



# *A longitudinal investigation of maternal influences on the development of child hostile attributions and aggression*

Article

Accepted Version

Healy, S. J., Murray, L., Cooper, P. J., Hughes, C. and Halligan, S. L. (2013) A longitudinal investigation of maternal influences on the development of child hostile attributions and aggression. *Journal of Clinical Child & Adolescent Psychology*, 44 (1). pp. 80-92. ISSN 1537-4424 doi: <https://doi.org/10.1080/15374416.2013.850698> Available at <http://centaur.reading.ac.uk/36021/>

It is advisable to refer to the publisher's version if you intend to cite from the work.

Published version at: <http://www.tandfonline.com/doi/full/10.1080/15374416.2013.850698>

To link to this article DOI: <http://dx.doi.org/10.1080/15374416.2013.850698>

Publisher: Taylor & Francis for the Society of Clinical Child & Adolescent Psychology

All outputs in CentAUR are protected by Intellectual Property Rights law, including copyright law. Copyright and IPR is retained by the creators or other copyright holders. Terms and conditions for use of this material are defined in the [End User Agreement](#).

[www.reading.ac.uk/centaur](http://www.reading.ac.uk/centaur)

## **CentAUR**

Central Archive at the University of Reading

Reading's research outputs online



**A longitudinal investigation of maternal influences on the development of child hostile attributions and aggression**

Journal:	<i>Journal of Clinical Child and Adolescent Psychology</i>
Manuscript ID:	JCCAP-2013-0040.R2
Manuscript Type:	Empirical Article
Keywords:	Aggression, Parenting, child, longitudinal, hostile attributions

SCHOLARONE™  
Manuscripts

View Only

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

**A longitudinal investigation of maternal influences on the development of child hostile attributions and aggression**

For Peer Review Only

## Abstract

Objective: Aggression in children is associated with an enhanced tendency to attribute hostile intentions to others. However, limited information is available regarding the factors that contribute to the development of such hostile attribution tendencies. We examined factors that contribute to individual differences in child hostile attributions and aggression, focusing on potential pathways from maternal hostile attributions via negative parenting behavior.

Method: We conducted a longitudinal study of 98 mothers and children (47 male, 49 female), recruited from groups experiencing high and low levels of psychosocial adversity. Maternal hostile attributions, observed parenting, and child behaviour were assessed at 18-months and 5-years child age; and child hostile attributions were also examined at 5-years. Independent assessments of maternal and child processes were utilized as far as possible.

Results: Analyses provided support for a direct influence of maternal hostile attributions on the development of child hostile attributions and aggressive behaviour. Maternal hostile attributions were also associated with negative parenting behaviour, which in turn influenced child adjustment. Even taking account of possible parenting influences and pre-existing child difficulties, hostile attributions in the mother showed a direct link with child aggression at 5-years. Maternal hostile attributions were themselves related to psychosocial adversity.

Conclusions: Maternal hostile attributions are prevalent in high risk samples, and are related to less optimal parenting behaviour, child hostile attributions, and child aggression. Targeting hostile maternal cognitions may be a useful adjunct to parenting programs.

## Keywords

hostile attribution bias; aggression; child; parenting; maternal attributions; longitudinal

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32

## **A longitudinal investigation of maternal influences on the development of child hostile attributions and aggression**

Cognitive accounts of aggressive behaviour in children and adolescents highlight systematic disturbances in social cognitions. The social information processing model (SIP) (Dodge, 1986; Crick & Dodge, 1996) outlines six sequential steps in the generation of behavioural responses: the encoding of social cues, cue interpretation, the clarification of goals, behavioural response generation, response selection, and behavioural enactment. Aggressive behaviour is associated with disturbances at each stage of this model, but in particular with biased cue interpretation: aggressive children and adolescents show a bias towards attributing hostile intent to others in ambiguous situations. Although a meta-analytic review of this field has confirmed a robust association between hostile attribution tendencies and externalising difficulties in children (Orobio de Castro, Veerman, Koops, & Bosch, 2002), the origins of biased SIP are relatively poorly delineated. Social influences, particularly parental attitudes and behaviours, are likely to be important.

### **Parenting and hostile attribution biases in children**

33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52

Poor parenting is implicated in the development of child externalizing problems and is also likely to contribute to hostile attribution tendencies. Individuals are assumed to interpret new social situations by reference to a database of prior experiences, and the schemas they have developed based on those experiences (MacKinnon-Lewis, Lamb, Hattie, & Baradaran, 1999; Fivush & Nelson, 2004). Costanzo and Dix (1983) propose that children form attributions about the world, not through reasoning and logic, but by observing and experiencing their parents' behaviour. As such, children who experience harsh or punitive parenting may come to see the world as hostile, with the corresponding schema generalising across contexts.

53  
54  
55  
56  
57  
58  
59  
60

Previous research provides tentative support for the proposal that parenting behaviours influence child SIP. In a study of 5-6-year old children, parental reports of harsh discipline were linked to SIP disturbances, although the particular association with child hostile attributions

1  
2 received only partial support (Weiss, Dodge, Bates, & Pettit, 1992). In a second study of older  
3  
4 children (9-10 years) self-reported paternal psychological control correlated with hostile  
5  
6 attributions in boys in instrumental provocation contexts, with equivalent effects in relational  
7  
8 contexts that approached significance. However, these findings did not emerge in girls, and  
9  
10 maternal self-reported parenting was not related to child hostile attributions in boys or girls  
11  
12 (Nelson & Coyne, 2009). By contrast, a longitudinal study of 9-10 year old aggressive boys found  
13  
14 that child perceptions of maternal control and support were associated positively and negatively,  
15  
16 respectively, with hostile attributions 1-year later; and child SIP disturbances mediated the  
17  
18 association between perceived parenting and aggression (Gomez, Gomez, DeMello, & Tallent,  
19  
20 2001). Conclusions from these studies are limited by their reliance on parental or child report of  
21  
22 parenting behaviour, as both may be subject to bias.  
23  
24  
25

26  
27 Nelson and Coyne (2008) assessed the relationship between parenting practices, measured  
28  
29 via self-report questionnaires, and children's relational intent attributions in a sample of 242  
30  
31 children and their parents. They found aversive parenting by fathers to be associated with a greater  
32  
33 tendency toward hostile attributional bias in children, with no significant findings in relation to  
34  
35 maternal parenting. Specifically there was a negative correlation with warm and responsive  
36  
37 paternal parenting and children's hostile attribution bias and a positive relationship between  
38  
39 paternal use of corporal punishment and attribution biases (but only for girls). There was also a  
40  
41 correlation between paternal psychological control and children's hostile attribution biases, but  
42  
43 this was only found for boys.  
44  
45

#### 46 **Parental attribution biases**

47  
48  
49 Researchers have also examined parents' own attributional biases, as both a potential  
50  
51 influence on parenting style and as a direct contributor to children's attributional tendencies. With  
52  
53 respect to the former, parental hostile attribution biases may increase the likelihood of responding  
54  
55 to children's problems with harsh discipline practices, which in turn may exacerbate hostile  
56  
57 attribution tendencies and externalising symptoms in the child. Previous research has  
58  
59  
60

1  
2 demonstrated associations between aggression in children and a maternal tendency to attribute  
3 hostile intent to their child (Bickett, Milich, & Brown, 1996). Moreover, Nix and colleagues (Nix  
4 et al., 1999) found that mothers' harsh discipline practices mediated a longitudinal association  
5 between maternal hostile attributions about their 4-6 year old children's behaviour and children's  
6 later externalising behaviour problems at school. A further longitudinal study found that the  
7 combination of maternal hostile attributions in relation to the child and ineffective/irritable  
8 discipline predicted an increase in child conduct problems from 5 to 7-years, suggesting that  
9 hostile parental attributions may result in a failure to monitor and adapt to actual child responding  
10 (as the parent already 'knows' the child's personality), resulting in reduced flexibility and negative  
11 parental behaviour (Snyder, Cramer, Afrank, & Patterson, 2005). Interestingly, although such  
12 research findings suggest a potential pathway from maternal hostile attributions to child  
13 aggression that operates via negative parenting and resultant child hostile cognition, this has yet to  
14 be examined directly.

