

Early Father-Child Interactions and Child
Behaviour

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Thesis declaration form

I confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

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Overview

Many development trajectories leading to maladaptive outcomes begin in infancy and toddlerhood. With more fathers caring for their children from a younger age there is a need to understand the associations between paternal behaviour and child development. This thesis will explore the relationship between father-child interaction and child outcomes in the early years. Part one is a review of the literature looking at the association between father-child interaction in the preschool years and child outcomes across social, behavioural, cognitive and linguistic domains. The key question addressed is, 'Do father-child interactions in the preschool years predict later child outcomes?' Part two of the thesis reports findings from a longitudinal cohort study looking at the associations between father-child interactions and child behaviour across the first two years. Specifically, it examines cross-sectional and longitudinal correlations between father-child interaction, infant temperament and externalizing behaviours, including exploring the direction of effects between fathers and their children. Part three is a critical appraisal of the research process which considers the issues that arise in translating complex family dynamics into quantifiable variables, including issues of measurement and researcher subjectivity.

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Part 1: Literature Review.

**Father-Child Interaction and Child Developmental
Outcomes**

Abstract

This paper reviews longitudinal evidence looking at the association between father-child interaction in the preschool years and subsequent child outcomes across a number of domains. A systematic literature search of major databases identified 13 publications which used observational measures of father-child interaction within the first 5 years. There was evidence for an association between interaction and linguistic outcomes. However, evidence was inconclusive for other outcomes, including cognitive, behavioural and social domains. There was more consistent evidence for maternal influences across all domains. This review highlights the scarcity of research looking at longitudinal associations between paternal interactions and child outcomes and makes recommendations for future research in this area.

Introduction

The first years of a child's life are critical for certain aspects of development and many developmental trajectories leading to maladaptive outcomes begin in infancy and toddlerhood, so quality of parenting at this time is important (Campbell, 1995). Changes in family dynamics over the past decades, including more women returning to work after birth and average levels of paternal involvement increasing across industrialised countries (Paquette, Coyl-Shepherd, & Newland, 2013), means that more fathers are caring for their children from a younger age (Cabrera, Tamis-LeMonda, Bradley, Hofferth, & Lamb, 2000). Therefore there is an increasing need to understand the mechanisms through which paternal involvement impacts on child development. This research can affect policy, be used in targeted interventions in at-risk groups and help to develop theory for future research to investigate.

The Concept of Father Involvement

Early research into father involvement generally contrasted absent and present fathers or focused on financial contributions and overall time spent with the child. Through increased recognition of the different roles that fathers play in their children's lives the concept of paternal involvement developed to include engagement, accessibility and responsibility (Lamb, Pleck, Charnov, & Levine, 1985). Aspects of fathering such as warmth, support, monitoring and decision making became important when thinking about involvement and researchers became interested in the quality of parenting as well as the quantity. More recently, Pleck (2010) proposed a revised conceptualisation of paternal involvement that includes three primary components: (a) positive engagement activities (interaction with the child of an intensive kind likely to promote development); (b) warmth and responsiveness; and (c) control, particularly monitoring and decision making. These

components reflect the way that paternal involvement has been operationalized in recent research (e.g. Carlson, 2006; Hofferth, 2003) and captures aspects of parenting that have been prominent in the literature, such as sensitivity and harsh control.

Fathers' Contributions to Child Development

Different components of paternal involvement have been linked to a number of outcomes in behavioural, cognitive and social domains. Behavioural outcomes have received a lot of attention in the research due to links between early externalizing behaviours and later delinquency and psychopathology. A systematic review by Sarkadi et al. (2008) looking at longitudinal associations between father involvement and child outcomes suggested that fathers' engagement with their child, as defined by direct contact such as play or care-giving, reduced behavioural problems in boys and reduced delinquency in low SES families. In terms of Pleck's definition of involvement there is evidence that lack of a warm paternal relationship is associated with externalizing problems (e.g. Amato & Rivera, 1999; Baker & Heller, 1996) and aspects of control, such as harsh discipline and monitoring the child's whereabouts, are linked with both the onset of conduct problems in children (DeKlyen, Speltz, & Greenberg, 1998) and with adolescent externalizing behaviour (Carlson, 2006). In addition, specific paternal traits such as depression (Kane & Garber, 2009) and antisocial personality (Jaffee, Moffitt, Caspi, & Taylor, 2003) have also been linked to the development of behaviour problems, perhaps through their effect on levels of paternal warmth and engagement.

Several studies have also looked at cognitive outcomes in relation to different aspects of paternal involvement. Bronte-Tinkew et al. (Bronte-Tinkew, Carrano, Horowitz, & Kinukawa, 2008) found that positive engagement activities such as cognitively stimulating activities and care-giving were associated with lower

likelihood of infant cognitive delay. Later in childhood, Flouri and Buchanan (2004) found that reading to the child and taking outings with the child at age 7 predicted academic achievement at age 20. In terms of the warmth/ responsiveness aspect of involvement, Easterbrooks and Goldberg (1984) found that paternal sensitivity was associated with problem solving ability in 3 year olds whilst Shannon et al. (Shannon, Tamis-LeMonda, London, & Cabrera, 2002) found that paternal responsiveness was associated with decreased likelihood of cognitive delay in two year olds.

There are fewer studies regarding social outcomes in children. However, theories of socio-emotional growth (e.g. attachment theory, Bowlby, 1969) and socialisation (e.g. Maccoby, 1992) assume associations between early relationships with caregivers and the development of social competence. Parke (Parke, et al., 2004) has suggested that fathers play a unique role in socializing their children's emotional expressiveness and emotion regulation, and there is some evidence that levels of paternal warmth and control uniquely predict children's peer adjustment (Parke et al., 2004).

Methodological issues

While there appears to be a range of evidence for the influence of paternal involvement on child outcomes, a number of methodological issues need to be highlighted.

Over and above mothers. While levels of paternal involvement have increased over recent decades in western countries (Paquette, et al., 2013), mothers still tend to spend more overall time with their children than fathers and evidence suggests mothers and fathers interact differently with their children from an early age (Lamb, 2013). Fathers tend to be more involved in play than care-giving, and fathers'

style of interaction is often more physically stimulating and unpredictable than mothers' (Lewis & Lamb, 2003). It is therefore important to look at the unique contribution that fathers make to child outcomes over and above maternal influences. For example, Black et al. (Black, Dubowitz, & Starr, 1999) found that fathers' nurturance during play predicted children's cognition, emotional behaviours and language competence at 3 years over and above the effects of the mother. Similarly, Amato and Rivera (1999) showed paternal support and closeness to be negatively associated with children's behaviour problems when mothers' involvement was controlled for. In addition, in the clinical literature, there is evidence that fathers' style of discipline and psychopathology contribute to the risk for child disorder over and above the effect of mothers (DeKlyen, Biernbaum, Speltz, & Greenberg, 1998; Lewis & Lamb, 2006), particularly for behavioural problems rather than emotional problems (DeKlyen, Speltz, et al., 1998; Ramchandani & Psychogiou, 2009).

Measuring involvement. Studies of father involvement use a range of methods to measure paternal behaviour, including direct observations of father-child interaction, maternal or adolescent report of father involvement, and questionnaire measures of involvement. This range may mask some important influences and make it more difficult to compare studies. For example, Rothbaum and Weisz (1994) found that studies using questionnaire measures tended to have smaller effect sizes than other studies. In addition, there are some problems associated with questionnaire measures such as ambiguity about the question and lack of opportunity for respondents to clarify reasons behind answers (Rothbaum & Weisz, 1994). Other methodological issues include shared method variance, for example where mothers provide data both on levels of paternal involvement and child outcome. In addition, studies relying on questionnaire measures or maternal report may confound quality

and quantity of paternal involvement, making it difficult to interpret if results are due to the amount of time spent with a child or the quality of the relationship between them. Observations of father-infant interaction on the other hand can identify specific mechanisms of influence within the interactions, directly measuring levels of positive engagement and warmth, as well as reducing shared method variance by ensuring different sources of data for paternal involvement and child outcomes. These have therefore become the gold standard for measuring the quality of paternal behaviours relevant to child outcomes.

In terms of measuring the influence of paternal involvement, while many studies have shown cross-sectional associations between father-child interaction and outcomes, longitudinal designs allow researchers to look beyond concurrent associations to understand the influence of early father-child interactions across time and begin to consider the causal influences on child development.

Child age. Some studies focus on paternal factors in infancy while others look at older children. There are competing hypotheses about whether parental influences may be greater in preschool children when there are fewer influences from others (e.g. peers and teachers), or in older children due to cumulative, reciprocal influences between parents and children over time. However, there are a number of reasons why focussing on early years may be important. Firstly, the changing nature of parental roles in the early years, with fathers increasing their involvement at this time means it is important to understand the possible consequences of these changes for child development. Evidence that mothers and fathers interact differently with their children makes it particularly important to understand the influence of fathers' early interactions on child outcomes. Secondly, the significance of early experiences, particularly within 'sensitive periods' of development, has a long history within

developmental psychology with research indicating that the quality and timing of early experiences is critical for typical brain and behavioural development (Fox & Rutter, 2010). Thirdly, a number of studies have identified specific developmental trajectories beginning in this period which may be influenced by parental interactions (e.g. Nagin & Tremblay, 1999; Shaw, Gilliom, Ingoldsby, & Nagin, 2003).

Relevance of current review

Given the variety of studies into the influence of paternal involvement on child outcomes and the importance of early child development, there is a need for an overview of how early aspects of involvement impact on different domains of child functioning. The current review was undertaken to examine the associations between the specific aspects of paternal involvement identified by Pleck, namely, positive engagement, warmth and control, and child outcomes across a number of domains. Studies were included where involvement was measured by observed father-child interactions within the first five years of the child's life in order to address the issue of early developmental trajectories. Only studies with longitudinal designs were included to look at influences across time and a number of outcome domains were examined to capture the variety present in the literature. Studies where maternal data was not collected were not excluded due to the small number of studies available. However, this issue is addressed in thinking about the quality of design and generalizability of findings.

The key question addressed was, do father-child interactions in the preschool years predict later child outcomes?

Method

Search strategy

A systematic literature search was conducted including the databases Psychinfo, Medline, and CINAHL-plus with the key words father, father-child relations, parent-child relations, parental involvement, father-child interaction and father-infant interaction. Additional search terms and criteria were added to further refine results, including adding the terms observation and/or videotaped and selecting only longitudinal studies. Reference lists of selected papers and reviews in the area were searched for relevant studies and specific journals which include paternal literature were also scanned (e.g. *Fathering*). The identified papers were then reviewed for more detailed evaluations and were included if they met the selection criteria described next.

Inclusion criteria

A number of father-child interaction variables relevant to Pleck's definition have been measured in the literature and analyses indicate that the three components of paternal involvement he proposes are moderately interrelated (Pleck, 2010). Therefore studies which measure any of these components through observational assessments are included. This includes: Positive engagement activities (e.g. supportive engagement, socio-emotional and cognitive stimulation); warmth and responsiveness (e.g. sensitivity, positive affect, synchronicity, response to distress. Also, measures of the opposite of these e.g. intrusiveness, detachment, negative affect); and control (e.g. monitoring).

Outcomes may be behavioural, cognitive, linguistic or social. Studies were not included if they used a single measure of a specific ability e.g. self-recognition (Borke, Lamm, Eickhorst, & Keller, 2007), false-belief understanding (McElwain &

Volling, 2004) or inhibition (Park, Belsky, Putnam, & Crnic, 1997) as these were considered too specific to make comparisons with other studies. In addition, it was intended to look at outcomes which may be assumed to have long term effects on health and well-being of the children (Sarkadi, et al., 2008). Therefore, studies were required to use multi-item scales or observational measures which provided composite scores on the chosen outcome.

Studies were included if first data collection was within the first five years i.e. preschool years. This covers the period when children reach significant developmental milestones across a range of domains and it is the time period within which mothers have traditionally been the primary carers but which fathers are increasingly involved with.

Included papers were required to have a longitudinal design. No specific minimum length between data points was specified, but data must have been collected at separate visits within a longitudinal design rather than being separate due to assessment burden within one visit. Collection of father-child interaction data must have preceded child outcome data. In addition, it was decided to include studies which measured outcomes prior to adolescence i.e. up to 13 years old. Beyond this age a young person's social world tends to expand and they have increased independence from parents, leading to an increasing number of influences on development. In addition, the majority of studies looking at preschool interactions measure outcomes within 36 months. Therefore, providing a limit to the age of outcome measure reduced heterogeneity between studies allowing easier comparisons between them.

Studies which focussed on clinical samples in which parents were selected due to psychopathology were not included in the review as these samples may show different patterns to non-clinical groups.

Results

Selection of studies

A total of 1266 potentially relevant papers were found using the search terms above. This was narrowed to 682 as search terms were refined and duplicates were removed. 618 papers were then excluded on the basis of titles and abstracts which indicated they were not relevant (e.g. non-empirical papers, medical studies). A total of 64 publications remained and these were appraised in more detail for relevance to the current review. This included scanning reference lists to search for additional papers which may meet selection criteria. Sixteen papers remained which met inclusion criteria. Key reasons for exclusion included cross-sectional designs, maternal data only, father-child interaction observed in later childhood, and outcome measures of a single, specific ability.

Three of the 16 papers which matched inclusion criteria used a sample from the US Early Head Start Research and Evaluation Project (Cabrera, Shannon, & Tamis-LeMonda, 2007; Cook, Roggman, & Boyce, 2011; Tamis-LeMonda, Shannon, Cabrera, & Lamb, 2004). This was a large scale random-assignment evaluation of Early Head Start which recruited mothers from low-income families and included paternal data in around half of their sites where fathers were identified by mothers. As the three papers used the same measures and time points, only the Tamis-LeMonda study was included as this paper provided more detailed reporting of results (both correlations and regression analyses). Results from the other studies, which included a later time point, are evaluated in the discussion. Magill-Evans and

Harrison (1999) and Magill-Evans and Harrison (2001) report on the same sample at different time points looking at cognition and language and so only the earlier study was included. Benzie et al. (Benzie, Harrison, & Magill-Evans, 1998) also use this sample, but report on outcomes in a different domain at a different time point and therefore was included. Lindsey et al. (Lindsey, Cromeens, Colwell, & Caldera, 2009) and Martin et al. (Martin, Ryan, & Brooks-Gunn, 2010) both report on data from the National Institute of Child Health and Human Development (NICHD) study in the US. However, they report on different interactions (one in the home and one in the laboratory) and on different outcomes and so were both included. The final number of publications was 13, which were based on 11 studies (see Figure 1). A summary of the data extracted from these publications can be seen in Table 1 on page 51-53.

Sample characteristics

Sample size within the publications ranged from 30 to 723 with the total number of participants across all studies being 1707. Age at observation ranged from 3 to 54 months and at outcome from 12 months to 11 years. Eight of the publications had samples from North America described as majority white, middle class, and well-educated. Three papers used similar middle class, well-educated samples from the UK, Israel and Palestine, while one paper used a low-income, ethnically diverse sample from the US. The final publication used an at-risk German sample. The length of interaction ranged from 3 minutes to 60 minutes, with nine of these being in the home and four in the laboratory. Five of these used free play, three used semi-structured play, three used a teaching task and two used observations of daily routines. Outcomes were measured by parental or teacher report questionnaires

in six studies, observational measures in three studies and standardised psychometric tests in four studies.

