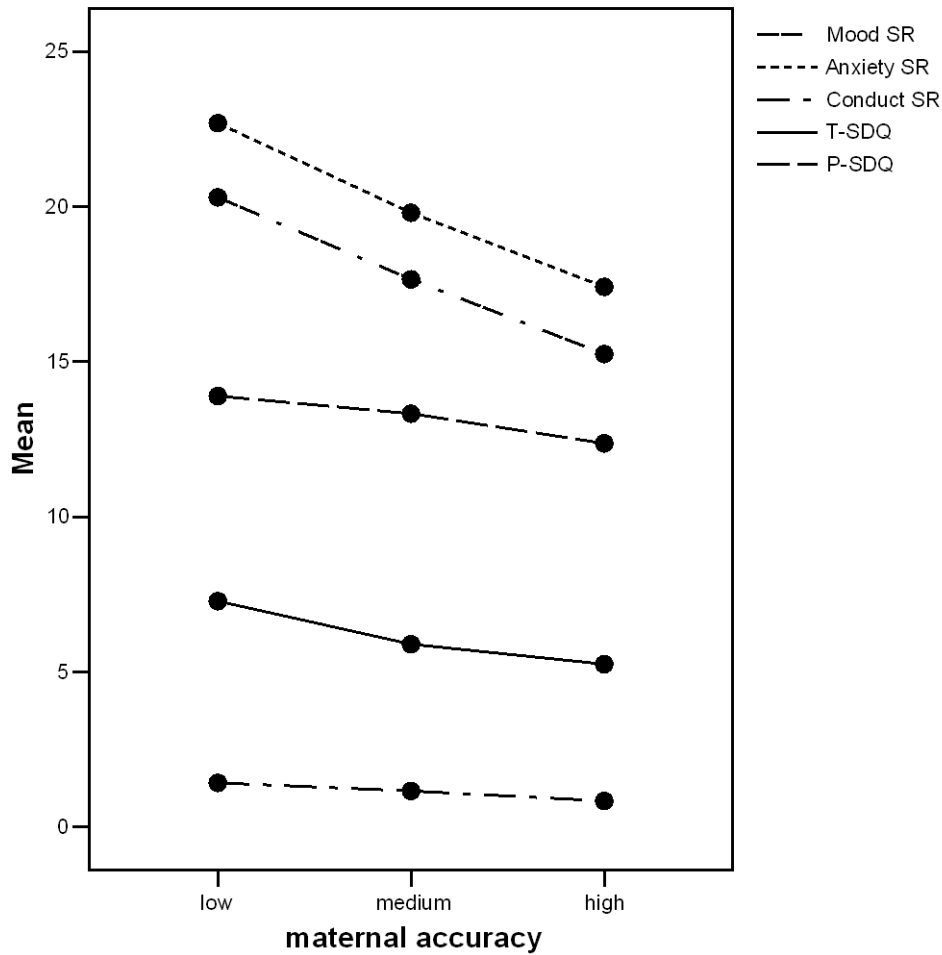
RCMAS = Reynolds Child Manifest Anxiety Scale

T-SDQ = Teacher reported Strengths and Difficulties

P-SDQ = Parent reported Strengths and Difficulties

Figure 1

Differences in means between low, medium and high maternal accuracy and measures of child psychopathology



Mood SR = Mood and Feelings Questionnaire self report; Anxiety SR = Revised Manifest Anxiety Scale self report; Conduct SR = self-reported DSM-IV conduct disorder symptoms; T-SDQ = teacher-reported Strengths and Difficulties Questionnaire; P-SDQ = parent-reported Strengths and Difficulties Questionnaire

Table 1

Linear regressions examining the independent contribution of maternal accuracy to child psychopathology while controlling for the effect of verbal IQ, non-verbal IQ, and sex.

	Self-reported mood		P-SDQ Total Diff	
	β	t	β	t
Maternal accuracy	-0.12	-2.25*	-0.11	-2.05*
Verbal IQ	-0.15	-2.52*	-0.21	-3.48**
Non-verbal IQ	-0.007	-0.11	-0.06	-0.96
Sex	1.30	1.29	-0.05	-0.96

*significant at 0.05; **significant at 0.01

P-SDQ Total Diff = Parent-reported Total Difficulties

Figure 2

The relationship between maternal accuracy and child attributional style