15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31 Direct associations between parental and child hostile attributions may also exist, as the  
32 child observes and internalises their parent's world view. Studies examining the possibility of  
33 direct associations between parental and child hostile attributions have yielded mixed results. Two  
34 studies of aggressive boys found no association between maternal and child attribution of hostile  
35 intent (Bickett et al., 1996; MacKinnon-Lewis, Lamb, Arbuckle, Baradaran, & Volling, 1992). By  
36 contrast, a study of disordered and non-disordered girls and boys demonstrated an association  
37 between mothers' and daughters' hostile attribution tendencies. This effect was not found for  
38 mothers and sons, suggesting that attributional style could be transmitted along gender lines  
39 (MacBrayer, Milich, & Hundley, 2003). However, Halligan and colleagues (Halligan, Cooper,  
40 Healy, & Murray, 2007) found no direct association between parental and child attributions, even  
41 when mother-daughter and father-son associations were considered separately. Conversely, Nelson  
42 and colleagues (Nelson, Mitchell, & Yang, 2008), found that maternal, but not paternal, hostile  
43 attributions were related to child hostile attributions, regardless of child gender.



## The current study

In sum, previous research has demonstrated that parents who interpret their child's behaviour in a hostile way show more negative parenting characteristics (Nix et al., 1999). There is also preliminary evidence for a direct link between parenting behaviour and child hostile attributions (Gomez et al., 2001; Nelson & Coyne, 2009), as well as partial support for a direct link between parental and child hostile attribution tendencies (Nelson et al., 2008; Halligan et al., 2007). Nonetheless, numerous questions remain. First, although previous research has established that maternal attributions and parenting behaviour are associated both with each other, and with child externalising difficulties, the intervening role of child attributional tendencies has yet to be established. Second, studies examining parental attributions in relation to either parenting behaviour or child outcomes have typically assessed parental attributions specifically in relation to their child. Although, arguably, child-related attributions are the most relevant, as a potentially immediate influence on parenting behaviour, this approach means that children's actual characteristics may confound results and make the direction of effects difficult to ascertain. Third, existing research in the area has typically examined parenting behaviour based on parent or child report, both of which have significant limitations, particularly when parent and/or child hostile attributions are being measured simultaneously. Direct observations of parenting behaviour are required (Zaslow et al., 2006).

In the current study, we conducted a comprehensive examination of associations between maternal parenting behaviour, maternal attributional tendencies, child attributional tendencies, and child aggression, with the aim of testing hypothesised pathways to child aggression that are summarised in Figure 1. To this end, we conducted detailed assessments in a sample of 98 five-year old children and their mothers, recruited as part of a longitudinal study of the impact of psychosocial adversity on child development (Cronin, Halligan, & Murray, 2008; Halligan et al., 2013; Sheridan et al., 2013; Gunning, Halligan, & Murray, 2013). Almost half the families in the study were characterised by high levels of adversity (including socioeconomic deprivation, lacking

1  
2 education/employment, low social support, feelings of anxiety and depression), ensuring a  
3 reasonable distribution of child externalising difficulties. Maternal attributions and parenting style  
4 were assessed at both 18-months and 5-years; and child hostile attributions and aggression were  
5 assessed at the 5-year follow-up. In order to address limitations of the existing literature, at 5-years  
6 maternal hostile attributions were assessed in both general and child-specific contexts, with the  
7 former allowing an examination of maternal hostile attributions that is unaffected by actual child  
8 characteristics; parenting behaviour was measured via direct observation; and child aggression via  
9 teacher report. Thus, we generated wholly independent assessments of maternal and child  
10 attributions and behaviour. In addition, we assessed both relational and overt components of  
11 aggression in children, based on some previous observations that hostile attributions may be  
12 differentially related to these aggression domains (Crick & Dodge, 1996; Mathieson et al., 2011).  
13 We examined cross-sectional and longitudinal interrelationships among variables, specifically  
14 focusing on potential influences of maternal hostile attributions on both child hostile attributions  
15 and aggressive behaviour; and on maternal parenting behaviour.

16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33 We took account of psychosocial adversity in our analyses, as it is known to be associated  
34 with both child externalising problems (Shaw, Winslow, Owens, & Hood, 1998; Rutter, Giller, &  
35 Hagell, 1998) and less optimal parenting styles (O'Connor, 2002), including in the current sample  
36 (Halligan et al., 2013). In principle, psychosocial adversity might also influence intervening  
37 cognitive processes, including child tendency to attribute hostile intent, or maternal attributions  
38 relevant to parenting behaviour. Chen and colleagues found elevated rates of hostile interpretations  
39 in low SES children and adolescents (Chen & Matthews, 2001), leading to the proposal that SES  
40 serves as a proxy for exposure to adverse interpersonal and community circumstances, which  
41 directly informs the development of a hostile world view (Chen, Langer, Raphaelson, &  
42 Matthews, 2004). As the current sample included groups of high and low adversity families, the  
43 examination of social context as a distal influence on maternal and child attributions was of  
44 particular interest.

## Methods

Study procedures were approved by the University of Reading and NHS research ethics committees. Mothers provided written informed consent prior to participating in each stage of the study, and were given a small reimbursement for their time (GBP 20).

### Recruitment

We screened primiparous mothers attending their routine 20-week antenatal scan appointment at a local maternity unit (Royal Berkshire Hospital, Reading, UK) using a 20 item questionnaire indexing level of psycho-social adversity (Cronin et al., 2008). Items assess socioeconomic disadvantage (e.g., low income, poor housing, lack of phone/car, single parenthood/low social support) and associated feelings of distress (e.g., symptoms of depression/anxiety). From the screened sample (73% of the potential population), we recruited 67 mothers scoring above a cut off defining the 20% highest scores (high risk group), along with 68 mothers with scores in the 40% lowest scoring range (low risk group). Cut-offs were based on pilot work with the questionnaire, and reflected our goal of recruiting distinct groups of women for whom the psychosocial context was clearly problematic versus not problematic. Recruitment was via telephone contact and/or a letter, and high versus low risk women did not differ in terms of recruitment percentages (low risk 60%, high risk 64%;  $\chi^2 = 0.56$ ,  $df = 1$ , ns). After excluding those delivering prematurely or withdrawing from the study, numbers in high and low risk groups were 58 and 63 respectively. On the questionnaire's principal demographic indices of adversity, high risk women were, compared to the low risk group, younger [ $M = 19.7$ ,  $SD = 3.3$  vs.  $M = 30.6$ ,  $SD = 3.3$  years;  $t_{120} = 18.3$ ,  $P < 0.001$ ], more often single [53.4% vs 0%;  $\chi^2(1) = 45.9$ ,  $P < 0.001$ ], and unemployed [63.2% vs 3.1%,  $\chi^2(1) = 50.4$ ,  $P < 0.001$ ], and fewer were educated beyond 16 years [14.8% vs. 96.8%,  $\chi^2(1) = 80.8$ ,  $P < 0.001$ ]. The sample was predominantly white (86%), but included a proportion of mixed race (9%), black (3%) and Asian (2%) participants. Ethnic minorities were better represented in the high (21%) versus low (8%) risk group versus ( $\chi^2 = 4.23$ ,  $df = 1$ ,  $p = 0.04$ ). Proportion of female infants was similar for high (51.7%) and low (51.6%) risk

1  
2 groups. Participants initially completed assessments in the perinatal period, specifically at 28-  
3 weeks and 34-weeks gestation, and at 10-days, 4-weeks, 7-weeks and 12-weeks postpartum.  
4  
5  
6 Follow-ups were completed at 12-months, 18-months and 5-years. Of the 121 families originally  
7  
8 recruited, 98 (81%) completed the 5-year assessments. Measures relevant to the current study were  
9  
10 obtained at 18-months, when maternal hostile attributions, parenting behaviour and child  
11  
12 behavioural problems were examined; and at 5-years, when child hostile attributions and  
13  
14 aggressive behaviour, as well as maternal hostile attributions and parenting behaviour, were each  
15  
16 assessed.  
17  
18

### 19 **Child Measures**

20  
21  
22 **Behaviour Screening Questionnaire.** At the 18-month assessment mothers completed an  
23  
24 age-adapted version of the BSQ (Richman & Graham, 1971), in semi-structured interview format.  
25  
26 The BSQ was originally developed as a screen to identify a range of clinical problems in 3-year-  
27  
28 old children. The version used in the current study comprised a reduced set of 8-items which has  
29  
30 previously been found to be appropriate for children in the current study age range (Murray, 1992;  
31  
32 Ghodsian, Zajicek, & Wolkind, 1984). We analyzed scores for items specifically addressing  
33  
34 externalizing-type difficulties (temper tantrums and hard-to-manage behaviors). The scale has  
35  
36 previously been shown to have external validity (as evidenced by associations with other indices of  
37  
38 child behavior problems and discrimination of high versus low risk groups) (Ghodsian, Zajicek, &  
39  
40 Wolkind, 1985; Murray, 1992; Halligan et al., 2013) and acceptable reliability (Ghodsian et al.,  
41  
42 1984; Richman & Graham, 1971). Internal consistency for the externalizing scale used in the  
43  
44 current study was acceptable ( $\alpha = .78$ ).  
45  
46  
47  
48

49  
50 **Teacher reported aggression.** At the 5 year assessment, teachers completed the Social  
51  
52 Behaviour Scale (SBS) – Teacher form (Crick, Casas, & Mosher, 1997), rated on 5 point scales  
53  
54 (from 1 ‘never/almost never true’ to 5 ‘always/almost always true’). The SBS includes subscales  
55  
56 indexing relational (6 items) and overt (6 items) aggressive traits, which, in combination form a  
57  
58 total aggression score. The SBS is a widely used measure with established validity and reliability  
59  
60

(Crick et al., 1997; Juliano, Werner, & Wright Cassidy, 2006). Internal consistency in the current study was acceptable for the total aggression score ( $\alpha = .89$ ), and for relational ( $\alpha = .82$ ) and physical ( $\alpha = .89$ ) subscales.