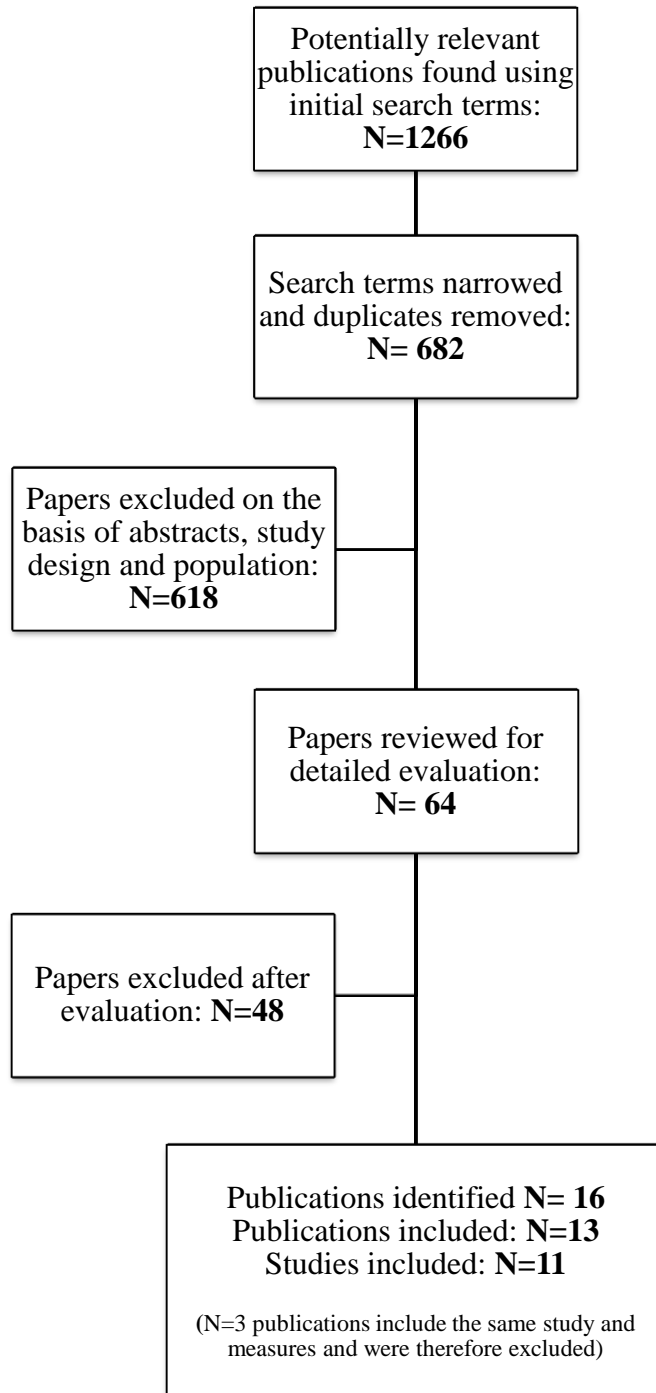


Figure 1. Stages in Retrieval of Relevant Publications

Assessing quality of included studies

Guidance by The Centre for Reviews and Dissemination (CRD, 2008) suggests that there are a number of factors that need to be taken into account when assessing study quality. These include appropriateness of study design, choice of outcome measure, statistical issues, quality of reporting and generalizability.

In terms of study design, Amato and Rivera (1999) suggest two design criteria which are important when seeking to establish an association between paternal involvement and child outcome. These are different source data on involvement and outcome, and controlling for maternal involvement. In their review of studies looking at parental care giving and child externalizing behaviour, Rothbaum and Weisz (1994) suggest that measures of observed interaction which use composites of multiple variables have more predictive value than individual items. Pleck (2010) adds that longitudinal studies are necessary to establish direction of effects.

All of the included studies used different source data as observations were coded by trained researchers for the interactions while outcomes involved a mixture of parental report, teacher report and measures taken by researchers. All studies also used a longitudinal design as this was one of the inclusion criteria. However, only seven out of the 13 publications used maternal data as a control. Ten used parenting measures which were a composite from at least two variables, while one measured only sensitivity and two used shared father-child interaction variables e.g. reciprocity and shared emotions.

An additional issue is the extent to which coding schemes are designed with fathers in mind, adapted from schemes used originally with mothers, or transferred from maternal research with no changes. Given the differences between the ways that

mothers and fathers interact with their children it may be important to consider whether coding schemes are capable of picking up father-specific behaviours which are linked to outcomes. Of the studies in this review, five used existing schemes while the remaining eight designed schemes specifically for their study. Two of those using existing schemes specifically mention adaptations for fathers, including using a floor mat instead of a car seat (Ramchandani, et al., 2013) and changes to the coding scheme (Trautman-Villalba, Gschwendt, Schmidt, & Laucht, 2006). Those designing their own schemes generally use items recognisable from maternal research such as sensitivity and intrusiveness.

In thinking about outcome measures, CRD suggests noting whether researchers were blind to study group (in this case whether different researchers coded interactions and collected outcome data) and whether measures have good reliability and validity. Only four studies specified whether researchers had been blind, others did not report this. Studies with cognitive, linguistic and behavioural outcomes tended to use standardized measures and reported their psychometric properties. However, in studies with social outcomes three had developed their own outcome measures, for example, observational instruments for child behaviour. In these cases, in accordance with CRD criteria, all studies reported how the measure was developed and how inter-rater reliability was established.

Statistical issues may take into account sample size and appropriateness of the statistical test, while quality of reporting refers to whether important aspects of methods and results have been adequately reported. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE; von Elm, et al., 2007) checklist indicates areas which should be reported in observational studies, including for example details of non-participation and descriptive statistics of the study sample.

Studies varied as to the level of detail of reporting, for example, two did not report correlation coefficients and several did not report non-significant values.

Generalisability may take into account the representativeness of the sample (e.g. SES, ethnicity, particular characteristics), the contexts in which data was collected (in this case either in the family home, which is considered to be more ecologically valid, or the laboratory), and the length of the observation (2 minutes vs. 10 minutes). Again, there was considerable variation between studies regarding these features. More details on these criteria are noted in sample characteristics, above, and in Table 1.

Father-child interaction and child outcomes

Studies are grouped by outcome. Where possible, statistical information has been extracted and included below. However, not all papers reported this information, particularly in the case of non-significant values. Results from Martin et al. (2010) are reported under cognitive and social outcomes as the study included outcome measures in both these domains.

Behavioural outcomes Five studies used behaviour problems as outcomes. Benzies et al. (1998) assessed 74 father-child dyads in the family home at 12 months during a novel teaching task. The parenting score obtained consisted of sensitivity to cues, response to child's distress, and social-emotional and cognitive growth fostering. Behaviour problems were assessed between 42 and 54 months using the Eyberg Child Behaviour Inventory (ECBI; Eyberg, 1992), which yields an intensity score and a problem score reflecting frequency of a behaviour and how problematic it is respectively. Paternal parenting scores were not associated with either the ECBI intensity score ($r = -.03, ns$) or the problem score ($r = .02, ns$). Equivalent maternal data was also collected and was non-significant.

Belsky et al. (Belsky, Hsieh, & Crnic, 1998) observed 125 firstborn sons and their fathers during mealtimes at 15, 21, 27 and 33 months. A positive-negative parenting score was created by summing ratings of sensitivity, positive affect, cognitive stimulation, detachment, intrusiveness and negative affect. Externalizing problems were assessed at 37 months by averaging mothers and fathers ratings on the Child Behaviour Checklist (CBCL; Achenbach, Edelbrock, & Howell, 1987). The authors do not report correlation coefficients for their data. Regression analyses including both maternal and paternal data indicated that father's parenting scores did not contribute to the prediction of externalizing behaviours ($\beta = -.08$, *ns*), while mothers scores did ($\beta = -.23$, $p < .05$).

Ramchandani et al. (Ramchandani, et al., 2013) visited 155 families at 3 months and coded father-infant interaction on four parenting dimensions: sensitivity, intrusiveness, remoteness and behaviour relevant to depression. Externalizing behaviour was measured at 12 months using maternal responses on the CBCL. Regression analyses indicated that remote interactions were associated with externalising behaviours ($\beta = -.175$, $p = .048$) after controlling for confounding variables which included maternal sensitivity. Equivalent analyses for maternal data were not included.

Trautman-Villalba et al. (2006) assessed an at-risk sample of 72 fathers' interaction behaviours at 3 months during a nursing and playing situation. Interactions were coded for positive emotionality, sensitivity and non-responsiveness. Externalizing behaviour was assessed using the CBCL, completed by mothers at 8 and 11 years. Scores were used to assign children to a high or low externalizing behaviour group. Fathers of the high externalizing group were less sensitive ($F(1, 67) = 8.24$, $p = .005$) and less responsive ($F(1, 67) = 5.17$, $p = .026$) at

3 months than the low externalizing group, while child gender and psychosocial adversity did not show an effect. No maternal data was reported.

Feldman and Eidelman (2004) assessed a sample of 138 infants consisting of 23 twins, 23 triplets and 23 single infants. Families were videotaped at home at 3 months during a 5 minute free-play session. Parent-infant synchrony was assessed by measuring the duration of coordinated father-infant behaviour under the headings gaze, vocalization and touch. Child behaviour problems were measured at 24 months using maternal responses on the CBCL. There was a significant correlation between father-infant covocalization at 3 months and both internalizing ($r = -.28, p < .05$) and externalizing ($r = -.30, p < .05$) problems. For mothers, gaze synchrony was associated with internalizing problems ($r = -.28, p < .05$). These variables were not used in regression analyses so it is not possible to determine if they contributed uniquely over and above other variables.

Summary: All studies used outcome measures with good psychometric properties (CBCL and ECBI) and used composite parenting measures. However, four of the studies had non-normative samples including at risk infants, boys only, multiple birth families and preterm infants.

Two studies showed no relationship between father-infant interaction and behavioural scores. Both these studies included maternal data in analyses; in one this data was also non-significant while the other indicated maternal variables contributed uniquely. The other three studies showed modest associations: one showed associations in an at-risk sample but did not control for maternal data; one showed correlations with father-infant co-vocalization but did not report regression analyses with separate mother and father data; and one showed some association with paternal remoteness when controlling for maternal sensitivity.

Overall, there appears to be a weak relationship in these studies with behavioural outcomes. Although the five studies span a range of ages and types of sample, there is little consistent evidence for the association between father-infant interactions and behavioural outcomes. None of the studies are able to show a unique contribution of paternal factors over and above equivalent maternal factors.

Cognitive and linguistic outcomes. Two studies looked at both cognitive and linguistic outcomes; two looked at only cognitive outcomes; one looked at only linguistic outcomes.

Tamis-LeMonda et al. (2004) used a sample of 111 families from the National Early Head Start study who were filmed in semi-structured free play at 24 months. Six dimensions of parenting were assessed: sensitivity, positive regard, cognitive stimulation, intrusiveness, detachment, and negative regard. Cognitive development was measured at 36 months using the Mental scale (MDI) of the Bayley Scales of Infant Development, 2nd ed. (BSID-II; Bayley, 1993) and language development was assessed using the Peabody Picture Vocabulary Test, 3rd ed. (PPVT-III; Dunn & Dunn, 1997). Increased paternal sensitivity was associated with higher MDI ($r = .30, p < .001$) and PPVT ($r = .26, p < .001$) scores, as was fathers' positive regard (MDI, $r = .22, p < .01$; PPVT, $r = .25, p < .001$) and cognitive stimulation (MDI, $r = .30, p < .001$; PPVT, $r = .25, p < .001$). A composite score of supportive parenting from these three scales predicted children's outcomes independently of maternal contribution (MDI, $\beta = .25, p < .01$; PPVT, $\beta = .25, p < .01$). Maternal supportive parenting also made a unique contribution to predicting both outcomes.

Magill-Evans and Harrison (1999) observed a sample of 103 families including both preterm and full-term infants at home at 3 and 12 months using the

same coding system as Benzie et al. (1998). Children were assessed at 18 months using the MDI, the Receptive Communication Age of the Sequenced Inventory of Communication Development-Revised (SICD-R; Hedrick, Prather, & Tobin, 1984), and the MacArthur Communicative Development Inventory (MCDI; Fenson, et al., 1991). In initial analyses, paternal interactions at 12 months were associated with MDI and interactions at 3 months were associated with receptive language. However, regression analyses indicated that paternal interactions were not associated with MDI when other variables, including maternal interactions, were included. In contrast, interactions at 3 months continued to be associated with receptive language ($\beta = .19$, $p < .05$). Maternal interactions at 12 months made a unique contribution to the prediction of MDI and receptive language.

Martin et al. (2010), using data from the NICHD study of early child care and youth development, studied a sample of approximately 723 children who were visited at home at 54 months and filmed in a semi-structured 15 minute interaction. These interactions were rated on supportive presence and stimulation of cognitive development, and these scales were then added to form a single measure of supportiveness. During the end of kindergarten and the beginning of first grade (when children are approximately 6 years old), children's teachers completed the Academic Rating Scale from the Early Childhood Longitudinal Study and the Academic Competence scale from the Social Skills Rating System (SSRS; Gresham & Elliot, 1990). Scores on these measures were then combined to provide a teacher-rated *academic competence score*. Additionally, children visited the laboratory to complete the Woodcock-Johnson Applied Problems and Letter-Word identification subtests (Woodcock & Johnson, 1989), which were averaged to create an *academic achievement score*. Correlation coefficients are not reported. Regression analyses

indicated that paternal supportiveness did not make a unique contribution to either the academic competence or academic achievement score ($\beta = .05, -.04$ and $.03, ns$, for kindergarten academic competence, first grade academic competence and first grade academic achievement respectively) when entered alongside maternal data and covariates. In contrast, maternal supportiveness made a unique contribution to all outcomes.

Hunter et al. (Hunter, McCarthy, MacTurk, & Vietze, 1987) visited a sample of 66 families at home at 6 and 12 months. At the first two visits fathers were observed with their infants during usual daily routines. These interactions were coded for object directed and vocalization behaviours by both father and infant, and the synchrony between the two. Cognitive development was measured at 30 months using the McCarthy Scales of Children's Abilities (McCarthy, 1972). Results indicated that there were no significant correlations between father-infant interactions at 6 and 12 months, and cognitive outcomes at 30 months. For mothers, all 12 month interaction variables were correlated with cognitive and verbal subtest scores.

Lindsey et al. (2009) used data from 80 father-child dyads in the NICHD study who had been videotaped in the laboratory during a 15 minute play session at 18 months. These interactions were coded using scales which assess parent-child dyadic reciprocity, shared positive and shared negative emotions, parent-child mutual initiation and mutual compliance. At 36 months children were assessed using the Reynell developmental language scales (RDLS; Reynell & Grubber, 1990). Regression analyses indicated that dyadic reciprocity made an independent contribution to children's verbal comprehension ($\beta = .25, p < .05$) and expressive vocabulary ($\beta = .21, p < .05$). Mutual compliance also contributed to verbal

comprehension ($\beta = .36$, $p < .01$) and shared positive emotions contributed to expressive vocabulary ($\beta = .34$, $p < .05$). Maternal data was analysed separately. Dyadic reciprocity and shared positive emotions contributed to language outcomes.

Summary of cognitive outcomes: All three studies used outcome measures with good psychometric properties. In terms of non-normative samples, one study included a sample of preterm infants while one specifically used a low-income sample.

One study found a strong association between supportive parenting and child outcome while controlling for maternal data. Maternal data was also significant. The other two studies did not find associations for fathers, while maternal data was significant. Overall, there is mixed evidence for paternal influence on cognitive outcomes while there is more consistent evidence for maternal influence.

Summary of linguistic outcomes: All three studies used composite measures of parenting and standardized outcome measures and found associations between father-infant interactions and receptive language. Two of these studies controlled for maternal data in regression analyses. Maternal data was also significant in all three. Two studies also measured expressive language; one found associations and one did not. Overall, there is some evidence that paternal interactions are associated with linguistic outcomes, especially receptive language.

Social outcomes Four studies looked at social outcomes including social competence and friendship quality.

Feldman and Masalha (2010) assessed a sample of 141 Israeli and Palestinian families in their home at 5 months during 5 minutes of free play. Interactions were coded under headings of parent sensitivity, parental control and dyadic reciprocity. Social competence was measured at 33 months by observations during child care

using the Nursery Assessment Scale (Feldman, Masalha, & Alony, 2006) (includes sociability, involvement with others, high activity level, cooperativeness etc.). Regression analyses indicated that father-infant interactions did not significantly predict social competence ($\beta = .19, -.2$ and $.09$, *ns*, for sensitivity, control and reciprocity respectively). Maternal data was analysed separately. Reciprocity was a significant predictor for mothers.

McEwain and Volling (2004) observed 30 father-infant dyads in the laboratory when the child was 12 months old during a 15 minute free play session and a teaching task. These were coded for sensitivity using intensity, frequency and duration of 'baby centred' behaviour such as pacing interactions to fit infant's cues. Ratings from the two tasks were averaged to produce an overall sensitivity score. At 4 years old children visited the laboratory again with a friend and were observed in a playroom. Play was coded under child-friend interaction, individual behaviour and dyadic interaction. From this, composite scores of positive and negative child-friend interaction and overall friendship quality were derived. Paternal sensitivity was not correlated with friendship outcomes at 4 years. Regression analyses which included maternal data indicated that paternal sensitivity did not make a unique contribution to friendship outcomes ($\beta = .27, .09$ and $.14$ for positive, negative and overall interaction respectively, *n.s.*) while maternal sensitivity contributed to all outcomes.

Martin et al. (2010) looked at the association between father-child interactions at 54 months (4.5 years) and social competence at 6 years. Details of data collection are described above. As well as the academic outcomes, teachers also completed the CBCL teacher report form and the social skills subscale of the SSRS. These were combined to provide a *teacher-rated social competence* score. Regression analyses indicated that paternal supportiveness significantly predicted

social competence at kindergarten ($\beta = .09, p < .05$) but not at first grade ($\beta = .03, ns$) when controlling for other variables. Maternal supportiveness was predictive at both time points.

Youngblade and Belsky (1992) filmed 73 families in the laboratory at 3 years during a 10 minute free play and 10 minute teaching task. Interactions were coded for aspects of warmth, including positive/negative affect and positive/negative verbal feedback, and aspects of control, including facilitation, intrusiveness, undercontrol and demands for self-reliance. Principal components analysis was then used to reduce both these items and child items to two dimensions: parent-child positive and parent-child negative. Friendship quality was measured at 5 years by observing the child with a close friend in the laboratory during 30 minutes free play. These interactions were coded for different aspects of friendships and two composites were created, namely, dyad positive and dyad negative. Path analysis was used to test models of parental antecedents of child friendships. Father-child relationship did not predict positive friendship interactions. However, lower levels of father-child positive and higher levels of father-child negative were associated with higher levels of negative friendships. For mothers, negative mother-child relationships were negatively associated with positive friendships and there was a marginally significant association between negative mother-child relationships and negative friendships.

Summary: One study used a combination of standardized scales to measure outcomes while the other three developed their own observational coding scheme for the purpose of the study. All reported reliability coefficients for the scheme. One study used a sample of Israeli and Palestinian families and one had a sample of only 30 families.

Two studies showed no association between paternal interactions and social outcomes. In one of these maternal data was used in analyses and made a unique contribution. In the other, maternal data was analysed separately and showed some contribution. Two studies showed significant associations: both of these included maternal data and indicated that fathers made a unique contribution. Overall there is some evidence for a unique contribution to social outcomes by fathers, while there is stronger evidence that mothers contribute uniquely.

Discussion

The aim of this review was to examine the association between father-child interactions in the preschool years and subsequent child outcomes. Interactions which coded specific aspects of paternal behaviour related to Pleck's definition of involvement were included. Outcomes were measured in a number of domains including behavioural, cognitive, linguistic and social.

Summary of findings

Of the 13 publications which fitted inclusion criteria, eight indicated a significant contribution of paternal interactions to child outcomes. Four of these included maternal interactions in regression analyses with fathers and showed that fathers made a unique contribution over and above mothers (Magill-Evans & Harrison, 1999; Martin, et al., 2010; Tamis-LeMonda, et al., 2004; Youngblade & Belsky, 1992). The outcomes in these four studies spanned cognitive, linguistic, and social domains. In addition, three of these four studies met many of the criteria set out above for assessing the quality of studies, including large samples, composite measures of parenting observed at home, and standardised outcome measures.

Two of the studies indicating significant paternal contributions reported maternal data but did not include this in regression analyses alongside paternal data

(Feldman & Eidelman, 2004; Lindsey, et al., 2009) while two further studies did not include maternal data (Ramchandani, et al., 2013; Trautman-Villalba, et al., 2006). Therefore, while these studies add to the growing literature of paternal effects on child outcomes it is not possible to say whether fathers made a unique contribution.

Overall, based on the outcome of the above studies, there is some evidence that father-child interactions in the preschool years contribute to child outcomes across a number of domains.

Seven of the 13 publications showed a non-significant contribution of paternal interactions to child outcomes (note that two of these studies had significant outcomes in other domains). All of these studies reported maternal data and only one found that maternal data also made no significant contribution (Benzies, et al., 1998). This study looked at behavioural outcomes and met many of the criteria for assessing quality. It used the same sample as the study above which found significant outcomes for receptive language, suggesting that the measures of parental interactions may have more predictive value for linguistic outcomes than behavioural ones.

Of the remaining six non-significant studies, four used maternal data in regression analyses (Belsky, et al., 1998; Magill-Evans & Harrison, 1999; Martin, et al., 2010; McElwain & Volling, 2004) and found that fathers made no contribution over and above mothers, while mothers did make a significant contribution. Correlation coefficients are not reported for two of these studies while for the remaining two, one showed fathers to contribute before maternal data was included and the other showed they did not. Two non-significant studies analysed mothers and fathers separately (Feldman, et al., 2006; Hunter, et al., 1987), and found maternal data to be significant while paternal data was not. Therefore, in the studies in this

review, there is more consistent evidence of the contribution of maternal influences in child outcome while evidence for paternal influence is more mixed and inconclusive.

There are a number of factors which may explain some of the variation in associations found in these studies. These will be explored in relation to their links with existing literature.

Between study factors that may affect associations

Age. Despite the studies all being selected for interactions in the preschool years, there was quite a range of ages at observation, from 3 months to 4.5 years. However, there did not appear to be any consistent relationship between the age at which data was collected and whether or not paternal interactions were associated with outcomes. Similarly, there did not seem to be any pattern in terms of the age at outcome or the length of time between measurements of interaction and outcome.

Nevertheless, some researchers have suggested that age may an important factor in measuring paternal influences (Lewis & Lamb, 2003). In particular, it seems that paternal influence may emerge later in adolescence and adulthood (Flouri & Buchanan, 2003, 2004). Although these studies also tend to measure involvement later in childhood rather than in the preschool years, there is some evidence that measures taken in the preschool years can predict important outcomes in adolescence (Grossman, et al., 2002). As the studies included in this review only measured outcomes up to pre-adolescence, it is possible that later measures may have found increased paternal influences.

Measures of interaction. Due to the variety of measures used to assess father-child interaction, with some studies reporting composites of several aspects of interaction (e.g. positive parenting) and others reporting specific dimensions such as

intrusiveness, it was not possible to identify any differences in the predictive value of the different components of involvement. In terms of the definitions proposed by Pleck, most studies included measures of warmth and responsiveness, and several also included measures of positive engagement activities, such as cognitive stimulation and physical play. Only one of the included studies used the term 'control' in their parenting measures (Feldman & Masalha, 2010). They defined this as a composite made up of physical manipulation of the child's body, overriding behaviour and parent-led interaction. Some similar behaviours may be defined in other studies as intrusiveness or it may be that more negative aspects of control such as being overly permissive or coercive are captured by low scores on dimensions such as responsiveness and acceptance. Alternatively, it may be that Pleck's definition of control as monitoring and decision making does not lend itself to observational measurement within a short time span. Nevertheless, most analyses of the three primary involvement components indicate that they are interrelated and comprise a single dimension suggesting that there is some validity in comparing studies which measure different aspects of the construct.

Outcome measures

Language. The strongest evidence for paternal influence comes from those studies looking at linguistic outcomes, especially receptive language. All three studies which measured linguistic outcomes found significant results for fathers. Two of these found paternal interactions predicted children's receptive language abilities over and above mothers. These studies both used composite measures of parenting which included both sensitivity and cognitive stimulation. The third study analysed mothers and fathers separately finding both to contribute to receptive and expressive language. This study focused on dyadic reciprocity and shared emotions. It may be

that positive, reciprocal interactions help promote infant attention and communication, particularly where parents are sensitive to the child's developmental level and are able to provide scaffolding for their language learning. Additionally, timing may be an important factor in linguistic outcomes. Supportive, sensitive interactions around age 2 when the child's vocabulary and grammar is expanding rapidly may be particularly important for predicting language outcomes (McKelvey, et al., 2011). Observed interaction in these three studies took place between 3 and 24 months with outcomes being measured around 12-18 months later, so they may have captured a key developmental phase in language learning which is highly receptive to parental input.

In one of the included studies a sample of preterm and full term infants were tested at 18 months for linguistic outcomes (Magill-Evans & Harrison, 1999) and at 3.5 years for behavioural outcomes (Benzies, et al., 1998). Only the former showed significant associations with paternal and maternal interactions. It may be that the aspects of father-child interaction measured in the studies reviewed here have more predictive value for language than for other outcomes.

Behavioural Problems. The studies in this review showed inconclusive evidence for an association between early father-child interaction and child behavioural problems. Previous research has suggested that parental control and monitoring are linked to behaviour problems, for example, hostile parenting practices are predictive of externalizing behaviours in preschool years (Petitclerc & Tremblay, 2009) and parents' skills at managing coercive interactions can influence the development of conduct problems (Shaw, et al., 2003). As noted earlier, it may be that brief observed interactions do not pick up these aspects of parenting effectively. It may also be that these associations are more notable in clinical samples where

families are considered to be at risk due to parental psychopathology or family conflict whereas in non-clinical samples, such as those included here, these associations are weaker. Indeed, two of the studies which found significant associations with behavioural outcomes used unusual samples: one had a higher than average proportion of fathers with depressive symptoms (Ramchandani, et al., 2013) and one included families from a larger study of at-risk children (Trautman-Villalba, et al., 2006).

There is also some evidence that links between parental caregiving and behaviour problems are stronger in older children compared to those under 5 years (Rothbaum & Weisz, 1994). These findings tend to come from concurrent studies rather than longitudinal designs but as most of the included studies measured both independent and dependent variables in the preschool years it may be one of the reasons for null findings. In terms of understanding this association with age, it may be that there are cumulative reciprocal effects of parent-child influence which increase over time so that effects are greater by later childhood. Alternatively, it may be that externalizing behaviours have different meanings in younger and older children: for younger children externalizing may be more instrumental and motivated by attention seeking, while in older children it may be more hostile and intentional. In this case, intentional externalizing may be more linked to caregiving qualities of parents. Further research is needed to establish a link between paternal interactions and behaviour problems and to identify the age at which any associations may emerge.

Cognition. Similarly, in the cognitive domain there was little evidence of an association between father-child interaction and child outcome, while maternal data appeared to have a stronger association. The only study which found an association used data from the EHS study, a sample of ethnically diverse low income families in

the USA. Correlations were found between supportive parenting at age 2 and cognitive outcomes at age 3. However, Cabrera et al. (2007) measured cognitive outcomes in the same sample at age 5 and found significant associations for mothers but not fathers. It may be that at age 5 children have more influences on their cognitive development from peers and school so parental influences reduce by this age. Fathers are thought to engage in more physically stimulating play than mothers and Power (1985) has suggested that fathers are more intrusive, interfere more with infants' play and are less responsive to infants' cues of interest. Therefore, it may be that fathers engage in less cognitively stimulating activities than mothers overall and so their influence attenuates by a greater extent. Alternatively, it may be that, as infants generally spend more time with their mothers than with their fathers, the child is more cued into interactions and opportunities for cognitive growth, with mothers being more aware of the child's developmental level and needs.

However, some studies have indicated that fathers may have an indirect influence on child cognition. Cook et al. (2011) found that mothers in families with resident biological fathers provided higher levels of cognitive stimulation than mothers in families with other father types (non-resident, non-biological etc.), suggesting that the presence of biological fathers supports more cognitive stimulation by mothers. Therefore, while there is little evidence of fathers making an independent contribution, they may contribute indirectly through their effect on mothers.

Social Competence. There is some evidence for social outcomes in the studies included here. Of the two studies showing significant outcomes one indicated that paternal behaviours such as negativity and intrusiveness were associated with friendship quality. The other showed an association with social competence at

kindergarten but this attenuated by first grade, while maternal data continued to be significant. Parke et al. (1989) suggest that father-child play has important implications for peer relationships. For example, studies have shown that fathers who show high levels of positive physical play and fewer coercive tactics have children who are better liked by their peers (McDowell & Parke, 2009). Given the differences between the play styles of mothers and fathers, these links may be particularly important in thinking about paternal influences on child outcomes.

In terms of the mechanism which accounts for this association, a social learning perspective suggests that fathers teach interactional skills through modelling the recognition and response of different affects which children then transfer to other interactions. Similarly, attachment theory suggests that children develop working models of relationships in the context of their relationships with their parents. Parental sensitivity has been linked with quality of attachment, which is thought to be a possible antecedent to sociability. There is some evidence for early maternal sensitivity being associated with the ability to form friendships in older children while the same study failed to find an association with paternal sensitivity (Freitag, Belsky, Grossmann, Grossman, & Scheuerer-Englisch, 1996). However, McElwain and Volling (2004) found that mother-infant attachment security was only related to friendship quality when father-infant attachment security was high. Similarly, Martin et al. (2010) found that fathers' supportiveness was only associated with child social outcomes when maternal supportiveness was low. These studies highlight the complex nature of family relationships and the importance of taking into account other contextual factors such as the couple relationship when looking at father-child associations as there may be both direct and indirect effects on child outcomes.

Limitations

The small number of studies within this review is of note. There were only a handful of studies which contributed to each outcome and it is therefore hard to draw conclusions from these as, even when using a similar outcome measure, there was a lot of heterogeneity in samples and methods. Similarly, despite good reasons for including only those studies which used observational measures of paternal involvement, variety in the duration and context of interactions and methods of measuring these interactions can make it difficult to compare studies. In addition, some studies had very small samples and therefore lacked power to identify paternal influences on outcome.

The majority of studies used white middle class samples from the USA. There is some evidence that associations between parent-child interaction and outcome may be stronger in socially disadvantaged families (Seeley, Murray, & Cooper, 1996), an issue which the studies here were not able to address. Additionally, it may be that fathers from different cultural backgrounds have different impacts on their children but, again, this question was beyond the scope of this review.

Clinical implications

A key issue in parenting research has been to try and identify early parental antecedents to a range of child outcomes, often with the aim of developing targeted interventions in at-risk families. While epidemiological studies have identified maternal factors such as sensitivity and depression as important, paternal variables have received far less attention. Despite mixed and inconclusive evidence for the influence of father-child interactions on child outcomes in this review, few would conclude that fathers are unimportant in their child's wellbeing and health. Some

studies showed that fathers contributed significantly when analysed separately but this association attenuated when maternal factors were included. It may be that fathers' influence is more important in the context of less supportive mothers (Martin, et al., 2010) or fathers may affect the level of involvement of the mother (Cook, et al., 2011), exerting an indirect influence on child outcomes. It seems that a comprehensive understanding of child development may require a more dynamic contextual model of human development and socialization that not only takes into account dyadic influences between parents and children, but also includes the parental relationship and views children as active participants in the developmental process who affect their parents and their interactions (Lamb, 2013).

Suggestions for further research

There were few studies that met the inclusion criteria for this review and fewer still that met the majority of the standards identified above for establishing an association between paternal interactions and child outcomes. Therefore, further research is needed with large samples that include maternal interaction data with detailed observational methods of interactions. Pleck (2010) suggests that other design features may also be employed to establish longitudinal associations. For example, including an earlier measure of the child outcome as a control (sometimes called autoregression) can help to identify the stable component of the outcome. Additionally, allowing for the possibility of reciprocal influences between parents and children by using cross-lagged designs can begin to establish direction of causality.

It may be that the interaction scenarios which the studies in this review used are more suited to picking up key features of mother-infant as opposed to father-infant interaction. Many observational measures were initially designed for assessing

maternal interactions and were subsequently tested for use with fathers (e.g. Global rating scales, NCATS). There is a substantial literature on the differences between the way that fathers and mothers interact with their children: fathers tend to play in more unencumbered, physically stimulating ways, as well as vocalising less and being less affectionate than their spouses (Lamb, et al., 1985). Variables included in current coding schemes may not pick up these features if they are focussed on measures of sensitivity and cognitive stimulation. Alternatively, fathers may not have the opportunity to display these behaviours in a structured observational framework. Ramchandani et al. (2013) found increased associations between paternal interactions and outcomes when filming on a floor mat compared to with the child in a car seat where movement was more restricted. Therefore, future studies may need to incorporate measures which allow fathers to display the full range of their normal behaviours in infant interaction.

It may also be useful to include measures of overall involvement in child care to provide an index of the quantity of paternal interaction as well as its quality. If a parent is highly involved and also very sensitive, this will have more of an impact on outcomes than a sensitive parent who is working most of the time. As mothers still tend to be primary caregivers this may partially explain why maternal factors continue to be more highly associated with outcomes. Given the changing roles of fathers within families and the increasing involvement of fathers in their children's lives this may be useful in future designs.

Conclusion

This review aimed to examine the association between father-child interactions in the preschool years and child outcomes. Results provided inconclusive evidence for the influence of observed paternal behaviours during interaction on

cognitive and behavioural outcomes, while more consistent evidence was found for linguistic and social outcomes. The relatively small number of publications and the heterogeneity across studies emphasises the need for further research in this area, in particular ensuring designs which take into account specific features relevant to fathers, for example, different styles of play and both quality and quantity of parenting.

References

- Achenbach, T., Edelbrock, C., & Howell, C. (1987). Empirically based assessment of the behavioural/emotional problems of 2-3 year old children. *Journal of Abnormal Child Psychology*, 5, 629-650.
- Amato, P., & Rivera, F. (1999). Paternal Involvement and Children's Behaviour Problems. *Journal of Marriage and Family*, 61, 375-384.
- Baker, B., & Heller, T. (1996). Preschool children with externalizing behaviours: Experience of fathers and mothers. *Journal of Abnormal Child Psychology*, 24, 513-532.
- Bayley, N. (1993). *Manual for Bayley Scales of Infant Development* (2nd ed.). San Antonio, TX: Psychological Corporation.
- Belsky, J., Hsieh, K., & Crnic, K. (1998). Mothering, fathering and infant negativity as antecedents of boys' externalizing problems and inhibition at age 3 years: Differential susceptibility to rearing experience? *Development and Psychopathology*, 10, 301-319.
- Benzies, K., Harrison, M., & Magill-Evans, J. (1998). Impact of marital quality and parent-infant interaction on preschool behaviour problems. *Public Health Nursing*, 15(1), 35-43.