**Ambiguous social scenarios.** At 5-years, child hostile attributions and aggressive solutions were measured using standard ambiguous scenarios ( $n = 8$ ), including both relational and overt provocations to ensure that situations relevant to both males and females were presented (Crick, Grotpeter, & Bigbee, 2002; Dodge, Pettit, Bates, & Valente, 1995; MacBrayer et al., 2003). An example of a relational scenario is: *“Imagine that you are standing in the corridor one morning before school starts. As you are standing there, two children from your class walk by. As they pass by you, they look at you, whisper something to each other, and laugh.”* An example of a physical scenario is: *“Pretend that you are standing on the playground playing catch with a <boy/girl> named <The Protagonist>. You throw the ball to <The Protagonist> and <he/she> catches it. You turn around, and the next thing you realise is that <The Protagonist> has thrown the ball and hit you in the middle of your back. The ball hits you hard, and it hurts a lot.”*

The scenarios utilised have been widely used in previous studies and responding has been found to distinguish aggressive and non-aggressive children (Crick et al., 2002; Dodge et al., 1995; MacBrayer et al., 2003). Because of the relatively young age of the children tested, doll play was used for the enactment of scenarios. For each scenario, children were asked to imagine themselves in the situation, with dolls/drawings of the background location used to enact each scenario. Following each scenario children were asked “Why do you think <The Protagonist> acted that way?”. Children enacted their responses using dolls, along with verbal description. We conducted pilot work which established that children of study age were able to engage with the tasks and that there was sufficient variability in responses. A single rater, blind to all other participant information, coded video recordings of child responses, using rules pre-specified in the literature (Dodge, 1980; Crick & Dodge, 1996; Bickett et al., 1996). A non-hostile attribution (scored 0) was assigned if the negative event was attributed to: an accident, misunderstanding,

1  
2 temporary state, third party or circumstance; to some neutral state or characteristic of the subject  
3  
4 themselves; or to the protagonist acting in order to try to help or benefit the subject. A hostile  
5  
6 attribution (scored 1) was assigned if the negative event was attributed to: an intentional or goal-  
7  
8 directed negative action by the protagonist; or to a negative personality trait ascribed to the  
9  
10 protagonist that suggests that they acted with hostile attributions, indifference, lack of sensitivity,  
11  
12 or lack of concern. Mean scores were derived. A second blind rater scored a randomly selected  
13  
14 subset of 14 child assessments (14%); the intra-class correlation showed a high level of agreement  
15  
16 ( $r = .98, P < .001$ ).  
17  
18

### 19 20 **Maternal Measures**

21  
22 **Parenting observations.** At 18-months mothers and infants were filmed in the course of  
23  
24 unstructured play based on three 2.5-minute consecutive sessions with a series of age-appropriate  
25  
26 toys (Wolke, Skuse, & Mathisen, 1990). Maternal insensitive parenting (unresponsive parenting  
27  
28 behavior that is low in warmth and acceptance, and fails to take appropriate account of infant cues)  
29  
30 was rated on standard 5-point scales for each of the three segments (Murray, FioriCowley, Hooper,  
31  
32 & Cooper, 1996) and an average score for the interaction computed.  
33  
34

35  
36 At 5-years, dyads completed a 15-20 minute interaction in three sections: first, a 10-minute  
37  
38 free play period using Playdoh; second, a 5-minute period during which mothers were asked to put  
39  
40 the Playdoh aside and to engage their child in playing with a shape selector toy, appropriate for a  
41  
42 much younger child; third, a tidy-up task where mothers were instructed to direct their child in  
43  
44 clearing up all toys. In sum, the interaction included a period of normal play, as well as activities  
45  
46 likely to provoke conflict between maternal and child goals (Dadds, Mullins, McAllister, &  
47  
48 Atkinson, 2003; Gardner, Sonuga-Barke, & Sayal, 1999). Video recorded interactions were coded  
49  
50 on five dimensions by two raters, blind to other variables: the extent of negative control (coding  
51  
52 verbal commands/control), intrusive behaviours (actions that impose a maternal agenda at the  
53  
54 expense of child activities), hostile maternal behaviours (threatening, yelling, criticising the child),  
55  
56 a lack of engagement with the child, and insensitive/non-contingent responding. Double coding of  
57  
58  
59  
60

1  
2 a minimum 10% of interactions was completed to assess inter-rater reliability at both 18-months  
3  
4 and 5-years. Intraclass correlations ranged from adequate to excellent (.77 to .90).  
5  
6

7 **Parental Concerns and Constraints Interview (PCCI).** Mothers were interviewed using  
8  
9 the PCCI (Pettit, Bates, & Dodge, 1997) at the 18-month assessment. Mothers were presented with  
10  
11 five hypothetical situations in which their child misbehaved, and were asked to provide a rationale  
12  
13 for their child's actions. For example: *"Imagine that you and your child are at a playgroup. All the*  
14  
15 *children are playing and running around excitedly. One of the other children bumps into your*  
16  
17 *child who then falls over. The other children laugh. Your child gets upset and then pushes the*  
18  
19 *other child to the ground."* Responses were scored for maternal hostile attributions, indexed via the  
20  
21 number of maternal interpretations provided for the child's behaviour that blamed negative child  
22  
23 traits or characteristics (versus situational or state factors). Coding was completed by two  
24  
25 researchers, blind to other scores. Double coding of a randomly selected subset of interviews (n =  
26  
27 10, 10% of sample) demonstrated acceptable inter-rater reliability (kappa = .79). Examination of  
28  
29 the resultant set of responses indicated that 72% of mothers showed no hostile attributions on this  
30  
31 measure, therefore responses were dichotomised as hostile attributions present (coded 1) versus  
32  
33 absent (0). The PCCI has been previously used in a number of studies, and analyses have  
34  
35 supported the validity of this measure (Pettit et al., 1997; Pettit, Laird, Bates, Dodge, & Criss,  
36  
37 2001), including associations with other indices of maternal responding and child outcomes. In  
38  
39 addition, the scenario based approach is typical of that used to index maternal attributions in  
40  
41 previous work (MacBrayer et al., 2003; Nix et al., 1999).  
42  
43  
44  
45

46 **Maternal Hostile Attribution Questionnaire (HAQ).** At 5-years mothers completed the  
47  
48 HAQ, a questionnaire which examined attributions for 16 hypothetical situations, including a  
49  
50 number *not* involving their child. In previous work this measure of maternal hostile attributions  
51  
52 distinguished mothers of clinically referred versus non-referred children and was associated with  
53  
54 measures of child hostile attribution tendencies (Bickett, Milich, & Brown, 1996; MacBrayer, et  
55  
56 al., 2003). In the current study, mothers were presented with written ambiguous vignettes and  
57  
58  
59  
60

1  
2 asked to imagine themselves in that situation. For each vignette, mothers provided: a) a written  
3 explanation of why they thought the situation had occurred; and b) a rating of the extent to which  
4 they believed that their explanation was correct (from 1 'somewhat' to, to 4 'extremely' likely).  
5  
6 The latter was introduced following pilot work in order to capture variation in the strength with  
7 which mothers held their beliefs. Six of the vignettes indexed general hostile attribution tendencies  
8 (situations described interactions with other adults, friends and colleagues), for example: "*Imagine*  
9 *you are seated at a bar in a restaurant. The people next to you are laughing and talking. One of*  
10 *them brushes against you. You do not pay any attention to this. This same person then bumps into*  
11 *you, causing you to spill your drink. You look over at the person and she is laughing.*" Ten  
12 vignettes indexed child-specific attributions, for example: "*Imagine that you give your child a*  
13 *"time out" in the living room. When you walk into the room to tell <him/her> that the time out is*  
14 *over, you see that an expensive vase is lying broken on the floor.*" In order to ensure that scenarios  
15 represented a range of relevant experiences, both relational and overt provocations were included  
16 (proportion of relational was 60% for child scenarios, 67% for general scenarios).  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32