- Black, M., Dubowitz, H., & Starr, R. (1999). African American fathers in low income, urban families: Development, behaviour and home environment of their three-year-olds. *Child Development, 70*, 967-978.
- Borke, J., Lamm, B., Eickhorst, A., & Keller, h. (2007). father-infant interaction, paternal ideas about early child care and their consequences for the development of children's self-recognition. *Journal of Genetic Psychology, 168*(4), 365-379.
- Bowlby, J. (1969). *Attachment and Loss* (Vol. 1). New York: Basic Books.
- Bronte-Tinkew, J., Carrano, J., Horowitz, A., & Kinukawa, A. (2008). Involvement among resident fathers and links to infant cognitive outcomes. *Journal of Family Issues, 29*(9), 1211-1244.
- Cabrera, N., Shannon, J., & Tamis-LeMonda, C. (2007). Fathers' influence on their children's cognitive and emotional development: from toddlers to pre-K. *Applied Developmental Science, 11*(4), 208-213.
- Cabrera, N., Tamis-LeMonda, C., Bradley, R., Hofferth, S., & Lamb, M. (2000). Fatherhood in the twenty-first century. *Child Development, 71*(1), 127-136.
- Campbell, S. (1995). Behaviour Problems in Preschool Children: A review of recent research. *Journal of Child Psychology and Psychiatry, 36*(1), 113-149.
- Carlson, M. (2006). Family structure, father involvement, and adolescent behavioural outcomes. *Journal of Marriage and Family, 68*, 137-154.
- Cook, G., Roggman, L., & Boyce, L. (2011). Fathers' and mothers' cognitive stimulation in early play with toddlers: Predictors of 5th grade reading and math. *Family Science, 2*(2), 131-145.
- DeKlyen, M., Biernbaum, M., Speltz, L., & Greenberg, M. (1998). Fathers and Preschool Behaviour Problems. *Developmental Psychology, 34*(2), 264-275.

- DeKlyen, M., Speltz, L., & Greenberg, M. (1998). Fathering and Early Onset Conduct Problems: Positive and Negative Parenting, Father-Son Attachment, and the Marital Context. *Clinical Child and Family Psychological Review*, *1*(1), 3-21.
- Dunn, L., & Dunn, L. (1997). *Peabody Picture Vocabulary Test III Manual*. Circle Pines, MN: American Guidance Support.
- Easterbrooks, M., & Goldberg, W. (1984). Toddler development in the family: Impact of father involvement and parenting characteristics. *Child Development*, *55*, 740-752.
- Eyberg, S. (1992). Parent and teacher behaviour inventories for the assessment of conduct problems in children. In L. Vandecreek, S. Knapp & T. Jackson (Eds.), *Innovations in clinical practice: A source book*. Sarasota: Professional Resource Press.
- Feldman, R., & Eidelman, A. (2004). Parent-infant synchrony and the social-emotional development of triplets. *Developmental Psychology*, *40*(6), 1133-1147.
- Feldman, R., & Masalha, S. (2010). Parent-child and triadic antecedents of children's social competence: Cultural specificity, shared process. *Developmental Psychology*, *46*(2), 455-467.
- Feldman, R., Masalha, S., & Alony, D. (2006). Micro-regulatory patterns of family interactions: Cultural pathways to toddlers' self-regulation. *Journal of Family Psychology*, *20*, 614-623.
- Fenson, L., Dale, P., Reznick, J., Thal, D., Bates, E., & Reilly, J. (1991). *McArthur Communication Development Inventories: User guide and technical manual and forms*. New York: Singular Press.

- Flouri, E., & Buchanan, A. (2003). The role of father involvement in children's later mental health. *Journal of Adolescence, 26*, 63-78.
- Flouri, E., & Buchanan, A. (2004). Early father's and mother's involvement and child's later educational outcomes. *British Journal of Educational Psychology, 74*, 141-153.
- Fox, N., & Rutter, M. (2010). Introduction to the special issue on the effects of early experience on development. *Child Development, 81*(1), 23-27.
- Freitag, M., Belsky, J., Grossmann, K., Grossman, K. E., & Scheuerer-Englisch, H. (1996). Continuity in parent-child relationships from infancy to middle childhood and relations with friendship competence. *Child Development, 67*, 1437-1454.
- Gresham, F., & Elliot, S. (1990). *The Social Skills Rating System*. Circle Pines, MN: American Guidance System.
- Grossman, K. E., Grossman, K., Fremmer-Bombik, E., Kindler, H., Scheuerer-Englisch, H., & Zimmerman, P. (2002). The uniqueness of the child-father attachment relationship: fathers' sensitive and challenging play as pivotal variable in a 16-year longitudinal study. *Social Development, 11*, 307-331.
- Hedrick, D., Prather, E., & Tobin, A. (1984). *Sequenced Inventory of Communication Development* (2nd ed.). Seattle: University of Washington.
- Hofferth, S. (2003). Race/Ethnic differences in father involvement in two-parent families: Culture, context or economy? *Journal of Family Issues, 24*, 185-216.
- Hunter, F., McCarthy, M., MacTurk, R., & Vietze, P. (1987). Infants' social-constructive interactions with mothers and fathers. *Developmental Psychology, 23*(2), 249-254.

- Jaffee, S., Moffitt, T., Caspi, A., & Taylor, A. (2003). Life with (or without) father: The benefits of living with two biological parents depend on the father's antisocial behaviour. *Child Development, 74*, 109-126.
- Kane, P., & Garber, J. (2009). Parental depression and child externalizing and internalizing symptoms: unique effects of fathers' symptoms and perceived conflict as a mediator. *Journal of Child and Family Studies, 18*, 465-472.
- Lamb, M. (2013). the changing faces of fatherhood and father-child relations. In M. Fine & F. Fincham (Eds.), *Handbook of Family Theories*. New York: Routledge.
- Lamb, M., Pleck, J., Charnov, E., & Levine, J. (1985). Paternal behaviour in humans. *American Zoologist, 25*, 883-894.
- Lewis, C., & Lamb, M. (2003). Fathers' influences on children's development: The evidence from two-parent families. *European Journal of Psychology of Education, XVIII(2)*, 211-228.
- Lewis, C., & Lamb, M. (2006). *Fatherhood: Connecting the strands of diversity across time and space*. York.
- Lindsey, E., Cremeens, P., Colwell, M., & Caldera, Y. (2009). The structure of parent-child dyadic synchrony in toddlerhood and children's communication competence and self-control. *Social Development, 18(2)*, 375-396.
- Maccoby, E. (1992). the role fo parents in the socialization of children: An historical overview. *Developmental Psychology, 28*, 1006-1017.
- Magill-Evans, J., & Harrison, M. (1999). Parent-child interactions and development of toddlers born preterm. *Western Journal of Nursing Research, 21(3)*, 292-312.

- Magill-Evans, J., & Harrison, M. (2001). Parent-child interactions, parenting stress, and developmental outcomes at 4 years. *Children's Health Care, 30*(2), 135-150.
- Martin, A., Ryan, R., & Brooks-Gunn, J. (2010). When fathers' supportiveness matters most: Maternal and paternal parenting and children's school readiness. *Journal of Family Psychology, 24*(2), 145-155.
- McCarthy, D. (1972). *McCarthy Scales of children's abilities*. New York: Psychological Corporation.
- McDowell, D., & Parke, R. (2009). Parental correlates of children's peer relations: An empirical test of a tripartite model. *Developmental Psychology, 45*, 224-235.
- McElwain, N., & Volling, B. (2004). Attachment security and parental sensitivity during infancy: Associations with friendship quality and false-belief understanding at age 4. *Journal of Social and Personal Relationships, 21*(5), 639-667.
- McKelvey, L., Bokony, P., Swindle, T., Connors-Burrow, N., Schiffman, R., & Fitzgerald, H. (2011). Father teaching interactions with toddlers at risk: Associations with later child academic outcomes. *Family Science, 2*(2), 146-155.
- Nagin, D., & Tremblay, R. (1999). Trajectories of boys' physical aggression, opposition, and hyperactivity on the path to physically violent and nonviolent juvenile delinquency. *Child Development, 70*, 1181-1196.
- Paquette, D., Coyl-Shepherd, D., & Newland, L. (2013). Fathers and development: New areas for exploration. *Early Child Development and Care, 183*(6), 735-745.

- Park, S., Belsky, J., Putnam, S., & Crnic, K. (1997). Infant emotionality, parenting and 3-year inhibition: Exploring stability and lawful discontinuity in a male sample. *Developmental Psychology*, 33(2), 218-227.
- Parke, R., Dennis, J., Flynn, M., Morris, K., Killian, C., McDowell, D., et al. (2004). Fathering and children's peer relationships. In M. Lamb (Ed.), *The role of the father in child development* (4th ed.). Hoboken, NJ: Wiley.
- Parke, R., MacDonald, K., Burks, V., Carson, J., Bhavnagri, N., Barth, J., et al. (1989). Family and peer systems: In search of linkages. In K. Kreppner & M. Lerner (Eds.), *Family systems of lifespan development*. Hillsdale, NJ: Erlbaum.
- Petitclerc, A., & Tremblay, R. (2009). Childhood disruptive behaviour disorders: review of their origin, development, and prevention. *La Revue Canadienne de Psychiatrie*, 54(4), 222-231.
- Pleck, J. (2010). Paternal involvement. In M. Lamb (Ed.), *The Role of the Father* (5th ed.). New Jersey: Wiley.
- Power, T. (1985). Mother- and father-infant play: A developmental analysis. *Child Development*, 56(6), 1514-1524.
- Ramchandani, P., Domoney, J., Sethna, V., Psychogiou, L., Vlachos, H., & Murray, L. (2013). Do early father-infant interactions predict the onset of externalising behaviours in young children? Findings from a longitudinal cohort study. *Journal of Child Psychology and Psychiatry*, 54(1), 56-64.
- Ramchandani, P., & Psychogiou, L. (2009). Paternal psychiatric disorders and children's psychosocial development. *The Lancet*, 374(9690), 646-653.
- Reynell, J., & Grubber, C. (1990). *Reynell Developmental Language Scale*. Los Angeles: Western Psychology Association.

- Rothbaum, F., & Weisz, J. (1994). Parental caregiving and child externalizing behaviour in nonclinical samples: A meta-analysis. *Psychological Bulletin*, *116*(1), 55-74.
- Sarkadi, A., Kristiansson, R., Oberklaid, F., & Bremberg, S. (2008). Fathers' Involvement and Children's Developmental Outcomes: a Systematic Review of Longitudinal Studies. *Acta Paediatrica*, *97*, 153-158.
- Seeley, S., Murray, L., & Cooper, P. (1996). The outcome for mothers and babies of health visitor intervention. *Health Visitor*, *69*, 135-138.
- Shannon, J., Tamis-LeMonda, C., London, K., & Cabrera, N. (2002). Beyond rough and tumble: Low income fathers' interactions and children's cognitive development at 24 months. *Parenting: Science and Practice*, *2*, 77-104.
- Shaw, D., Gilliom, M., Ingoldsby, E., & Nagin, D. (2003). Trajectories leading to school-age conduct problems. *Developmental Psychology*, *39*(2), 189-200.
- Tamis-LeMonda, C., Shannon, J., Cabrera, N., & Lamb, M. (2004). Fathers and mothers at play with their 2- and 3-year-olds: Contributions to language and cognitive development. *Child Development*, *75*(6), 1806-1820.
- Trautman-Villalba, P., Gschwendt, M., Schmidt, M., & Laucht, M. (2006). Father-Infant Interaction Patterns as Precursors of Children's Later Externalizing Behaviour Problems. *European Archive of Psychiatry and Clinical Neuroscience*, *256*, 344-349.
- von Elm, E., Altman, D., Egger, M., Pocock, S., Gotsche, P., & Vandembroucke, J. (2007). The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: Guidelines for reporting observational studies. *Ann Intern Med.*, *147*(8), 573-577.

Woodcock, R., & Johnson, M. (1989). *Woodcock-Johnson Psycho-Educational Test Battery - Revised*. Chicago: Riverside Publishing.

Youngblade, L., & Belsky, J. (1992). Parent-child antecedents of 5-year-olds' close friendships: A longitudinal analysis. *Developmental Psychology*, 28(4), 700-713.

Table 1.

Summary of Studies Included in Review

BEHAVIOURAL OUTCOMES						
Authors	Sample characteristics	Father-child interaction			Outcome	
		Age	Observation characteristics	Measures	Age	Measures
Trautman-Villalba et al., 2006	72 infants from at-risk sample in Germany.	3 months	5 minute standardized nursing and play session in lab.	Categorical system for microanalysis of mother-child interaction (Jorg et al., 1994), adapted for fathers.	8 and 11 years	Mother report Child Behaviour Checklist (CBCL; Achenbach, 1992).
Ramchandani et al., 2013	155 families from Oxford Father Project in UK.	3 months	3 minute free play session at home.	Global Rating Scales (GRS; Murray et al., 1996).	12 months	Mother report CBCL.
Benzies et al., 1998	74 families with preterm and term infants in Canada.	12 months	Novel teaching interaction at home.	Nursing Child Assessment Teaching Scale (NCATS; Sumner and Speietz, 1994).	42-54 months	Eyberg Child Behaviour Inventory (ECBI; Eyberg, 1992).
Belsky et al., 1998	125 first born sons in USA.	15, 21, 27 and 33 months	60 minutes, observed during mealtimes at home.	Positive-Negative composite parenting score made from 6 subscales.	37 months	Average mother and father CBCL score.
Feldman and Eidelman, 2004	138 infants including triplets and twins in Israel.	3 months	5 minute free play session at home.	Parent-infant synchrony in gaze, vocalization and touch.	24 months	Mother report CBCL.

COGNITIVE AND LINGUISTIC OUTCOMES

Authors	Sample characteristics	Father-child interaction			Outcome	
		Age	Observation characteristics	Measures	Age	Measures
Tamis-LeMonda et al., 2004	111 low income families from Early Head Start study in USA.	24 months	10-15 minutes semi-structured free play at home.	Three Box scales from NICHD study. Composite scores of supportive and overbearing parenting.	36 months	Bayley Scales of Infant Development, 2 nd ed (BSID-II; Bayley, 1993) mental scale (MDI) Peabody Picture Vocabulary Test, 3 rd ed. (PPVT-III; Dunn and Dunn, 1997).
Lindsey et al., 2009	80 families from NICHD study in USA.	18 months	15 minute free-play with toys in lab.	Dyadic reciprocity, shared positive and negative emotions, and mutual initiation and compliance.	36 months	Reynell developmental language scales (RDLS; Reynell, 1990).
Magill-Evans and Harrison, 1999	103 families with preterm and term infants in Canada.	3 and 12 months	Novel teaching interaction at home.	Nursing Child Assessment Teaching Scale (NCATS).	18 months	MDI, Sequenced Inventory of Communication Development-Revised (SICD-R; Hedrick et al., 1994) and MacArthur Communicative Development Inventory (MCDI; Fenson et al., 1991).
Hunter et al., 1987	66 white middle class families in USA.	6 and 12 months	1 hour observation during usual activities at home.	Object directed/ vocalization behaviours and synchrony.	30 months	McCarthy Scales of Children's Abilities (MSCA; McCarthy, 1972).
Martin et al., 2010	723 families from NICHD study in USA.	54 months	15 minute semi-structured free play at home.	Supportive parenting composite from Supportive presence and Cognitive stimulation.	6 years	Academic Rating Scale from the NICHD study, Academic Competence scale from the Social Skills Rating System (SSRS; Gresham and Elliot, 1990), Woodcock-Johnson Applied Problems and Letter-Word identification subtests (Woodcock and Johnson, 1989).

SOCIAL OUTCOMES

Authors	Sample characteristics	Father-child interaction			Outcome	
		Age	Observation characteristics	Measures	Age	Measures
Youngblade and Belsky, 1992	73 families in USA.	36 months	20 minute free play and teaching task in lab	Positive and negative composites from aspects of warmth and control.	5 years	Positive-negative child-friend interactions during observation
Martin et al., 2010	723 from NICHD study in USA.	54 months	15 minute semi-structured free play at home.	Supportive parenting composite from Supportive presence and Cognitive stimulation.	6 years	Combined Teacher-reported CBCL and SSRS to provide Social Competence score.
Feldman and Masalha, 2010	141 Palestinian and Israeli families.	5 months	5 minute free play at home.	Sensitivity, control and dyadic reciprocity.	33 months	Nursery Assessment Scale (Feldman et al., 2006) to provide Social Competence score.
McElwain et al., 2004	30 families in USA.	12 months	15 minute free-play session and teaching task in lab.	Sensitivity score from combined free play and teaching task.	4 years	Composite scores of positive and negative child-friend interaction and overall friendship quality from observation in lab.

Part 2: Empirical Paper

**Father-Child Interactions and Child Behaviour in the First
Two Years**

Abstract

Child behavioural disorders are associated with a range of poor outcomes which represent a considerable health and social burden. Both early parent-child interactions and child temperament have been identified as risk factors in the development of behaviour problems although it is unclear how these may interact across the early years. This study examined the association between father-child interaction and child behaviour across the first two years, including exploring the direction of effects between fathers and their children.

A sample of 156 father-child dyads was filmed at home at 3 months and 2 years post-partum. Infant temperament was assessed at 3 months by maternal report, and child behaviour was assessed at 2 years, also by maternal report. Correlation analyses were used to examine the stability of key variables across time and investigate cross-lagged associations between paternal interactions and child behaviour.

The findings indicate that a particular style of paternal interaction, characterised by disengagement and low emotional tone, remains relatively stable across the first two years and is associated with higher levels of infant activity, particularly in boys. This suggests that early aspects of infant temperament may affect levels of paternal engagement in interactions, lending support to a child effects model.

Introduction

Behaviour problems

Behaviour problems in young children have a significant impact on family and peer relationships and are associated with a range of negative outcomes in adolescence including psychological problems, delinquency and poor academic functioning (Campbell, 1995; Shaw & Gross, 2008). While oppositional and aggressive behaviours in children as young as 12 months often diminish after the second year as part of normal development, a significant minority of children go on to develop behavioural disorders. Indeed, several studies have found that around 6% of normative samples of children show persistent aggressive behaviour across childhood (e.g. Nagin & Tremblay, 1999; Shaw, Gilliom, Ingoldsby, & Nagin, 2003) and may go on to meet diagnostic criteria for disorders such as ADHD, oppositional defiant disorder and conduct disorder. The poor outcomes for these children represent a considerable health and social burden, with a high cost to society (National Institute for Health and Care Excellence, 2013; Scott, Knapp, Henderson, & Maughan, 2001). Given that the developmental antecedents of these behaviours are identifiable from a young age, there is increasing interest in understanding the risk factors for behaviour problems in order to aid the development of potential preventive interventions.

A number of risk factors have been identified for the onset and maintenance of behaviour problems, including socioeconomic status, marital functioning, child gender and parenting characteristics. Parenting in particular has received a lot of attention in research and clinical settings due to strong correlations between levels of parental involvement and child behaviours (Sarkadi, Kristiansson, Oberklaid, & Bremberg, 2008) as well as the efficacy of clinical interventions which target

parenting (e.g. Sanders, 1999; Webster-Stratton, 1982). In particular, maternal sensitivity (Owens & Shaw, 2003) and depression (Petitclerc & Tremblay, 2009) have been linked with children's externalising behaviours in the preschool years and these variables have also been found to act as mediators between other contextual variables and child outcomes (e.g. Shonkoff, Boyce, & McEwan, 2009).

Fathers and child outcomes

The average level of paternal involvement in children's lives has increased in industrialised countries in recent decades (Pleck & Masciadrelli, 2004), especially in middle socio-economic families, with fathers being more involved in care giving and with younger children (Yeung, Sandberg, Davis-Kean, & Hofferth, 2001). Alongside these changes there has been increasing interest in the role of fathers in child development and the impact of different aspects of paternal involvement.

While the earliest models of father involvement contrasted absent and present fathers and tended to look at the amount of time spent with the child or financial contributions, more recent theories of father-child relationships have begun to look at quality of parenting as well as quantity. The three components of father involvement put forward by Lamb, Pleck and Levine (1985), namely engagement, accessibility and responsibility, put more of an emphasis on specific aspects of paternal behaviour such as sensitivity and monitoring and these have since become more prominent in the literature on a number of child outcomes. For example, Bronte-Tinkew et al. (Bronte-Tinkew, Carrano, Horowitz, & Kinukawa, 2008) found that child cognitive development was predicted by both fathers' warmth and cognitively stimulating activities during interactions with their 9 month-olds, while in an older sample Flouri and Buchanan (2004) found associations between fathers' involvement with their 7 year-olds, such as taking them on outings and managing the child, and academic

achievement at age 20. In literature looking at the influence of paternal involvement on the development of behavioural problems Trautman-Villalba et al. (2006) found that fathers who were more sensitive at 3 months had children with lower externalizing problems at 8 and 11 years. Similarly, a review by Sarkadi et al. (2008) found that paternal engagement was associated with behavioural problems in boys and psychological problems in girls.

There are often significant positive correlations between mother and father involvement which reflect the joint influence of parents. Many studies look at the links between paternal involvement and child outcomes when maternal influence is controlled for in order to identify the specific effects of fathers over and above mothers. These studies show mixed results for behavioural outcomes with some paternal associations attenuating when maternal data is included and others indicating a unique contribution of fathers to child development. For example, Belsky et al. (Belsky, Hsieh, & Crnic, 1998) found that fathers' parenting did not make a significant contribution to child behaviour when mothers were controlled for, while other studies have shown fathers continue to make a unique contribution to psychosocial adjustment (Flouri & Buchanan, 2002) and externalising problems (Aldous & Mulligan, 2002) over and above mothers. Meta-analyses similarly show a mixed picture. In a meta-analysis of non-clinic samples mothering was found to be a better predictor of externalizing than fathering (Rothbaum & Weisz, 1994) while in clinic referred samples, fathering was a better predictor (Loeber & Stouthamer-Loeber, 1986).

One explanation for mixed findings may be that mothers and fathers interact differently with their children and most measurement tools have been designed with mothers in mind, therefore potentially missing paternal behaviours that are linked to

child outcomes. Lamb (Lamb, 1977) found that mothers hold their babies more for care-giving while fathers hold them more for play, and Grossman et al. (2002) found that fathers are more likely to interact with their infants when the infant is in a good mood, handing them back to the mother if they become distressed. In terms of style of play, fathers tend to engage in more physically stimulating, unpredictable play whereas mothers seem to prefer object mediated play and role-playing (Paquette, 2004). In addition, play is often an especially important part of father-child relationships with a far greater proportion of time spent playing with the child than mothers. Given the differences between maternal and paternal interaction behaviours, it is important to consider whether measurement tools used to assess mothers need to be adapted to pick up the full range of paternal behaviours which may be associated with outcomes. There are, of course, also many similarities in the way that mothers and fathers interact with their children and similar behaviours in either parent show links to the same child outcomes, with sensitivity being a particularly important predictor of outcomes for both parents. However, it is important that researchers ensure that methods for collecting data on sensitivity can capture the specific qualities of father-child interaction (Grossman et al., 2002). It should also be noted that, despite recent increases in the level of paternal involvement, mothers still contribute the majority of their time to children, even when they work outside the home (Livingston & Parker, 2011) and this may partly explain why maternal influences seem more important in some studies, especially in the early years.

Another possible explanation for mixed findings may be the heterogeneity in methods used to study paternal involvement. Questionnaires, maternal report and observation of interaction have all been used and this variety may mask important differences. For example, Rothbaum and Weisz (1994) found that questionnaires

tended to elicit smaller effect sizes than other measures. Using maternal report to measure paternal involvement may also introduce bias either due to the quality of the parental relationship or same source bias with outcomes when mothers are used as informants for both independent and dependant variables. Observations by trained researchers have therefore become the gold-standard to measure specific aspects of paternal behaviour such as sensitivity and intrusiveness. Studies which use observations of father-child interaction have reported a range of outcomes associated with paternal behaviours. Sensitive, supportive paternal behaviours, characterised by responsiveness and positive affect have been associated with less externalizing behaviours (Trautman-Villalba, et al., 2006), improved cognitive and linguistic outcomes (Tamis-LeMonda, Shannon, Cabrera, & Lamb, 2004) and greater social competence (Martin, Ryan, & Brooks-Gunn, 2010). In addition, observational settings and coding schemes can provide opportunities for measuring fathers' typical behaviours with their children. For example, Ramchandani et al. (2013) found that fathers were more comfortable and able to show a greater range of interaction behaviours with their 3 month-old infants when the observation was changed from the car-seat scenario, which had been used successfully with mothers, to a floor mat. In addition, they found greater associations between paternal behaviours and later child behaviour when using data from the floor mat.

Overall it seems that there is evidence to support the idea that the quality of father-child relationships is associated with the development of behavioural problems over and above the influence of mothers, and that the key features of behaviour previously found to be important for mothers (sensitivity, warmth, responsiveness) are also important for fathers. However, in order to pick up these effects it is

important to use measures that reduce bias and pick up specific aspects of paternal behaviour as they may be different to mothers.

Direction of effects

There are a number of theories about the mechanisms that account for the associations between parental behaviour and child outcomes, including social modelling (Bandura, 1977), emotional regulation and containment (Bion, 1962), attachment security (Bowlby, 1969), and coercive parenting cycles (Patterson, DeBaryshe, & Ramsey, 1989). Biological models also suggest genetic influences on some traits such as aggression and psychopathology. It is likely that an interplay of these factors contributes to the development of child behavioural outcomes. Studies have found that positive parenting practices exert influences that are independent of negative parenting (Gardner, Dishion, Shaw, & Burton, 2007) i.e. both an absence of coercion and a high level of responsiveness in interactions lead to optimal outcomes. Similarly, a securely attached child may be less reactive to stressful parental interactions than a child who is insecurely attached. While several of these theories are based around the idea of particular parental behaviours leading to more difficult child behaviour, Patterson's coercion model describes a cycle of reinforcement between child and parent which may begin with normative noncompliance by the child. This then escalates due to parents inadvertently reinforcing antisocial behaviours such as noncompliance and aggression by using inconsistent and ineffective discipline. In this way, early child factors such as temperament may be important risk factors in the development of behavioural problems.

The studies cited above implicitly assume a 'father effects' model in terms of the causal direction between variables, with early paternal interaction behaviours being assumed to influence child behaviours. However, some researchers have

suggested that significant concurrent relations may reflect parental reactions to behaviour as much as child response to parenting style (Maccoby & Martin, 1983). Indeed, this may also be the case in longitudinal designs as few measure child behaviour at an earlier time point to control for stability across time. This has particularly been suggested in literature on antisocial behaviour where parental rejection may follow certain behaviours by the child (e.g. Patterson, Reid, & Dishion, 1992). However, as these studies tend to look at adolescent behaviour it is possible that this pattern of relating begins early in childhood or even infancy, where children with more difficult temperaments may elicit more negative parental reactions.

Temperament has been defined as individual differences in reactivity and self-regulation (Rothbart, 1981) that are seen across the domains of emotion, activity and attention. These key personality differences are considered to be biologically based and therefore present and measureable in infancy prior to the development of higher cognitive and social aspects of personality. Newborns show distress and avoidant movement, and by 2 to 3 months anger, frustration and approach reactions are evident (Rothbart, 2007). Although there is still debate about the idea of temperament being constitutional and stable given all the environmental influences on a child, there has been some consensus on the definition of temperament and increasing research into how it can influence child development (Frick, 2004). 'Difficult' temperaments are characterised by more intense reactions, less smiling and lower self-regulation, and these infants tend to have more problems in adjustment later in development (Thomas & Chess, 1977). In particular, when difficult temperament is measured during the first year of life it is found to predict problem behaviour in later years (Goldberg, Corter, Lojkasek, & Minde, 1990). However, it is unclear what the mechanism is that links the two. These studies tend

to suffer from the methodological flaw of common-source bias in the measurements and some have argued that the stable component in these measurements comes from the mother's interpretation of behaviour. Indeed, some studies have found that if observer reports of behaviour are used rather than maternal reports, the association attenuates (Bates, Maslin, & Frankel, 1985). It may be that difficult temperaments predict externalizing behaviours in the context of problematic parenting, either because the child elicits harsher parenting practices which then exacerbate temperamental difficulties or because those with difficult temperaments are more susceptible to rearing experiences so more likely to develop problems in the context of poor parenting than more easy-going infants (Belsky, et al., 1998). Alternatively, it may be that parents find it hard to match their parenting style to the needs of the infant, prompting the child to increase externalising behaviours instrumentally. Clearly, the links between child factors and parental factors are complex and likely to interact with each other in the development of behaviour problems across childhood.

The present study

In summary, behavioural problems in young children can lead to a number of poor outcomes. Therefore, identifying early risk factors and antecedents which are potentially modifiable is an important research goal. Changes in family dynamics which mean that fathers are more involved with younger children have led to increased interest in the influence of paternal behaviour on child outcomes. While there is evidence for an association between father-child interaction and behavioural problems, some of these associations are weak or mixed and seem to attenuate when maternal data is included. This may be because mothers continue to spend more overall time with children or because studies use tools that suffer from shared method variance and do not include instruments that take into account the differences

in the way that mothers and fathers interact with their children. In addition, the assumption that the direction of causality is from paternal interactions to child behaviour may miss important child effects on parental behaviour. There is some evidence that infants with more difficult temperaments may elicit harsher parenting practices, which could exacerbate behavioural difficulties. Therefore, early indicators of potential externalizing problems may lie in infant temperament as well as parental factors. It is therefore important to examine the associations between father-child interactions and child behaviour problems within a model which allows for both father effects and child effects. Additionally, using observational measures which are adapted for use with fathers and which can reduce same source bias ensures that specific paternal behaviours can be picked up effectively.

To address these issues, the current study reports findings from a longitudinal study in which father-child interactions were filmed in the family home at 3 months and 2 years, infant temperament was assessed at 3 months by maternal report, and child behaviour was assessed at 2 years, also by maternal report. A model was built to investigate associations between key variables, beginning with cross-sectional correlations and progressing to longitudinal processes including the stability of both paternal and child behaviours across time and the direction of effects between paternal interactions and child behaviour. Stability across time was included to address the issue identified by Pleck (2010) of controlling for within-construct correlations across time when looking at cross-construct correlations.

It was hypothesised that there would be concurrent associations between father-child interactions and child behaviour, both at 3 months and 2 years. In addition it was hypothesised that there would be some stability over time both between infant temperament and later child behaviour, and between father-child

interaction at 3 months and 2 years. While it is questionable that a direct pathway exists between temperament and externalizing behaviour, this pathway was included to examine any stability in these constructs in this sample. In terms of the direction of effects, the current weight of evidence favours an expectation that paternal effects on child behaviour would be more robust than child temperamental effects on fathering, and therefore it was hypothesised that there would be a stronger association from early father-child interactions to later child behaviour than vice versa.

Method

Participants

This study was part of a longitudinal study, the Oxford Fathers' Project, which aimed to investigate the effects of paternal depression on child outcomes. A copy of the letter confirming ethical approval for this study can be seen in Appendix 1. Participants were recruited from the postnatal maternity wards of the John Radcliffe Hospital in Oxford and the Milton Keynes General Hospital. They were subsequently contacted at 7 weeks, 3 months, 1 year and 2 years postpartum. This study uses data collected from the 3 month and 2 year time points. Following initial recruitment fathers were sent further information on the study and asked to complete and return a questionnaire. Out of those who returned their questionnaires (1,562 out of 4,107: 38%) a sample of 192 families was visited when the infant was approximately 14 weeks old. This sample consisted of 74 fathers who scored highly on the Edinburgh Postnatal Depression Scale and 118 randomly selected families who had returned questionnaires. Families were contacted again at 24 months postpartum. 156 families agreed to participate in this stage.

There were no differences between those who did and did not complete the 2 year visit in terms of infant gender, $\chi^2 (1) = .213$, $p = .145$, paternal academic qualifications, $\chi^2 (2) = 3.09$, $p = .213$, or paternal age, $t(189) = .426$, $p = .641$. There was a significant difference in socioeconomic status (SES) between the two groups, $\chi^2 (1) = 5.16$, $p = .023$, reflecting the fact that those who did not complete the second part of the study were more likely to have routine and manual occupations than professional jobs. Demographic characteristics of the study sample are presented in Table 2.

Table 2.

Characteristics of the Study Sample (n = 156)

	Frequency (%) / Range
Infant gender	
Male	70 (45%)
Female	86 (55%)
Paternal age (mean and SD)	35 (5.7) / 19-52
Paternal academic qualifications*	
No qualifications	1 (0.6%)
GCSE	15 (9.6%)
A levels or equivalent	14 (8.9%)
Diploma or equivalent	26 (16.6%)
Degree	55 (35.9%)
Postgraduate	43 (28.1%)
SES	
Managerial/ professional	88 (56.5%)
Intermediate occupations	41 (26.2%)
Routine/ manual	26 (16.6%)
Unemployed	1 (0.6%)

*Data for 3 participants is missing

Procedure

Prior to the 3 month visit parents completed a consent form (see Appendix 2) and a questionnaire with measures of depression, infant temperament, marital status and occupation. They were subsequently visited in the family home where further demographic information was collected and both mothers and fathers were filmed interacting with their infant in two scenarios- a car seat and floor mat- for three minutes.

In the car seat interaction, the infant was placed in a car seat with the parent sitting facing them. A mirror was placed next to the car seat so that the parents' face could be seen on camera. For the second interaction, the infant was placed on a floor mat on their back with the parent positioned face to face with their infant. For both interactions parents were instructed to play with the infant in any way they chose without the use of toys or objects, for three minutes. Participants were reimbursed with a £15 voucher for their time.