33 Scenario Responses were coded as hostile (1) or benign (0), rated as per the child  
34 assessment. Scores for analyses derived from combining hostile attribution codes and  
35 accompanying 'belief' ratings (i.e., hostile attributions scored between 1 and 4, according to the  
36 corresponding rating of "correctness"), and mean scores for both the general and child-specific  
37 scenarios were derived separately (resultant possible range 0 to 4). Coding of responses was  
38 completed by a single rater, blind to other variables. A second blind rater coded a sub-sample of  
39 10 questionnaires (10%), and inter-rater reliability was established ( $\kappa = .79$ ).  
40  
41  
42  
43  
44  
45  
46  
47  
48

### 49 Data Analyses

50 Hypothesized longitudinal models were examined via path analysis, conducted using  
51 Maximum Likelihood Estimation using MPLUS 4.2 software (Muthen & Muthen, 2007). In  
52 addition to chi-square tests, model fit was evaluated using the Comparative Fit Index (CFI), the  
53 Tucker Lewis Tucker Lewis Index (TLI) and the Root Mean Square Error of Approximation  
54  
55  
56  
57  
58  
59  
60



(RMSEA). For the CFI and TLI values above .90 indicate acceptable fit, and those above .95 good fit. For the RMSEA values less than 0.08 show acceptable fit and below 0.05 good fit. Prior to the construction of models, correlational analyses were used to screen for potential influences of gender and risk on key outcomes. Gender effects were then included in models as appropriate. Preliminary models were constructed without risk effects, due to both the complexity that resulted from the inclusion of this variable and the focus of research questions. Following the construction of satisfactory models that did not include risk, risk effects were added with the goal of examining both the relevance of risk to maternal and child hostile attributions, and also the impact of this potential confound on existing pathways.

As already noted, 98 of the original 121 families were retained in the study at 5-years. There was greater attrition from the high versus the low-risk group (17/58 versus 6/63 at 5-years;  $\chi^2 = 7.68$ ,  $df = 1$ ,  $p = 0.006$ ). Rates of refusal were similar across groups (3 high versus 2 low risk mothers), but we were unable to trace a higher proportion of the high risk families (14 high versus 4 low risk mothers). We used analysis of variance to examine original adversity scores in relation to retention status and risk group, with analyses conducted for both 18-month and 5-year retention status. Retention status showed no significant association with initial adversity scores, either as a main effect ( $P > .28$ , partial  $\eta^2 < .01$ ), or in interaction with risk group ( $P > .62$ , partial  $\eta^2 < .002$ ). Within group comparisons yielded the same conclusions. Thus, those who were lost to follow-up appeared to be comparable to those in their group who were retained in the study. Path analyses were based on the 105 participants who had data available for 18-months and/or 5-years, with missing data modelled using full information maximum likelihood estimation, as recommended for minimizing the introduction of bias due to missing data (Allison, 2003).

## Results

### Preliminary analyses

Table 1 presents descriptive statistics and Table 2 presents a full correlation matrix for key study variables. Of the 98 children assessed at 5-years, 47 were male and 51 female. Correlational

1  
2 analyses identified gender effects as follows: boys scored higher than girls in terms of teacher-  
3 rated total aggression on the SBS and also on the physical aggression subscale; and mothers of  
4 boys were more insensitive than mothers of girls in their interactions at 18-months and showed a  
5 trend towards using more negative control at 5-years.  
6  
7  
8  
9

10  
11 Examination of the correlation matrix presented in Table 2 yielded some key observations.  
12 First, child hostile attributions were not significantly correlated with teacher-reported total child  
13 aggression scores on the SBS but were significantly correlated with relational aggression subscale  
14 scores (Table 2)<sup>1</sup>. In the light of these findings, we modelled total aggression scores and relational  
15 aggression scores separately, with our examination of influences on child hostile attribution scores  
16 being restricted to the latter. Second, general (but not child-specific) maternal hostile attributions  
17 at 5-years were significantly associated with parenting and child adjustment; our analyses  
18 therefore focused exclusively on these general maternal hostile attribution scores. Third, although  
19 small in magnitude<sup>2</sup>, the overall pattern of correlations was consistent with hypothesised effects.  
20 Thus, maternal and child hostile attributions showed both prospective and concurrent associations.  
21 Likewise, maternal hostile attributions were associated with maladaptive parenting behaviour,  
22 particularly at the 5-year assessment. Negative parenting, in turn, was significantly correlated with  
23 child hostile attributions at 5-years, although there was no equivalent longitudinal association from  
24 18-month maternal insensitivity. Finally, as expected, there were also significant associations  
25 between parental behaviour and child aggression at 5-years.  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44

#### 45 **Maternal influences on child overall aggression scores**

46 We used path analysis to examine cross-sectional and longitudinal pathways from maternal  
47 hostile attributions to child total aggression scores at 5-years. Our proposed model included pre-  
48  
49  
50

---

51 <sup>1</sup> We also tested for domain specificity across relational/overt types of aggression/scenarios. For relational aggression,  
52 significant correlation was found with relational scenario hostile attribution scores ( $r = .21, P = .041$ ) but not with  
53 overt attribution scores ( $r = .14, P = .27$ ); however, correlations were not significantly different in magnitude ( $t = 0.62,$   
54  $P = .54$ ). For overt aggression, there were no significant correlations with either relational or overt hostile attributions.  
55 (both  $r < .11$ ).

56 <sup>2</sup> These effects were similar in magnitude for female and male children. Note that there were no significant effects  
57 when scores for relational versus overt scenarios were computed and the possibility of domain specificity in  
58 transmission was examined. However, the small number of scenarios indexing relational/overt dimensions limited  
59 these analyses.  
60

1  
2 existing child problem behaviours at 18-months, as well as maternal parenting behaviour (see  
3 Figure 2). Two modifications were made to this proposed model in the light of preliminary  
4 analyses. First, correlational analyses provided no evidence for a prospective influence from  
5 maternal hostile attributions at 18-months to negative parenting at 5-years; and the pathway from  
6 child behaviour at 18-months to maternal hostile attributions at 5-years was not considered  
7 plausible when the focus was exclusively on general versus child specific maternal attributions.  
8 These pathways (dashed lines in Figure 2) were excluded. Second, gender effects on maternal  
9 parenting behaviour and child aggression were included. The resultant model showed a good fit ( $\chi^2$   
10 = 5.79,  $df = 7$ ,  $p = 0.56$ ; CFI = 1.00, TLI = 1.00; RMSEA < 0.01), and is depicted in Figure 2  
11 including standardized regression coefficients. Several notable observations emerged from the  
12 model. First, there were within time-point associations at both 18-months and 5-years between  
13 maternal hostile attributions and less optimal parenting behaviour. These associations were present  
14 even once existing levels of child problem behaviours (18-months) or aggression (5-years) were  
15 taken into account in the model. Second, between 18-months and 5-years there was modest  
16 stability in maternal hostile attribution tendencies, even though the assessment differed  
17 substantially in type and content over this period. Third, at 5-years, there was a significant  
18 association between maternal general hostile attributions and child aggression, even once any  
19 effects via parenting behaviour were taken into account.  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41

### 42 **Maternal influences on child relational aggression**

43  
44 We constructed a second model that focused on child relational aggression at 5-years. As  
45 relational aggression showed a significant association with child hostile attributions, influences on  
46 the latter could also be examined in the context of this model. Given the potential complexity  
47 associated with the introduction of an additional variable, and the lack of gender effects on  
48 relational aggression or child hostile attributions, gender was not included in the model. In  
49 addition, only pathways that were supported by basic correlations were examined. The resultant  
50 model showed an adequate fit ( $\chi^2 = 9.93$ ,  $df = 7$ ,  $p = 0.19$ ; CFI = 0.96, TLI = 0.89; RMSEA =  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

0.63). The pathway from 18-month parenting to 5-year relational aggression was weak ( $r = .10$ ); when this was dropped, fit indices were generally consistent with a good fitting model ( $\chi^2 = 10.7$ ,  $df = 8$ ,  $p = 0.22$ ; CFI = 0.97, TLI = 0.91; RMSEA = 0.057). Figure 3 shows the resultant model's standardised regression weights, with the excluded pathway indicated by a dashed line.

Associations between maternal attributions and both parenting behaviour and child difficulties were supported, as for the model of overall aggression. An intervening role for child hostile attributions was less clear. There was a significant longitudinal pathway from 18-month maternal hostile attributions to 5-year child hostile attributions. However, regression weights for pathways from 5-year maternal hostile attributions and negative parenting behaviour to child attributions were small in magnitude and not statistically significant; and the association between child hostile attributions and relational aggression was similarly modest.