The floor mat scenario was developed in response to initial feedback and observations from fathers using the car seat: fathers seemed a little uncomfortable in this scenario as it appeared they were not used to interacting with their infants in this way and were less likely than mothers to know games and nursery rhymes to use during the filming. The floor mat set up provided more freedom and flexibility to interact in different ways which appeared to suit fathers' interaction style better. Indeed, previous research with this sample (Ramchandani, et al., 2013) has found more associations with child outcomes when using ratings from the floor mat as opposed to the car seat interactions. For these reasons, data from the floor mat interactions were used for this study.

When the child was 24 months old parents were sent a questionnaire including the 100-item Child Behaviour Checklist (CBCL; Achenbach, Edelbrock, & Howell, 1987). Families were then visited at home and both mothers and fathers were filmed interacting with their child in two scenarios: in free play and with a book.

For the first part of the interaction fathers were instructed to play with the child on a blanket for two minutes without any toys. Fathers were asked to keep the child on the blanket as this was where the camera was focussed. For the second part of the interaction the father was given a book and told to share it with the child for five minutes, again remaining on the blanket. Only data from the free play interactions is used in this study.

Of the 156 families who were visited at 2 years, eight families did not have data for the filmed father-infant interactions at 3 months (three families were visited early in the project before the floor mat scenario had been developed; four fathers picked up their children during the interaction so did not follow standard methodology; one family did not want to be filmed.) Fourteen families did not have data for the filmed interactions at 2 years. Reasons included not wanting to be filmed, the child being too upset to film, and problems with equipment during filming. In addition, 12 interactions could not be effectively coded as they were shorter than 90 seconds which reduced reliability. One father spoke in Swedish and an interpreter could not be found. Therefore, 129 families had data for 2 year interactions. There were no differences between those who did and did not have data for the interactions in terms of infant gender, $\chi^2(1) = .142$, $p = .433$, paternal academic qualifications, $\chi^2(3) = 5.01$, $p = .171$, or SES, $\chi^2(2) = .974$, $p = .614$. There was a significant difference in fathers' age between the groups, $t(154) = 2.15$, $p =$

.009, indicating that those who did not complete the interaction were older than those who did.

One family did not have complete data for the maternal IBQ as the mother had not completed her questionnaires at the 3 month visit. Ten families did not have complete data for the 2 year CBCL due to the mother not completing the relevant parts of the questionnaire.

Within the sample of 156 families all analyses were run on a pairwise basis. Therefore N ranged from 113-148. The numbers for each analysis are indicated in tables.

Measures at 3 months

Temperament

The Infant Behaviour Questionnaire (IBQ; Rothbart, 1981) is a widely used parent-report measure for assessing infant temperament. Caregivers are asked to report the relative frequency of occurrence of specific infant reactions over the past week on a 7-point scale. Questions refer to specific contexts such as feeding, bathing and sleeping. Responses range from 1=never to 7=always. There is also an option of selecting 'x=does not apply' if the behaviour has not occurred during the last week. The questionnaire consists of 86 items which make up six subscales: activity level, distress to limitations, smiling and laughter, duration of orientation, soothability and fear. In the original paper by Rothbart (1981) the scales are defined as follows:

Activity level refers to the child's gross motor activity, including movement of arms and legs, squirming and locomotor activity. Smiling and laughter relate to any situation in which the child displays these actions. Fear is defined as the child's distress and/or extended latency to approach an intense or novel stimulus. Distress to limitations refers to the child's fussing, crying or showing distress in any of the

following situations: waiting for food, refusing a food, being in a confining place or position, being dressed or undressed, being prevented access to an object towards which the child is directing his or her attention. Soothability is defined as the child's reduction of fussing, crying, or distress when soothing techniques are used by the caretaker. The final scale, duration of orientation, refers to the child's vocalization, looking at, and/or interaction with a single object for extended periods of time when there has been no change in stimulation.

The IBQ has good validity and reliability. Reliability, convergent validity and relative stability have been demonstrated for the IBQ with infants as young as 2 weeks of age (Worobey, 1986).

The current study used an adapted version of the IBQ with 46 items which made up five of the subscales. This version can be seen in Appendix 3. Scoring involves summing numerical responses for items within a subscale and dividing by the number of items responded to, therefore this scoring system could still be used when fewer items were used.

There was evidence of correlation between maternal and paternal IBQ ratings on all subscales, activity: $r = .452, p < .001$; smiling and laughter: $r = .201, p < .01$; fear: $r = .413, p < .001$; distress to limitations: $r = .464, p < .001$; soothability: $r = .159, p < .05$. Maternal scores were used for analyses with paternal interactions in order to minimise reporter bias. Internal consistencies (Cronbach's alpha) for maternal responses on subscales were acceptable for fear (.71), activity (.74), distress (.79) and smiling (.66), and good for soothability (.82).

Internal consistencies for paternal responses on subscales were acceptable for smiling (.68), soothability (.79) and distress (.77), and good for activity (.81) and fear (.80).

3 month interactions

The Global Ratings Scales (GRS) are a video-based assessment of the quality of interaction between mother and infant. They were developed to assess differences between mothers with and without postnatal depression, and have since been successfully applied to other clinical groups, including in cross-cultural settings, and to low-risk samples. They can be used from 2-6 months post-partum and have been found to predict infant and child outcome at 18 months and 5 years (Murray, Fiori-Cowley, Hooper, & Cooper, 1996; Murray, Hipwell, Hooper, Stein, & Cooper, 1996). Parental behaviour is rated on 13 items, infant behaviour on seven items and dyadic interaction of five items. A list of these items can be seen in Appendix 4.¹ These are then combined to form four parental dimensions: sensitivity (e.g. warmth, responsiveness and acceptance), intrusiveness (in both speech and behaviour), remoteness (in both speech i.e. silence, and behaviour), and behaviour relevant to depression (e.g. happy or sad, relaxed or tense); two infant dimensions: positive engagement, and inert-fretfulness; and a single interaction dimension. High scores on these scales represent a more positive interaction e.g. a high score on the remote scale represents a less remote interaction.

Coding. The videotaped interactions were scored by trained researchers who had not been involved in the family visit. To establish agreement between coders weighted kappa was used (Cohen, 1968) and the strength of agreement for the kappa coefficient was interpreted using guidelines by Landis and Koch (1977). Coefficients for subscales were calculated from an average of the kappa values on the individual items which contributed to each scale. Inter-rater reliability was excellent for all subscales: Sensitivity (.82), Intrusive (.85), Remote (.82), Depressed (.78).

¹ A manual with full details of scoring is available from Lynne Murray, Winnicott Research Unit, School of Psychology and Language Sciences, University of Reading, Reading, RG6 6AL.

Measures at 2 years

Child Behaviour

The CBCL is the most widely used questionnaire for the assessment of child behaviour problems. The original CBCL for ages 2-3 years (Achenbach, et al., 1987) was subsequently revised to include a wider age range (CBCL for ages 1 ½ to 5 years) (Achenbach & Rescorla, 2000). This uses a list of 100 items which parents rate on a 3-point scale (0 not true, 1 somewhat true, 2 very true or often true). The CBCL 1.5-5 yields seven composite scores: emotionally reactive, anxious/depressed, somatic complaints, withdrawn, sleep problems, attention problems, and aggressive behaviour. In addition, composite scores in the domains of internalizing, externalizing and total problems can be obtained. The externalizing scale is formed by summing the scores on two subscales: attention problems and aggressive behaviour. This scale was used to measure behavioural problems in the current study. A copy of the CBCL used in this study can be seen in Appendix 5.

There was evidence of correlation between maternal and paternal CBCL ratings on all subscales, emotional reactivity: $r = .288, p < .001$; anxious-depressed: $r = .514, p < .001$; somatic complaints: $r = .631, p < .001$; withdrawn: $r = .396, p < .001$; sleep problems: $r = .625, p < .001$; attentional problems: $r = .433, p < .001$; and aggressive behaviour: $r = .399, p < .001$, and on overall externalising behaviours: $r = .403, p < .001$, and internalising behaviours: $r = .552, p < .001$. Maternal scores were used for analyses presented here in order to minimise reporter bias. Internal consistencies (Cronbach's alpha) for mothers were acceptable for emotionally reactive (.65), anxious-depressed (.69), withdrawn (.69), attention problems (.66), somatic complaints (.59) and aggressive behaviour (.82)

Internal consistencies for paternal scores are also reported as these were used to compare maternal data. These were acceptable for emotionally reactive (.61), anxious-depressed (.58), somatic complaints (.6), withdrawn (.65), attention problems (.61), and aggressive behaviour (.84)

2 year interactions

Videotaped parent-child interactions at 2 years were coded using a scheme based originally on the GRS and further developed to take into account the greater range of behaviours of 2-year-olds (Zioga Hadjianastassiou, 2012). For the purposes of this study, the scheme was further adapted to account for some of the different behaviours that fathers have been noted to display. Specifically, based on the work of Sethna (2009), dimensions of physical interaction (e.g. rough and tumble play) and excitatory arousal (unexpected vocal and behavioural stimulation) were included to pick up the typical way that fathers interact with their children. In addition, codes related to the father's ability to mentalize about the child were included (physiological, emotional and cognitive state comments), based both on previous work with mothers (Meins, Fernyhough, Fradley, & Tuckey, 2001; Murray, Kempton, Woolgar, & Hooper, 1993) and on the work of Sethna (2009).

Within this scheme paternal behaviour is rated on 20 dimensions (e.g. sensitivity, warmth, intrusions), child behaviour is rated on six dimensions (e.g. referencing, emotional tone), and two dimensions are used to rate the interaction between child and parent (conflictual behaviour and reciprocity and synchronicity). Codes may be rated on a 3-point or 5-point ordinal scale or as an event count. A copy of the coding sheet and details of the codes with their descriptions can be found in Appendix 6.

Coding. Trained raters who had not been involved with the 3 month interactions coded the 2 year interactions. Reliability was established on a sample of 10% of the data (n=16). For those codes which used multicategory, ordinal scales weighted kappa was used (Cohen, 1968). For codes which used event counts or for which Kappa was not reliable due to very high agreement between raters, intra-class correlation (ICC) was used.

Kappa values ranged from .43 (moderate agreement) to .89 (almost perfect agreement) with an average of .66 (substantial agreement). One code had an ICC value of 0. This code (emotional state comments) was not used in further analysis. Remaining ICC values ranged from .38 (moderate agreement) to 1 (perfect agreement) with an average of .73.

Control variables

Maternal factors. Epidemiological studies have identified maternal depression (Petitclerc & Tremblay, 2009) and maternal sensitivity (Owens & Shaw, 2003) as potential risk factors for the onset and continuity of behavioural problems. Depression was measured by parental responses to the Structured Clinical Interview for DSM IV (SCID), which was administered at 3 months and 1 year postpartum. Maternal sensitivity was measured using observations of mother-infant interaction at 3 months.

Paternal factors. This sample was part of a larger study looking at the effects of paternal depression on child outcomes and therefore there is a larger presence of depressive symptoms compared to the general population. Paternal depression was therefore included, measured by SCID interviews. A previous study with the same sample (Ramchandani et al., 2013) also found fathers' age to be an

important predictor in early behaviour problems. This was therefore included as a covariate.

Child factors. Infant gender has been identified as a risk factor for behaviour problems (Bongers, Koot, van der Ende, & Verhulst, 2003), with boys being at higher risk than girls and was therefore included as a covariate.

Other factors. Increased environmental adversity (indexed by lower Socio-economic status: SES) has consistently been linked with increased externalizing behaviours (e.g. Bradley & Corwyn, 2008). SES was measured using paternal employment status on a scale of 0 to 3, with 0 indicating unemployment, 1 indicating routine and manual occupations, 2 indicating intermediate occupations, and 3 indicating managerial and professional roles.

Results

Preliminary analyses are presented first, including data reduction of 2 year interaction variables and descriptive statistics of the main variables. Bivariate correlations between the main variables in the study and potential confounding variables were then run to see if these needed to be controlled for in subsequent analyses. Correlation analyses are then presented in three stages: cross-sectional correlations between variables at the same time point to examine concurrent associations between child behaviour and father-child interaction; longitudinal correlations between variables measuring a similar construct at different time points to examine the stability of child behaviour and paternal interaction behaviours across time; longitudinal cross-lagged correlations between variables measuring different constructs to examine predictive ability of the variables and the direction of effects. Where associations were found, hierarchical regression analyses were performed to control for the effect of potential confounding variables. This analysis was then

repeated for maternal data to provide a comparison with paternal outcomes. A summary of this analysis is provided. Finally, as previous literature indicates that gender is an important factor in behavioural outcomes, associations were examined separately for girls and boys. Despite the high number of correlations performed, results where $p < .05$ are reported as significant as the sample size is relatively small and variables were chosen for inclusion based on previous literature showing associations.

Preliminary analysis

Data reduction

For purposes of data reduction, principal components analysis (PCA) was conducted to create factorial scales of parents' behaviour during interaction. Only items relating to parental behaviour and interaction between parent and child were included in the analysis (i.e. not those codes related to child behaviour). A number of the codes in the scheme were excluded for the following reasons: Lack of variance in the data (self-referential helplessness); no opportunity for coding in some interactions (facilitating attention, physiological state comments, cognitive state comments); poor inter-rater reliability (strong control, paternal anxiety); no correlation with other items (educational references, elaboration, direct warm touching, paternal attention, physical interaction, instrumental touching, imitation).

The final items used in PCA were: positive affect, emotional tone, reciprocity & synchronicity, conflictuous behaviour, intrusiveness, negative affect, following child's attention, withdrawal and sensitivity.

Parallel analysis (a method for determining the number of factors to retain; Horn, 1965) indicated the emergence of three parental factors which accounted for 66.2% of the variance. The factors extracted were labelled Positive Affect (high

scores on positive affect, emotional tone and reciprocity & synchronicity), Negative Involvement (high scores on conflict, intrusions and negative affect) and Engagement (high scores on following child's attention and sensitivity alongside a low score on withdrawal).

An equivalent analysis was done on maternal data for purposes of comparison with paternal outcomes. This involved a principal components analysis which resulted in a two factor solution that accounted for 50% of the variance. The first factor, labelled Sensitivity, had high scores on the following codes: sensitivity, warmth, reciprocity & synchronicity, and following child's attention; and low scores on the following codes: conflictuous behaviour, intrusiveness, instrumental touching, self-referential helplessness, and negative affect. The second factor, labelled Positive Emotion, had high scores on the following codes: positive affect, emotional tone and maternal attention.

Descriptive statistics

Table 3 shows means and standard deviations for the main variables in the study.

Table 3.

Descriptive Statistics of Study Variables.

Variable	Mean (SD)
<u>3 month variables</u>	
Maternal IBQ ratings	
Distress	3.61 (0.84)
Soothability	4.96 (0.96)
Activity	3.42 (0.74)
Smiling	5.06 (1.17)
Fear	2.08 (1.07)
Paternal IBQ ratings	
Distress	3.76 (0.78)
Soothability	4.59 (0.96)
Activity	3.42 (0.79)
Smiling	4.77 (1.33)
Fear	2.12 (1.07)
Paternal GRS scales	
Sensitivity	3.71 (0.55)
Intrusiveness	3.72 (0.83)
Remoteness	4.59 (0.83)
Depression	4.02 (0.54)
Maternal GRS scales	
Sensitivity	3.42 (0.63)
Intrusiveness	3.72 (0.78)
Remoteness	4.75 (0.49)
Depression	4.09 (0.54)
<u>2 year variables</u>	
CBCL ratings	
Paternal Externalizing	11.76 (5.83)
Maternal Externalizing	11.36 (5.92)

Note. 2 year interaction variables are not shown as they are factor scores which have means of 0 and SDs of 1.

Covariates

Initially, correlations were performed to see if any of the identified potential confounding variables were significantly associated with key variables at 3 months (Table 4) or 2 years (Table 5). For the 3 month variables maternal depression was negatively associated with IBQ smile, indicating that infants tend to smile less in the presence of maternal depression. At 2 years there were no associations between confounding variables and CBCL scores. However, there were some associations with father-child interaction variables: older fathers tended to show more positive affect in interactions; low maternal sensitivity was associated with fathers' negative involvement; fathers showed more engaged interactions with boys than girls; and fathers were less engaged when mothers had higher levels of depression. Therefore, these variables were controlled for in subsequent analyses involving 2-year father-child interactions.

Father-child interaction and child behaviour

Correlations between father-child interaction variables and child behaviour variables were examined both cross-sectionally and longitudinally.

Cross-sectional. Cross-sectionally, there were some associations between IBQ subscales and GRS subscales at 3 months: IBQ activity was correlated with GRS remote ($r = -.178, p = .032$) and GRS depressive ($r = -.194, p = .02$), indicating that infants with higher activity levels tend to have fathers who are more remote and depressive in interaction. However, there were no associations between CBCL scores and paternal interactions at 2 years. Cross-sectional correlations can be seen in Table 6.

Table 4.

Correlation Between Covariates and 3 Month Variables.

	<u>Maternal IBQ</u>					<u>Paternal GRS</u>			
	Distress	Activity	Fear	Smile	Soothe	Sensitive	Intrusive	Remote	Depressed
Infant gender	.004	.090	.138	.020	.101	-.042	-.018	-.006	-.105
SES	-.072	.031	-.123	.046	-.089	-.094	-.140	.060	.086
Paternal age	-.080	-.137	-.115	.037	-.078	.038	.016	-.090	-.122
Paternal depression	-.014	.033	.058	-.061	-.096	-.011	.039	-.067	-.098
Maternal depression	.070	.005	.117	-.191*	-.016	-.062	-.006	-.078	-.046
Maternal sensitivity	.106	-.019	.100	-.090	-.108	.045	.012	-.082	.128

Note. N = 135 to 153

*. Correlation is significant at the 0.05 level

Table 5.

Correlation Between Covariates and 2 Year Variables

	Maternal CBCL	Positive Affect	Negative Involvement	Engagement
Infant gender	-.105	-.017	.009	-.229**
SES	-.075	.155	-.194	.147
Paternal age	-.011	.181*	-.025	-.032
Paternal depression	.109	.069	.069	-.161
Maternal depression	.126	.006	-.041	-.236**
Maternal sensitivity	.091	.055	-.349**	.049

Note. N = 122 to 156

** Correlation is significant at the 0.01 level

* Correlation is significant at the 0.05 level

Longitudinal stability. Looking at the stability of child behaviour longitudinally, there were no associations between maternal IBQ scores at 3 months and maternal externalising CBCL scores at 2 years.

For parental interaction behaviours across time, there were associations between GRS remote at 3 months and positive affect in interactions at 2 years ($r=.198$, $p=.028$), GRS remote and engagement in interactions at 2 years ($r=.245$, $p=.006$), and between GRS depressed and engagement in interactions at 2 years ($r=.23$, $p=.011$). This indicates that fathers who were more remote and depressed in interactions at 3 months were less positive and engaged in interactions at 2 years. When entered in regression analysis alongside the confounding variables identified above the associations remained between GRS remote and positive affect ($\beta= .227$, $p=.011$), GRS remote and engagement ($\beta= .231$, $p=.007$), and GRS depressed and engagement ($\beta= .198$, $p=.023$). However, when remote and depressed were entered together in the prediction of engagement the association attenuated due to shared variance ($\beta= .177$, $p=.087$ and $\beta= .098$, $p=.342$ for remote and depressive respectively). Indeed they are highly correlated ($r =.572$, $p<.001$).

Cross-lagged. Longitudinal correlations to examine the direction of effects indicated there were no associations between IBQ subscales at 3 months and paternal interactions at 2 years and, similarly, there were no associations between GRS subscales at 3 months and CBCL scores at 2 years. Longitudinal correlations can be seen in Table 7.

Table 6.

Paternal Cross Sectional Correlations at 3 Months and 2 Years

IBQ	Paternal GRS				2 year paternal interaction	Maternal CBCL
	Sensitivity	Intrusive	Remote	Depressive		
Activity	.064	.051	-.178*	-.194*	Positive Affect	-.067
Distress	.072	.073	-.151	-.041		
Novel	.084	.046	.045	.027	Negative Involvement	.037
Smile	-.025	-.042	.024	-.039		
Soothability	.082	.036	.111	.134	Engagement	-.089

Note. N = 135 – 153 at 3 months and 120 – 129 at 2 years

* Correlation is significant at the 0.05 level

Table 7

Paternal Longitudinal Correlations

	Maternal IBQ						Paternal GRS		
	Distress	Activity	Fear	Smile	Soothe	Sensitive	Intrusive	Remote	Depressed
CBCL	.137	.087	.113	-.146	.040	.098	.060	-.028	.019
Positive Affect	-.092	-.125	-.055	.114	-.052	-.023	-.047	.198*	.082
Negative Involvement	-.103	-.004	-.03	.000	-.036	-.077	-.029	.070	-.065
Engagement	-.091	-.012	-.16	.079	.038	-.041	.017	.245**	.230*

Note. N = 120 - 153

** Correlation is significant at the 0.01 level

* Correlation is significant at the 0.05 level

Comparison with mothers

In analysing maternal data, paternal reports on the IBQ and CBCL were used to ensure an equivalent model and reduce shared method variance.

Cross-sectionally, higher IBQ distress scores were associated with more remote mother-infant interactions at 3 months ($r=-.223$, $p=.007$), while higher CBCL scores were associated with less sensitive mother-infant interactions at 2 years ($r=-.189$, $p=.042$).

Longitudinally, higher IBQ activity and distress scores were associated with higher CBCL scores ($r=.22$, $p=.009$ and $r=.241$, $p=.01$ for activity and distress respectively), representing an association in paternal reports of child behaviour across time. Additionally, more remote interactions at 3 months were associated with less positive affect in interactions at 2 years ($r=.198$, $p=.03$). There were no cross-lagged associations.

In comparing mothers and fathers, parent-child interactions showed cross-sectional associations with child behaviours for fathers at 3 months and for mothers at both 3 months and 2 years. Longitudinally, infant temperament showed increased association with CBCL externalising scores when using father reports of child behaviour rather than mother report. Both mothers and fathers showed some stability in their style of interactions across time, with less engaged interactions at 3 months showing a similar pattern at 2 years. However, parent-child interactions at 3 months were not associated with CBCL scores at 2 years for mothers or fathers. Similarly, infant temperament at 3 months was not associated with parental interaction at 2 years for mothers or fathers.

Gender differences

Fathers

When analyses were run separately for boys and girls there were some differences in the outcomes (see Table 8 and 9). Cross-sectional correlations between remote interactions and higher activity levels appeared to be restricted to boys, while those between depressed interactions and higher activity were only present in girls. Associations between 3 month interactions and 2 year interactions were only present for boys; there were no significant correlations for girls.

A cross-lagged association emerged between infant behaviour and 2 year interactions for boys: higher scores on IBQ activity were associated with lower paternal positive affect in interactions ($r=-.389$, $p=.003$), while for girls a longitudinal association emerged between IBQ distress levels and CBCL scores ($r=.242$, $p=.029$).

Mothers

Similarly for mothers, associations between remote interactions at 3 months and less positive affect in interactions at 2 years were restricted to boys, as were associations between IBQ activity and CBCL scores. In contrast, cross-sectional associations at both 3 months and 2 years were only present in girls. A cross-sectional association emerged for boys between CBCL scores and maternal positive affect in interactions ($r=-.345$, $p=.015$).

Table 8.

Paternal Cross Sectional Correlations at 3 Months and 2 Years by Gender

	<u>Paternal GRS</u>				2 year paternal interaction	Maternal CBCL
	<u>Maternal IBQ</u> Sensitivity	Intrusive	Remote	Depressive		
	Boys				Boys	
Activity	.099	.085	-.341*	-.119	Positive affect	.035
Distress	.067	.134	-.161	.024	Negative	
Novel	.223	-.097	-.011	.179	Involvement	.061
Smile	-.001	.055	-.058	-.064	Engagement	-.118
Soothability	.171	.124	.045	.117		
	Girls				Girls	
Activity	.048	.032	-.084	-.236*	Positive affect	-.154
Distress	.076	.017	-.143	-.098	Negative	
Novel	.027	.132	.077	-.026	Involvement	.016
Smile	-.048	-.132	.092	-.016	Engagement	-.109
Soothability	.001	-.050	.178	.177		

Note. N= 59-68 (boys at 3 months), 76-85 (girls at 3 months), 50-57 (boys at 2 years), 70-72 (girls at 2 years)

* Correlation is significant at the 0.05 level

Table 9

Paternal Longitudinal Correlations by Gender

	<u>Maternal IBQ</u>					<u>Paternal GRS</u>			
	Distress	Activity	Fear	Smile	Soothe	Sensitive	Intrusive	Remote	Depressed
	Boys								
CBCL	.003	.152	.217	-.060	.012	.162	.019	-.113	.017
Positive Affect	.051	-.368*	-.038	.049	-.092	.053	-.051	.350*	.052
Negative Involvement	-.199	.089	-.189	.012	-.054	-.142	-.021	.077	-.137
Engagement	-.092	-.136	.007	-.098	.115	.089	.023	.328*	.300*
	Girls								
CBCL	.242*	.067	.093	-.215	.072	.034	.088	.039	-.011
Positive Affect	-.231	.045	-.075	.176	-.010	-.105	-.044	.054	.113
Negative Involvement	-.004	-.078	.049	-.013	-.022	-.003	-.036	.065	.012
Engagement	-.129	.032	-.165	.162	.055	-.131	.005	.232	.192

Note. N = 50-68 (boys), 67-85 (girls)

* Correlation is significant at the 0.05 level

Discussion

This study looked at the associations between father-child interactions and child behaviour across the first 2 years, in particular looking at the direction of effects between fathers and their children. The findings suggest that a particular style of paternal interaction, characterised by disengagement and low emotional tone, remains relatively stable across the first 2 years and is associated with higher levels of infant activity, particularly in boys. While it is not possible to draw any causal conclusions from this data, results provide some tentative support for a child effects model, with early temperament being associated with later father-child interactions. Before looking at the strengths and weaknesses of this study it is important to consider how these findings fit with existing literature and what the clinical implications may be.

The first stage of the analysis was to look at cross sectional associations at both time points. At 3 months more remote, depressive fathers had infants with higher levels of activity, indicating more body movements, for example, more squirming, kicking and waving. One explanation for this association is that it represents a parental response to being overwhelmed by a highly active baby through being more detached. Alternatively, it may be that increased activity may represent an attempt by the infant to elicit a parental response where one is lacking or could also be a form of self-soothing for the infant where fathers are less able to emotionally regulate their child (Bridges, 1997).

The lack of cross-sectional associations at 2 years is surprising given previous research which has shown links in this age group (Black, Dubowitz, & Starr, 1999; Shannon, Tamis-LeMonda, London, & Cabrera, 2002). However, previous studies have tended to use low-income samples so it may be that parental behaviours are

more strongly associated with child behaviour in the context of socio economic disadvantage and that better environmental circumstances act as a buffer against the negative impact of parenting (Seeley, Murray, & Cooper, 1996).

It was hypothesised that there would be some stability in the constructs of both father-child interactions and child behaviour over time. This hypothesis was supported for father-child interactions where more remote, depressive interactions at 3 months were associated with less engaged, less positive interactions at 2 years. A similar pattern was found for mothers. This may represent a stable feature of parental behaviour over time, for example, in parents who are more introverted or are more persistently depressive. However, the association was largely carried by boys for both parents, raising the question of why parents would continue to show more negative patterns of interaction with boys rather than girls. Some studies have suggested that boys may have an increased sensitivity to parenting (Rothbaum & Weisz, 1994) so may be contributing to a cycle of interaction which maintains more negative parental responses. However, it is less usual for these differences to be found in children so young (Campbell, 1995) and therefore this is something that warrants further investigation.

Lack of an association between maternal report on the IBQ and CBCL is a little surprising given the same-reporter bias and previous research showing associations (e.g. Goldberg et al., 1990). It may be that the different instruments pick up different aspects of behaviour so are not measuring the same construct. Temperament measures are intended to pick up constitutionally based differences in reactivity that show some stability over time, while externalizing behaviours are a particular set of problematic behaviours directed outwards towards others which are linked to a number of psychosocial variables in addition to possible biological

factors. Therefore, infant temperament may not predict behaviour at 2 years due to the many influences on child development across these early years which have an impact on behaviour, for example, modelling by parents, experiences of emotional regulation, or reinforcement cycles. Interestingly, when paternal report was used on these questionnaires there was an association between higher externalizing scores on the CBCL and higher activity and distress scores on the IBQ. There was a higher rate of depression in fathers than mothers in the first year after birth in this sample and, therefore, it may be that this association reflects paternal interpretations of behaviour as more difficult. This lends support to the theory that there is little direct association between early temperament and later externalising behaviours and that correlations reflect a third variable such as parenting or parental attitudes (Goldberg et al., 1990).

No cross-lagged associations were found for either fathers or mothers. Therefore neither hypothesis regarding direction of effects was supported. In terms of father effects, there has previously been mixed evidence for an association between early father-child interactions and later child behaviour with some studies finding that fathers did not contribute to outcomes (Belsky, et al., 1998; Benzies, Harrison, & Magill-Evans, 1998) and others finding significant associations (Feldman & Eidelman, 2004; Trautman-Villalba, et al., 2006). There are several possible explanations for these differences. Associations may depend on which aspects of paternal behaviour are measured e.g. hostile parenting practices such as aggression and coercive interactions have been linked to externalizing problems (Petitclerc & Tremblay, 2009) and may not be picked up in short observed interactions where parents are aware of being filmed. Associations may be stronger in clinical samples where paternal depression or antisocial traits contribute to behavioural problems through a mixture of biological, psychological and social

mechanisms. Additionally, some researchers have suggested that links between parental caregiving and behaviour problems are stronger in older children (Rothbaum & Weisz, 1994) due either to the cumulative reciprocal effects of parent-child influence over time or to changing meanings of externalizing behaviours from instrumental in younger children to more hostile and intentional in older children. Therefore, it may be that it was too early to pick up behavioural difficulties in this very young sample or that the measures of father-child interaction used were not able to pick up the key aspects of paternal behaviour which may influence child behavioural outcomes. A further issue is the potential moderating effect of the amount of involvement fathers have in their children's lives. A highly sensitive father who spends little time with his child will have less impact on outcomes than a more involved father. Level of involvement was not measured in this study and may be an important addition to future research.

In terms of child effects, there were no overall associations. However, again there was a difference between data for boys and girls. There was some evidence for temperament in boys being associated with later paternal interactions, in particular, higher activity scores at 3 months correlated with less positive affect at 2 years. Therefore, for boys, higher IBQ activity levels were associated both with more remote interactions at 3 months and less positive interactions at 2 years. From a child effects perspective, this may indicate that more active boys elicit a less engaged response from fathers which continues across the first 2 years.

In the maternal depression literature infant factors such as irritability and poor motor skills have been linked with increased likelihood of developing postnatal depression in women who have a bad case of the 'baby blues' (Murray, Stanley, Hooper, & Fiori-Cowley, 1996). The effect of the infant's behaviour occurred over

and above the impact of the mother's early mood with one suggestion being that it may be harder for the mother to bond with her infant (Cooper, Murray, Hooper, & West, 1996). It is possible that a similar mechanism may explain some of these results if fathers who are prone to low mood struggle to create a bond with an active infant and thus respond more remotely when interacting. It is interesting to note that overall fathers were more engaged with their sons than their daughters in this sample and therefore may be more affected by difficulties bonding with boys than girls, thus providing a possible explanation for the gender differences found. In the studies cited above, mothers who went on to develop postnatal depression tended to be those who had little social support and their infants were subsequently more likely to develop behaviour problems such as tantrums and mood difficulties. Paternal depression during the postnatal period has also been linked with an increased risk of behavioural problems in children, especially in boys (Ramchandani, Stein, Evans, & O'Connor, 2005). Therefore, while temperament was not linked to CBCL scores in this study and infants were in two-parent families where both parents were involved with the child, it is possible that these early neonatal factors have an impact on fathers' behaviour and are important to think about as potential risk factors for later problems.

There were some specific similarities between paternal and maternal data, in particular the pattern of disengaged interactions across time which were present only for boys. It is unclear what these similarities may represent, for example, whether boys are more likely to elicit this type of interaction in their parents or parents tend to interact more remotely with their boys. There were also some important differences between mother and fathers. There were associations between infant temperament and child behaviour when paternal report was used but not when maternal report was

used. In particular, higher activity and distress scores at 3 months correlated with higher CBCL scores at 2 years. As noted earlier, since this represents associations in fathers' report of the child it is potentially due to the higher rate of depression in fathers affecting their reporting. Mothers also showed some cross-sectional associations at 2 years which were not present for fathers. Previous studies in this age group have also tended to find stronger associations for mothers with child behavioural outcomes (e.g. Belsky, et al., 1998; Rothbaum & Weisz, 1994), perhaps because of the greater overall time that mothers tend to spend with young children.

It is also worth noting some of the associations found with covariates at the 2 year time point. Two year paternal interactions were associated with maternal sensitivity and maternal depression: where mothers had low sensitivity, fathers showed more negative involvement (conflict, intrusions, negative affect). Where mothers had higher levels of depression, fathers were less engaged. These associations were not present at 3 months, suggesting that these patterns of interaction may develop across time. These findings suggest how important the wider context may be in understanding links between parental behaviour and child outcomes, in particular, the importance of marital functioning in parenting behaviours and how parents may influence each other. For example, some studies have suggested that mothers can act as a gatekeeper, whereby fathers have less opportunity to engage with children when there is marital conflict (Schoppe-Sullivan, Brown, Cannon, Mangelsdorf, & Sokolowski, 2008). Alternatively, involved fathers may act as a buffer against the negative consequences of unsupportive mothering (Martin, et al., 2010).