### Psychosocial adversity effects

Our sample included groups distinguished by high versus low levels of psychosocial adversity, and the correlational analyses presented in Table 2 identified several associations between adversity status and mother/child outcomes. Notably, there were significant links with maternal hostile attribution indices: at 18-months, 53.3% of high versus 18.3% of low risk mothers provided hostile interpretations on the PCCI for their child's behaviour, and at 5-years significantly higher general maternal hostile attribution scores were present in the high ( $M = 1.09$ ,  $SD = 0.64$ ) versus low ( $M = 0.58$ ,  $SD = 0.48$ ) adversity group. As highlighted in previous reports with the same sample (Halligan et al., 2013), relative to their low adversity counterparts, mothers in the high adversity group also showed less optimal parenting behaviours at 18-months and 5-years, and children showed more problem behaviours at 18-months (see Table 2). These four associations were modelled in path analyses, particularly with the aim of examining the impact on pathways already identified in previous models.

With regards to the model examining total aggression scores as outcome, adding effects of adversity status resulted in a model which showed a reasonable fit ( $\chi^2 = 12.3$ ,  $df = 9$ ,  $p = 0.20$ ; CFI

= 0.97, TLI = 0.94; RMSEA = 0.059). Regression coefficients for pathways between adversity group status and maternal attributions were robust (18-months estimate = 1.00, SE = 0.27, standardised coefficient = .45; 5-years estimate = 0.47, SE = 0.14, std coeff. = .39). Two previously identified pathways were weak ( $r < .10$ ) when risk was included. Specifically the association between child behavioural difficulties (BSQ) and maternal insensitive parenting at 18-months (estimate = 0.001, SE = 0.13, std coeff. = .001. ns), and that between maternal 18-month and 5-year hostile attributions (estimate = 0.02, SE = 0.06, std coeff. = .03, ns), showed essentially zero effects. Eliminating these two pathways resulted in a good fitting model ( $\chi^2 = 10.7$ ,  $df = 10$ ,  $p = 0.38$ ; CFI = 0.99, TLI = 0.99; RMSEA = 0.026). Equivalent analyses including risk indices in the modelling of relational aggression yielded identical conclusions, with the same three existing pathways being weak following the inclusion of risk.

### Discussion

We examined several possible pathways to child aggression from maternal attributions, generating the following findings. First, our analyses provided tentative support for a direct association between maternal and child hostile attribution tendencies. In particular, we found a longitudinal link between maternal hostile attributions at 18-months and child attributions at 5-years was maintained even once possible indirect influences via parenting behaviour were included in our model. This observation extends previous reports of cross-sectional links between maternal and child attributions, and suggests that maternal hostile attributions may be a sustained influence on children's social understanding. Second, we found associations between maternal hostile attributions and less optimal parenting behaviour, highlighting the potential for maternal hostile attributions to also influence child outcomes indirectly, via negative parenting behaviour. Third, general maternal hostile attributions showed direct, cross-sectional associations with child aggression at 5-years, even once any effects via parenting behaviour were taken account of, highlighting the importance of taking account of maternal social cognition. Fourth, we found limited support for the putative role of child hostile attributions in contributing to associations

1  
2 between maternal hostile attributions/parenting and child aggression. Fifth, psychosocial adversity  
3 was an important correlate of maternal (but not child) hostile attribution tendencies, as well as of  
4 parenting behaviour (Halligan et al., 2013). The inclusion of longitudinal measures, the  
5 simultaneous modelling of several sources of potential maternal influence, the direct observation  
6 of parenting, and the independence of measures at 5-years represent methodological advantages  
7 relative to previous work in the field.  
8  
9

### 15 **Direct associations between maternal and child hostile attributions**

17  
18 In support of a developmental influence of maternal hostile attributions on child aggresso-  
19 genic cognition, we found a prospective, direct association between 18-month maternal and 5-year  
20 child hostile attributions. Thus, longitudinal nature of this association is significant, as it supports  
21 the assumption that child may observe and internalize the hostile interpretative style of their  
22 parents over time. At the same time, we failed to establish a robust link between maternal and child  
23 attributions at 5-years. Although this null finding must be interpreted cautiously in the light of the  
24 sample size, our observations echo similarly mixed results across previous studies, in which direct  
25 parent-child correlations in hostile attributions have proved difficult to establish. Thus, in addition  
26 to numerous null findings (Halligan et al., 2007; Bickett et al., 1996; MacKinnon-Lewis et al.,  
27 1999), where positive associations have been identified they have typically been limited to a subset  
28 of the sample studied and of the indices of hostile attributions obtained (MacBrayer et al., 2003;  
29 Nelson et al., 2008). Variations in the approach taken to the measurement of parental attributions  
30 may have contributed to mixed findings, including in the current study. Nonetheless, the weight of  
31 evidence suggests that maternal hostile attribution tendencies are likely to exert relatively modest  
32 direct influences on child hostile social cognition.  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50

### 51 **Maternal hostile attributions as an influence on parenting behaviour and child aggression**

52  
53 Our findings identified potential influences of maternal hostile attribution tendencies on  
54 parenting behaviour – specifically, insensitivity in 18-month interactions and the use of negative  
55 control. These findings are in line with previous reports of associations between maternal hostile  
56  
57  
58  
59  
60

1  
2 attributions and child aggression (Bickett et al., 1996; Nix et al., 1999). In particular, in their 4-  
3  
4 year longitudinal study, Nix and colleagues (1999) found that harsh discipline practices mediated a  
5  
6 predictive association between mother's hostile attribution tendencies and children's later  
7  
8 externalizing problems. Notably, previous research has typically focused on maternal hostile  
9  
10 attributions occurring in relation to their own child's behaviour. Such a focus is warranted, as child  
11  
12 specific attributional tendencies are the most likely to influence maternal parenting behaviour.  
13  
14 However, conclusions in this context are complicated by the likely reciprocal relationship between  
15  
16 children's externalising symptoms and variation in mothers' proclivity to assume the worst of  
17  
18 them. In the current study, in addition to concurrent associations between maternal hostile  
19  
20 attributions made in relation to the child and child difficulties at 18-months, we also found that  
21  
22 mothers' *general* hostile attributions (indexed by interpretations of situations involving other  
23  
24 adults) at 5-years were associated with both negative parenting and child externalising symptoms.  
25  
26 This finding is significant, as the assessment used in this case represents a measure of maternal  
27  
28 hostile attribution tendencies that is not contaminated by existing representations of/experiences  
29  
30 with a specific individual (i.e., her child). The fact that this association held even once pre-existing  
31  
32 child behavioural problems at 18-months were included in the model also suggests that maternal  
33  
34 attributions are not only a reflection of the presence of child behavioural problems. Unexpectedly,  
35  
36 maternal hostile attributions in relation to the child at 5-years were unrelated to negative parenting  
37  
38 and other outcomes. We used open-ended vignettes to assess maternal attributions versus the  
39  
40 rating scale approach utilised in previous research (Nix et al., 1999), and mothers may have had  
41  
42 reservations about expressing overtly negative views of their child, particularly in this non-clinical  
43  
44 sample. However, it may also be that our general assessment of attributions at 5-years tapped into  
45  
46 a more fundamental, maternal characteristic, explaining the stronger link to parenting behaviours.  
47  
48  
49  
50  
51  
52

53 A direct association between maternal hostile attributions and child aggression still held  
54  
55 when our models took parenting characteristics into account. There are several possible  
56  
57 explanations for this link. Maternal hostile attributions may influence aspects of parental  
58  
59  
60

1  
2 behaviour or the parent-child relationship that are not necessarily captured by laboratory  
3  
4 observations, particularly the tendency to engage in harsh or over-reactive discipline in the context  
5  
6 of perceived child transgressions. Further exploration of the contexts in which maternal  
7  
8 attributions are particularly activated may be fruitful in the development of related interventions.  
9  
10 Maternal interpretations of child behaviour may also be conveyed to a co-parent or to other carers,  
11  
12 with implications for their interactions with the child. Finally, maternal hostile attributions may  
13  
14 relate to their own externalizing traits, which were not measured in the current study but may be  
15  
16 shared by the child. Regardless of the underlying mechanisms, maternal attributions represent a  
17  
18 potentially useful target for interventions focused on parenting behaviour and/or child aggression.  
19  
20  
21

### 22 **Intervening role of child hostile attributions**

23  
24 Our research provided limited support for the role of child hostile attributions as a key  
25  
26 intervening process between maternal hostile attributions/negative parenting and child aggression.  
27  
28 This was, at least in part, due to the fact that the hostile attributions-aggression association in  
29  
30 children was modest, and was also limited to relational versus overt aggression (Crick & Dodge,  
31  
32 1996; Crick et al., 2002). Stronger effects may emerge in older samples, where child attributions  
33  
34 appear to be more stable and more closely linked to aggressive responding (Lansford et al., 2006;  
35  
36 Orobio de Castro, Veerman, Koops, Bosch, & Monshouwer, 2002). It is also notable that we found  
37  
38 associations between child hostile attributions and aggression for relational but not overt  
39  
40 aggression in the current sample. While some previous studies have also linked hostile attributions  
41  
42 to relational aggression, associations with overt aggression have more commonly been reported in  
43  
44 the literature (Crick & Dodge, 1996; Mathieson et al., 2011). Relational aggression scores were  
45  
46 higher than physical aggression scores, particularly for girls, meaning that the lack of association  
47  
48 with overt aggression may be a consequence of relatively infrequent occurrence of these  
49  
50 behaviours in our non-clinical sample. More generally, the existing literature examining  
51  
52 relational/overt aggression specificity with regards to child hostile attributions is limited, and this  
53  
54 possibility needs further empirical investigation before conclusions can be drawn.  
55  
56  
57  
58  
59  
60



1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

Regardless of the possible explanations for the limited role of child hostile attributions in the current study, parental influences on child aggression are likely to include numerous, other intervening processes. Previous research has identified numerous developmental processes that may be influenced by parenting behaviour and contribute to child externalising problems, including empathy and moral reasoning (Arsenio & Gold, 2006), inhibitory control (Hughes & Ensor, 2006), and emotion regulation capacities (Halligan et al., 2013). The current findings should be considered in the light of this evidence for the multifaceted role of parenting behaviour.

### **Associations between psychosocial adversity and maternal hostile attribution tendencies**

We found robust associations between psychosocial adversity and maternal hostile attribution tendencies. Compared to their control group counterparts, mothers in the high risk group showed higher levels of child related hostile attributions at 18-months and of general hostile attributions at 5-years. This link between social context and maternal attributional style is consistent with findings that, in older children and adolescents, youth hostile attributions are inversely associated with family SES (Chen & Matthews, 2001). Extending these observations, the current research demonstrated that parents in high risk contexts also show elevated levels of hostile attributions, including in relation to their child. High risk families in the current study were experiencing numerous adversities, including generally higher exposure to negative behaviours (e.g., criminality) in their local communities and elevated rates of specific adverse life events. The presence of higher levels of maternal hostile attributions in this context is consistent with the assumption that individuals develop social schemas based on prior experiences. However, the opposite effect, whereby maladaptive maternal attributional style is a contributor to their adverse social circumstances, cannot be ruled out. Children did not show similar risk status effects in the current sample, but at 5-years may have limited awareness of the broader social context; contextual influences may become apparent later in development. Notably, the inclusion of psychosocial adversity as a predictor in our models appeared to impact some key associations. In particular, the pathway between maternal hostile attributions and negative parenting at 18-months

1  
2 was negligible once psychosocial adversity was taken into account, and stability in maternal  
3  
4 hostile attributions from 18-months to 5-years was also essentially eliminated. Our observations  
5  
6 highlight the need to take account of social context in future work.  
7

### 8 9 **Conclusions**

10  
11 Strengths of the current research include the longitudinal design, the use of direct  
12  
13 observations of maternal behaviour, and the independent measurement of key attributional and  
14  
15 behavioural outcomes. Our results suggest that negative parenting behaviours play an intervening  
16  
17 role in the association between maternal hostile attribution tendencies child aggression. We found  
18  
19 less support for the role of child hostile attributions as an intervening variable, primarily due to  
20  
21 modest correlations with child aggression. Other social influences on the development of child  
22  
23 hostile attributions should be given further consideration. For example, more extreme adverse  
24  
25 parental behaviours, such as physical abuse, may be particularly important to child hostile  
26  
27 attribution tendencies (Dodge, Bates, & Pettit, 1990); and aspects of peer relationships have also  
28  
29 been found to be relevant, including exposure to peer victimisation (Schwartz et al., 1998) or to  
30  
31 peer hostile attribution tendencies (Freeman, Hadwin, & Halligan, 2011; Halligan & Philips,  
32  
33 2010). Our findings should also be considered in the light of several limitations. The modest  
34  
35 sample size limited our power to detect small effects; and although our sample was representative  
36  
37 of the population from which it was drawn, the number of participants from minority groups was  
38  
39 small and findings may not generalise to other samples. In addition, changes in assessments over  
40  
41 time occurred as a consequence of the developmental approach, and the correlational design  
42  
43 necessitates caution in drawing conclusions about causal processes. Nonetheless, overall, the  
44  
45 results support a focus on reducing maternal hostile attributional tendencies as a potentially useful  
46  
47 adjunct to treatment interventions aimed at altering negative parenting behaviours and/or reducing  
48  
49 child aggression. Such interventions may be particularly relevant in high-risk populations where  
50  
51 maternal hostile attributions are somewhat more likely to occur.  
52  
53  
54  
55  
56  
57  
58  
59  
60

Table 1

Descriptive statistics, reported by child gender

	Male	Female
<b><u>18-months</u></b>		
Child problem behaviours (BSQ)	1.33 (0.86)	1.18 (0.72)
Maternal hostile attributions present (PCCI: %)	27.5%	38.9%
Maternal insensitivity (parenting observation: 1-5)	2.82 (0.84)	2.43 (0.59)
<b><u>5-years</u></b>		
Child hostile attribution score (0-1)	0.35 (0.25)	0.36 (0.24)
Teacher reported total aggression (SBS: 1-5)	2.93 (1.16)	2.44 (0.54)
Relational aggression subscale (SBS: 1-5)	1.50 (0.62)	1.36 (0.40)
Physical aggression subscale (SBS: 1-5)	1.43 (0.68)	1.11 (0.24)
Maternal general hostile attributions (0-4)	0.90 (0.64)	0.72 (0.57)
Maternal child-specific hostile attributions (0-4)	1.15 (0.64)	1.20 (0.64)
Maternal negative control (parenting observation)	.131 (.697)	-.13 (.703)

BSQ: Behaviour Screening Questionnaire

SBS: Social Behavior Scale

PCCI: Parental Constraints and Concerns Interview

Table 2: Correlation matrix

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Child gender	-										
2. Risk status	-.01	-									
<u>18-month variables</u>											
3. Child problem behaviours (BSQ)	-.09	.33***	-								
4. Maternal insensitivity	-.26*	.44***	.20*	-							
5. Maternal hostile attributions	-.12	.37***	.36***	.19 <sup>+</sup>	-						
<u>5-year child variables</u>											
6. Hostile attributions	<.01	.05	-.09	-.03	.27**	-					
7. Total aggression (SBS)	-.27*	.17	.31**	.37***	.08	.14	-				
8. Relational aggression (SBS)	-.14	.14	.23*	.21 <sup>+</sup>	.06	.22*	.88***	-			
9. Physical aggression (SBS)	-.32**	.20 <sup>+</sup>	.31**	.43***	.12	.04	.86***	.54***	-		
<u>5-year maternal variables</u>											
10. General hostile attributions (HAQ)	-.16	.42***	.17	-.06	.20*	.18 <sup>+</sup>	.32**	.32**	.26*		
11. Child specific hostile attributions (HAQ)	.04	-.02	.08	.13	.15	.10	.14	.13	.10	.29**	-
12. Negative control	-.19 <sup>+</sup>	.53***	.10	.43***	.16	.21*	.31**	.28*	.35**	.39***	.14

<sup>+</sup> $P < .10$ , \*  $P < .05$ , \*\* $P < .01$ , \*\*\* $P < .001$ : BSQ: Behaviour Screening Questionnaire; SBS: Social Behavior Scale; HAQ: Hostile Attribution Questionnaire

Figure 1

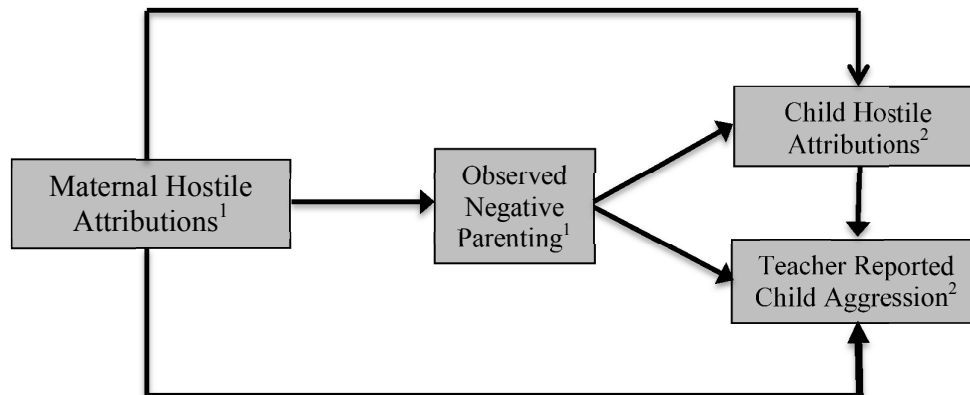


Figure 2

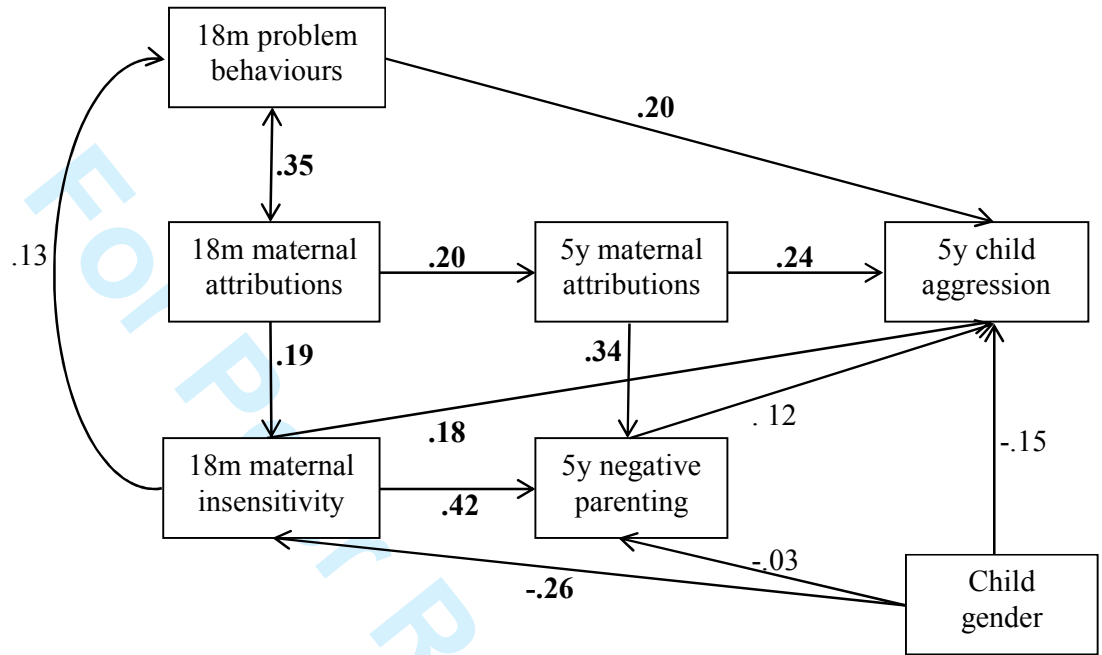
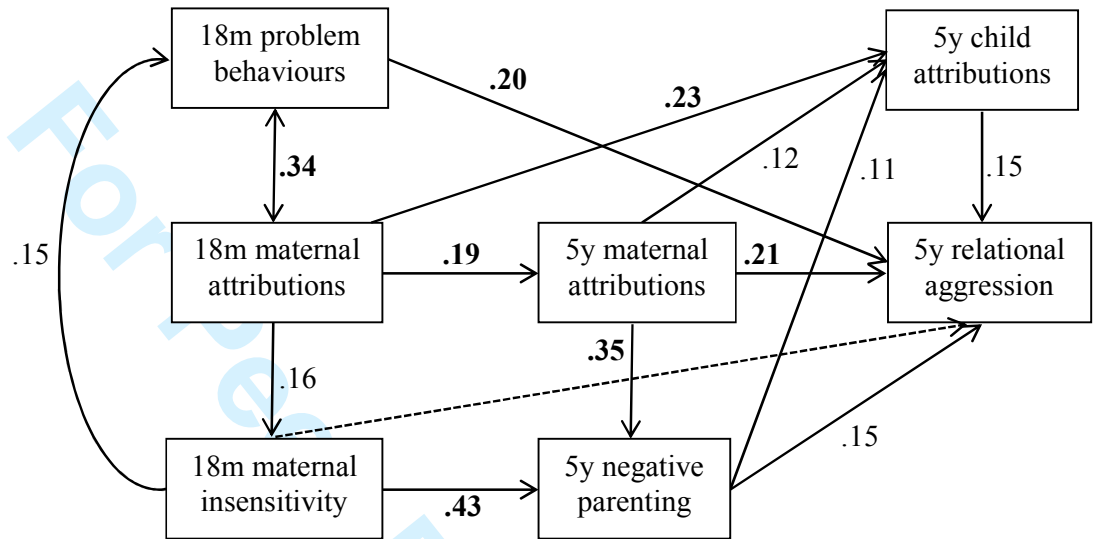


Figure 3



1  
2 Figure 1 Title

3  
4 Depiction of hypothesised associations

5  
6 Figure 1 Legend

7  
8  
9 <sup>1</sup> Assessed at 18-months and 5-years child age

10  
11 <sup>2</sup> Assessed at 5-years child age

12  
13  
14  
15 Figure 2

16  
17 Model examining the prediction of total child aggression, including gender effects: dashed lines  
18 indicate predicted associations that were not supported in preliminary analyses

19  
20 Figure 2 footnote

21  
22 Standardised coefficients are presented; paths with  $P < .10$  are in bold

23  
24  
25  
26  
27  
28 Figure 3

29  
30 Model examining the prediction child relational aggression: dashed line indicates a weak pathway  
31 excluded from the final model

32  
33 Figure 3 footnote

34  
35 Standardised coefficients are presented; paths with  $P < .10$  are in bold



## Reference List

Allison, P. D. (2003). Missing data techniques for structural equation modeling. *Journal of Abnormal Psychology, 112*, 545-557.

Arsenio, W. F. & Gold, J. (2006). The effects of social injustice and inequality on children's moral judgments and behavior: Towards a theoretical model. *Cognitive Development, 21*, 388-400.

Bickett, L. R., Milich, R., & Brown, R. T. (1996). Attributional styles of aggressive boys and their mothers. *Journal of Abnormal Child Psychology, 24*, 457-472.

Chen, E., Langer, D. A., Raphaelson, Y. E., & Matthews, K. A. (2004). Socioeconomic status and health in adolescents: the role of stress interpretations. *Child Development, 75*, 1039-1052.

Chen, E. & Matthews, K. A. (2001). Cognitive Appraisal Biases: An Approach to Understanding the Relation Between Socioeconomic Status and Cardiovascular Reactivity in Children. *Annals of Behavioral Medicine, 23*, 101-111.

Crick, N. R., Casas, J. F., & Mosher, M. (1997). Relational and overt aggression in preschool. *Developmental Psychology, 33*, 579-588.

Crick, N. R. & Dodge, K. A. (1996). Social information-processing mechanisms in reactive and proactive aggression. *Child Development, 67*, 993-1002.

Crick, N. R., Grotpeter, J. K., & Bigbee, M. A. (2002). Relationally and physically aggressive children's intent attributions and feelings of distress for relational and instrumental peer provocations. *Child Development, 73*, 1134-1142.

Cronin, A., Halligan, S. L., & Murray, L. (2008). Maternal psychosocial adversity and the longitudinal development of infant sleep. *Infancy, 13*, 469-495.

Dadds, M. R., Mullins, M. J., McAllister, R. A., & Atkinson, E. (2003). Attributions, affect, and behavior in abuse-risk mothers: a laboratory study. *Child Abuse and Neglect, 27*, 21-45.

Dodge, K. A. (1980). Social cognition and children's aggressive responses. *Child Development, 51*, 162-170.

1  
2 Dodge, K. A. (1986). A social information processing model of social competence in  
3 children. In M.Perlmutter (Ed.), *Minnesota Symposium on Child Psychology* (pp. 77-125).  
4 Hillsdale, NJ: Erlbaum.  
5  
6  
7

8 Dodge, K. A., Bates, J. E., & Pettit, G. S. (1990). Mechanisms in the cycle of violence.  
9  
10 *Science*, 250, 1678-1683.  
11  
12

13 Dodge, K. A., Pettit, G. S., Bates, J. E., & Valente, E. (1995). Social information-processing  
14 patterns partially mediate the effect of early physical abuse on later conduct problems. *Journal of*  
15 *Abnormal Psychology*, 104, 632-643.  
16  
17  
18

19 Fivush, R. & Nelson, K. (2004). Culture and language in the emergence of autobiographical  
20 memory. *Psychological Science*, 15, 573-577.  
21  
22  
23

24 Freeman, K., Hadwin, J. A., & Halligan, S. L. An experimental investigation of peer  
25 influences on hostile attributions in adolescents. *Journal of Clinical Child and Adolescent*  
26 *Psychology*, (in press).  
27  
28  
29

30 Gardner, F. E., Sonuga-Barke, E. J., & Sayal, K. (1999). Parents anticipating misbehaviour:  
31 an observational study of strategies parents use to prevent conflict with behaviour problem children.  
32  
33 *Journal of Child Psychology and Psychiatry*, 40, 1185-1196.  
34  
35  
36

37 Ghodsian, M., Zajicek, E., & Wolkind, S. (1984). A Longitudinal-Study of Maternal  
38 Depression and Child-Behavior Problems. *Journal of Child Psychology and Psychiatry*, 25, 91-109.  
39  
40

41 Ghodsian, M., Zajicek, E., & Wolkind, S. (1985). Comparative study of social and family  
42 correlates of children's behaviour ratings. *Child: Care, Health and Development*, 11, 209-228.  
43  
44  
45

46 Gomez, R., Gomez, A., DeMello, L., & Tallent, R. (2001). Perceived maternal control and  
47 support: effects on hostile biased social information processing and aggression among clinic-  
48 referred children with high aggression. *Journal of Child Psychology and Psychiatry*, 42, 513-522.  
49  
50  
51

52 Gunning, M., Halligan, S. L., & Murray, L. (2013). Contributions of maternal and infant  
53 factors to infant responding to the Still Face paradigm: A longitudinal study. *Infant Behav.Dev*, 36,  
54 319-328.  
55  
56  
57  
58  
59  
60

Halligan, S. L., Cooper, P. J., Fearon, R. M. P., Sampson, S., Crosby, M., & Murray, L. (2013). The longitudinal development of emotion regulation capacities in children at risk for externalizing disorders. *Development and Psychopathology, 25*, 391-406.

Halligan, S. L., Cooper, P. J., Healy, S. J., & Murray, L. (2007). The attribution of hostile intent in mothers, fathers and their children. *Journal of Abnormal Child Psychology, 35*, 594-604.

Halligan, S. L. & Philips, K. J. (2010). Are you thinking what I'm thinking? Peer group similarities in adolescent hostile attribution tendencies. *Developmental Psychology, 46*, 1385-1388.

Hughes, C. & Ensor, R. (2006). Behavioural problems in 2-year-olds: links with individual differences in theory of mind, executive function and harsh parenting. *Journal of Child Psychology and Psychiatry, 47*, 488-497.

Juliano, M., Werner, R., & Wright Cassidy, K. (2006). Early correlates of prechool aggressive behaviour according to type of aggression and measurement. *Journal of Applied Developmental Psychology, 27*, 395-410.

Lansford, J. E., Malone, P. S., Dodge, K. A., Crozier, J. C., Pettit, G. S., & Bates, J. E. (2006). A 12-year prospective study of patterns of social information processing problems and externalizing behaviors. *Journal of Abnormal Child Psychology, 34*, 715-724.

MacBrayer, E. K., Milich, R., & Hundley, M. (2003). Attributional biases in aggressive children and their mothers. *Journal of Abnormal Psychology, 112*, 698-708.

MacKinnon-Lewis, C., Lamb, M. E., Arbuckle, B., Baradaran, L. P., & Volling, B. L. (1992). The relationship between biased maternal and filial attributions and the aggressiveness of their interactions. *Development and Psychopathology, 4*, 403-415.

MacKinnon-Lewis, C., Lamb, M. E., Hattie, J., & Baradaran, L. P. (1999). A longitudinal examination of the associations between mothers' and sons' attributions and their aggression. *Development and Psychopathology, 13*, 69-81.

Mathieson, L. C., Murray-Close, D., Crick, N. R., Woods, K. E., Zimmer-Gembeck, M., Geiger, T. C. et al. (2011). Hostile intent attributions and relational aggression: the moderating roles of emotional sensitivity, gender, and victimization. *J Abnorm. Child Psychol., 39*, 977-987.

1  
2 Murray, L. (1992). The impact of postnatal depression on infant development. *Journal of*  
3  
4 *Child Psychology and Psychiatry*, 33, 543-561.

5  
6 Murray, L., FioriCowley, A., Hooper, R., & Cooper, P. (1996). The impact of postnatal  
7  
8 depression and associated adversity on early mother-infant interactions and later infant outcome.  
9  
10 *Child Development*, 67, 2512-2526.

11  
12 Nelson, D. A. & Coyne, S. M. (2009). Children's intent attributions and feelings of distress:  
13  
14 associations with maternal and paternal parenting practices. *Journal of Abnormal Child Psychology*,  
15  
16 37, 223-237.

17  
18 Nelson, D. A., Mitchell, C., & Yang, C. (2008). Intent attributions and aggression: a study of  
19  
20 children and their parents. *Journal of Abnormal Child Psychology*, 36, 793-806.

21  
22 Nix, R. L., Pinderhughes, E. E., Dodge, K. A., Bates, J.E., Pettit, G. S., & McFadyen-  
23  
24 Ketchum, S. A. (1999). The relation between mothers' hostile attribution tendencies and children's  
25  
26 externalizing behavior problems: the mediating role of mothers' harsh discipline practices. *Child*  
27  
28 *Development*, 70, 896-909.

29  
30 O'Connor, T. G. (2002). Annotation: The 'effects' of parenting reconsidered: findings,  
31  
32 challenges, and applications. *J Child Psychol Psychiatry*, 43, 555-572.

33  
34 Orobio de Castro, B., Veerman, J. W., Koops, W., Bosch, J. D., & Monshouwer, H. J. (2002).  
35  
36 Hostile attribution of intent and aggressive behavior: a meta-analysis. *Child Development*, 73, 916-  
37  
38 934.

39  
40 Pettit, G. S., Bates, J. E., & Dodge, K. A. (1997). Supportive parenting, ecological context,  
41  
42 and children's adjustment: A seven-year longitudinal study. *Child Development*, 68, 908-923.

43  
44 Pettit, G. S., Laird, R. D., Bates, J. E., Dodge, K. A., & Criss, M. M. (2001). Antecedents and  
45  
46 behavior-problem outcomes of parental monitoring and psychological control in early adolescence.  
47  
48 *Child Development*, 72, 583-598.

49  
50 Richman, N. & Graham, P. J. (1971). A Behavioural Screening Questionnaire for use with  
51  
52 three-year-old children: preliminary findings. *Journal of Child Psychology and Psychiatry*, 12, 5-  
53  
54 33.

1  
2 Rutter, M., Giller, H., & Hagell, A. (1998). *Antisocial Behavior by Young People*. Cambridge,  
3  
4 England: Cambridge University Press.

5  
6 Schwartz, D., Dodge, K. A., Coie, J. D., Hubbard, J. A., Cillessen, A. H., Lemerise, E. A. et  
7  
8 al. (1998). Social-cognitive and behavioral correlates of aggression and victimization in boys' play  
9  
10 groups. *Journal of Abnormal Child Psychology*, 26, 431-440.

11  
12 Shaw, D. S., Winslow, E. B., Owens, E. B., & Hood, N. (1998). Young children's adjustment  
13  
14 to chronic family adversity: a longitudinal study of low-income families. *Journal of the American*  
15  
16 *Academy of Child and Adolescent Psychiatry*, 37, 545-553.

17  
18 Sheridan, A., Murray, L., Cooper, P. J., Evangeli, M., Byram, V., & Halligan, S. L. (2013). A  
19  
20 longitudinal study of child sleep in high and low risk families: relationship to early maternal settling  
21  
22 strategies and child psychological functioning. *Sleep Medicine*, 14, 266-273.

23  
24 Snyder, J., Cramer, A., Afrank, J., & Patterson, G. R. (2005). The contributions of ineffective  
25  
26 discipline and parental hostile attributions of child misbehavior to the development of conduct  
27  
28 problems at home and school. *Developmental Psychology*, 41, 30-41.

29  
30 Weiss, B., Dodge, K. A., Bates, J. E., & Pettit, G. S. (1992). Some consequences of early  
31  
32 harsh discipline: child aggression and a maladaptive social information processing style. *Child*  
33  
34 *Development*, 63, 1321-1335.

35  
36 Wolke, D., Skuse, D., & Mathisen, B. (1990). Behavioral style in failure-to-thrive infants: a  
37  
38 preliminary communication. *Journal of Pediatric Psychology*, 15, 237-254.

39  
40 Zaslow, M. J., Weinfield, N. S., Gallagher, M., Hair, E. C., Ogawa, J. R., Egeland, B. et al.  
41  
42 (2006). Longitudinal prediction of child outcomes from differing measures of parenting in a low-  
43  
44 income sample. *Developmental Psychology*, 42, 27-37.