There are several strengths of this study which are worth highlighting. In particular the use of father-specific observational measures was a key feature in

measuring parent-child interactions. The floor mat scenario used at 3 months allowed a greater range of behaviours to be present, specifically linked to research indicating that fathers' play is more physically dynamic than mothers'. In addition, the inclusion of codes at 2 years which were designed with fathers in mind ensured coders picked up on these different types of behaviours. While these father-specific codes were not used in the final analysis of this study due to issues such as low correlation with other items their inclusion in other schemes (Sethna, 2009) has proved useful. Inclusion of maternal data to provide a comparison was also an important strength, as was the longitudinal design to allow exploration of stability of constructs across time and direction of effects.

There were also some important limitations in this study. This was a relatively small sample of fathers who, overall, were older and more highly educated than the population from which they were drawn. This may reflect fathers who are more willing to engage in research about father involvement and so may be overall more engaged with their infants than others, as well as having lower socioeconomic risk. Therefore, results may not generalise to families with different demographics. Similarly, when analyses were conducted separately for boys and girls only a small number of families contributed to each outcome so results should be interpreted with caution. However, the fact that gender analyses were in the expected direction and were consistent with other literature provides support for these results despite low numbers.

In terms of measurement, observed interactions at both time points were very brief. This may have impacted on the range of behaviours that parents could display, including ratings being unduly influenced if the child was unsettled and the parent had limited time to deal with this behaviour. Nevertheless, using observed

interactions coded by trained researchers remains the gold standard for measuring paternal behaviour. Maternal report was used to measure both infant temperament and child behaviour. While this was used to reduce same source bias with observations, this confound was still present for longitudinal associations of behaviour. It did not appear to affect results in this study, but future studies may benefit from more objective measures of child behaviour such as observations by researchers. Finally, while the early measurements may be considered a strength in investigating the earliest risk factors for the development of behaviour problems, it is possible that a stronger association may have been found with externalizing behaviours later in childhood (Rothbaum & Weisz, 1994). Therefore, a follow up measurement of behaviour at a later time point would be a useful addition to future studies.

Conclusion

The findings of this study add to current research by investigating associations between father-child interactions and child behaviour very early in life and demonstrating that infant temperament may be an important factor in predicting paternal responses to their child. In particular, boys who show high levels of activity as infants may elicit a more remote, negative interaction style in their fathers which continues across the first two years. While associations were not found between these factors and later child behaviours in this very young sample, it may be that problem behaviours emerge later in development. Other studies with at-risk maternal samples have found that early negative responses to infant temperament can increase risk for child behavioural problems and this study therefore provides tentative evidence that a similar pattern may be present in fathers.

References

- Achenbach, T., Edelbrock, C., & Howell, C. (1987). Empirically based assessment of the behavioural/emotional problems of 2-3 year old children. *Journal of Abnormal Child Psychology*, 5, 629-650.
- Achenbach, T., & Rescorla, L. (2000). *Manual for the ASEBA preschool forms and profiles*. Burlington: University of Vermont, Research Centre for Children, Youth and Families.
- Aldous, J., & Mulligan, G. (2002). Fathers' child care and children's behaviour problems: A longitudinal study. *Journal of Family Issues*, 23, 624-647.
- Bandura, A. (1977). *Social Learning Theory*. Englewood Cliffs, NJ: Prentice Hall.
- Bates, J., Maslin, C., & Frankel, K. (1985). Attachment security, mother-child interaction and temperament as predictors of behaviour problem ratings at age three years. *Monographs of the Society for Research in Child Development*, 50(1), 167-193.
- Belsky, J., Hsieh, K., & Crnic, K. (1998). Mothering, fathering and infant negativity as antecedents of boys' externalizing problems and inhibition at age 3 years: Differential susceptibility to rearing experience? *Development and Psychopathology*, 10, 301-319.
- Benzies, K., Harrison, M., & Magill-Evans, J. (1998). Impact of marital quality and parent-infant interaction on preschool behaviour problems. *Public Health Nursing*, 15(1), 35-43.
- Bion, W. (1962). *Learning from Experience*. London: Heinemann.

- Black, M., Dubowitz, H., & Starr, R. (1999). African American fathers in low income, urban families: Development, behaviour and home environment of their three-year-olds. *Child Development, 70*, 967-978.
- Bongers, I., Koot, H., van der Ende, J., & Verhulst, F. (2003). The Normative Development of Child and Adolescent Problem Behaviour. *Journal of Abnormal Child Psychology, 112*(2), 179-192.
- Bowlby, J. (1969). *Attachment and Loss* (Vol. 1). New York: Basic Books.
- Bradley, R., & Corwyn, R. (2008). Infant temperament, parenting, and externalizing behaviour in first grade: a test of the different susceptibility hypothesis. *Journal of Child Psychology and Psychiatry, 49*(2), 124-131.
- Bridges, L. (1997). Infant emotion regulation with mothers and fathers. *Infant Behaviour and Development, 20*(1), 47-57.
- Bronte-Tinkew, J., Carrano, J., Horowitz, A., & Kinukawa, A. (2008). Involvement among resident fathers and links to infant cognitive outcomes. *Journal of Family Issues, 29*(9), 1211-1244.
- Campbell, S. (1995). Behaviour Problems in Preschool Children: A review of recent research. *Journal of Child Psychology and Psychiatry, 36*(1), 113-149.
- Cohen, J. (1968). Weighted kappa: Nominal scale agreement provision for scaled disagreement or partial credit. *Psychological Bulletin, 70*(4), 213-220.
- Cooper, P., Murray, L., Hooper, R., & West, A. (1996). The development and validation of a predictive index for postnatal depression. *Psychological Medicine, 26*(3), 627-634.
- Feldman, R., & Eidelman, A. (2004). Parent-infant synchrony and the social-emotional development of triplets. *Developmental Psychology, 40*(6), 1133-1147.

- Flouri, E., & Buchanan, A. (2002). Life satisfaction in teenage boys: The moderating role of father involvement and bullying. *Aggressive Behaviour, 28*, 126-133.
- Flouri, E., & Buchanan, A. (2004). Early father's and mother's involvement and child's later educational outcomes. *British Journal of Educational Psychology, 74*, 141-153.
- Frick, P. (2004). Integrating research on temperament and childhood psychopathology: Its pitfalls and promise. *Journal of Clinical Child and Adolescent Psychology, 33*(1), 2-7.
- Gardner, F., Dishion, T., Shaw, D., & Burton, J. (2007). Randomized prevention trial for early conduct problems: effects on proactive parenting and links to toddler disruptive behaviour. *Journal of Family Psychology, 21*(3), 398-406.
- Goldberg, S., Corter, C., Lojkasek, M., & Minde, K. (1990). Prediction of behaviour problems in 4-year-olds born prematurely. *Development and Psychopathology, 2*, 15-30.
- Grossman, K. E., Grossman, K., Fremmer-Bombik, E., Kindler, H., Scheuerer-Englisch, H., & Zimmerman, P. (2002). The uniqueness of the child-father attachment relationship: fathers' sensitive and challenging play as pivotal variable in a 16-year longitudinal study. *Social Development, 11*, 307-331.
- Horn, J. (1965). A rationale and test for the number of factors in factor analysis. *Psychometrika, 32*, 179-185.
- Lamb, M. (1977). Father-infant and mother-infant interaction in the first year of life. *Child Development, 48*(1), 167-181.
- Lamb, M., Pleck, J., & Levine, J. (1985). The role of the father in child development: The effects of increased paternal involvement. In B. Lahey & A. Kazdin (Eds.), *Advance in Clinical Child Psychology* (Vol. 8). New York: Plenum.

- Landis, J., & Koch, G. (1977). The measurement of observer agreement for categorical data. *Biometrics*, 33(1), 159-174.
- Livingston, G., & Parker, K. (2011). A tale of two fathers: More are active but more are absent. Retrieved from Pew Research Center website: <http://pewsocialtrends.org/2011/06/15/a-tale-of-two-fathers/>
- Loeber, R., & Stouthamer-Loeber, M. (1986). Family factors as correlates and predictors of juvenile conduct problems and delinquency. In M. Tonry & N. Morris (Eds.), *Crime and Justice* (Vol. 7). Chicago: University of Chicago Press.
- Maccoby, E., & Martin, J. (1983). *Socialization in the context of the family: Parent-child interaction* (4th ed. Vol. 4). New York: Wiley.
- Martin, A., Ryan, R., & Brooks-Gunn, J. (2010). When fathers' supportiveness matters most: Maternal and paternal parenting and children's school readiness. *Journal of Family Psychology*, 24(2), 145-155.
- Meins, E., Fernyhough, C., Fradley, E., & Tuckey, M. (2001). Rethinking maternal sensitivity: Mothers' comments on infants' mental processes predict security of attachment at 12 months. *Journal of Child Psychology and Psychiatry*, 42(5), 637-648.
- Murray, L., Fiori-Cowley, A., Hooper, R., & Cooper, P. (1996). The impact of postnatal depression and associated adversity on early mother-infant interactions and later infant outcome. *Child Development*, 67, 2512-2526.
- Murray, L., Hipwell, A., Hooper, R., Stein, A., & Cooper, P. (1996). The cognitive development of 5-year-old children of postnatally depressed mothers. *Journal of Child Psychology and Psychiatry*, 37, 927-935.

- Murray, L., Kempton, C., Woolgar, M., & Hooper, R. (1993). Depressed mothers' speech to their infants and its relation to infant gender and cognitive development. *Journal of Child Psychology and Psychiatry*, *34*(7), 1083-1101.
- Murray, L., Stanley, C., Hooper, R., & Fiori-Cowley, A. (1996). The role of infant factors in postnatal depression and mother-infant interactions. *Developmental Medicine and Child Neurology*, *38*(2), 109-119.
- Nagin, D., & Tremblay, R. (1999). Trajectories of boys' physical aggression, opposition, and hyperactivity on the path to physically violent and nonviolent juvenile delinquency. *Child Development*, *70*, 1181-1196.
- National Institute for Health and Care Excellence. (2013). *Antisocial behaviour and conduct disorder in children and young people: Recognition, intervention and management*. CG158. London: National Institute for Health and Care Excellence.
- Owens, E., & Shaw, D. (2003). Predicting growth curves of externalizing behaviour across the preschool years. *Journal of Abnormal Child Psychology*, *31*, 575-590.
- Paquette, D. (2004). Theorizing the father-child relationship: Mechanisms and developmental outcomes. *Human Development*, *47*(4), 193-219.
- Patterson, G., DeBaryshe, B., & Ramsey, E. (1989). A Developmental Perspective on Antisocial Behaviour. *American Psychologist*, *44*(2), 329-335.
- Patterson, G., Reid, J., & Dishion, T. (1992). *Antisocial Boys*. Eugene, OR: Castalia.
- Petitclerc, A., & Tremblay, R. (2009). Childhood disruptive behaviour disorders: review of their origin, development, and prevention. *La Revue Canadienne de Psychiatrie*, *54*(4), 222-231.

- Pleck, J. (2010). Paternal involvement. In M. Lamb (Ed.), *The Role of the Father* (5th ed.). New Jersey: Wiley.
- Pleck, J., & Masciadrelli, B. (2004). Parental involvement: Levels, sources and consequences. In M. Lamb (Ed.), *The role of the father in child development* (4th ed.). New York: John Wiley and Sons.
- Ramchandani, P., Domoney, J., Sethna, V., Psychogiou, L., Vlachos, H., & Murray, L. (2013). Do early father-infant interactions predict the onset of externalising behaviours in young children? Findings from a longitudinal cohort study. *Journal of Child Psychology and Psychiatry*, 54(1), 56-64.
- Ramchandani, P., Stein, A., Evans, J., & O'Connor, T. (2005). Paternal depression in the postnatal period and child development: A prospective population study. *The Lancet*, 365(9478), 2201-2205.
- Rothbart, M. (1981). Measurement of Temperament in Infancy. *Child Development*, 52(2), 569-578.
- Rothbart, M. (2007). Temperament, development and personality. *Current Directions in Psychological Science*, 16(4), 207-212.
- Rothbaum, F., & Weisz, J. (1994). Parental caregiving and child externalizing behaviour in nonclinical samples: A meta-analysis. *Psychological Bulletin*, 116(1), 55-74.
- Sanders, S. (1999). Triple P-Positive Parenting Program: Toward an empirically validated multilevel parenting and family support strategy for the prevention of behaviour and emotional problems in children. *Clinical Child and Family Psychological Review*, 2, 71-90.

- Sarkadi, A., Kristiansson, R., Oberklaid, F., & Bremberg, S. (2008). Fathers' Involvement and Children's Developmental Outcomes: a Systematic Review of Longitudinal Studies. *Acta Paediatrica*, 97, 153-158.
- Schoppe-Sullivan, S., Brown, G., Cannon, E., Mangelsdorf, S., & Sokolowski, M. (2008). Maternal gatekeeping, coparenting quality, and fathering behaviour in families with infants. *Journal of Family Psychology*, 22, 389-398.
- Scott, S., Knapp, M., Henderson, J., & Maughan, B. (2001). Financial cost of social exclusion: follow up study of antisocial children into adulthood. *BMJ*, 323, 191-194.
- Seeley, S., Murray, L., & Cooper, P. (1996). The outcome for mothers and babies of health visitor intervention. *Health Visitor*, 69, 135-138.
- Sethna, V. (2009). *Father's role in infancy: Examining the influence of paternal depression in the postnatal period on early father-infant interactions*. University of Oxford.
- Shannon, J., Tamis-LeMonda, C., London, K., & Cabrera, N. (2002). Beyond rough and tumble: Low income fathers' interactions and children's cognitive development at 24 months. *Parenting: Science and Practice*, 2, 77-104.
- Shaw, D., Gilliom, M., Ingoldsby, E., & Nagin, D. (2003). Trajectories leading to school-age conduct problems. *Developmental Psychology*, 39(2), 189-200.
- Shaw, D., & Gross, H. (2008). Early childhood and the development of delinquency: What we have learned from recent longitudinal research. In A. Lieberman (Ed.), *The long view of crime: A synthesis of longitudinal research*. (pp. 79-127). New York: Springer.
- Shonkoff, J., Boyce, W., & McEwan, B. (2009). Neuroscience, molecular biology, and the childhood roots of health disparities: Building a new framework for

- health promotion and disease prevention. *Journal of the American Medical Association*, 301(21), 2252-2259.
- Tamis-LeMonda, C., Shannon, J., Cabrera, N., & Lamb, M. (2004). Fathers and mothers at play with their 2- and 3-year-olds: Contributions to language and cognitive development. *Child Development*, 75(6), 1806-1820.
- Thomas, A., & Chess, S. (1977). *Temperament and Development*. New York: New York University Press.
- Trautman-Villalba, P., Gschwendt, M., Schmidt, M., & Laucht, M. (2006). Father-Infant Interaction Patterns as Precursors of Children's Later Externalizing Behaviour Problems. *European Archive of Psychiatry and Clinical Neuroscience*, 256, 344-349.
- Webster-Stratton, C. (1982). Teaching mothers through videotape modeling to change their children's behaviour. *Journal of Pediatric Psychology*, 7, 279-294.
- Worobey, J. (1986). Convergence amonth assessments of temperament in the first month. *Child Development*, 57, 47-55.
- Yeung, W., Sandberg, J., Davis-Kean, P., & Hofferth, S. (2001). Children's time with fathers in intact families. *Journal of Marriage and Family*, 63(1), 136-154.
- Zioga Hadjianastassiou, M. (2012). *Maternal postnatal depression and anxiety in relation to 2 year old children's development of emotion regulation and attention*. University of Oxford.

Part 3: Critical Appraisal

This critical appraisal describes how this study came about and provides a critical discussion of the research process, including issues of measurement and design. In particular it considers the ways in which the methods used can impact on data and results, the implications this has on translating the complexity of family life into something measurable, and the influence of the researcher on this process. It also considers the validity and generalizability of the study and areas for future research.

I became involved with the Oxford Fathers Project as a research assistant prior to clinical training. My role included collecting around half of the data from families at the 2-year time point by doing home visits around Oxfordshire and Milton Keynes. After the data was collected I became involved in developing the coding scheme for these interactions and went on to code interactions from families which I had not visited. I was then able to use this data for my doctoral thesis. The Oxford Fathers Project involved collection of a number of variables alongside those used in this thesis, including Axis 1 disorders, antisocial traits, marital functioning, father involvement, and expressed emotion, as well as child cognitive and language outcomes and triadic family interactions. My decision to focus on father-child interaction and child behaviour came about both because of involvement in a previous paper looking at the impacts of early interactions and also a growing interest in the systemic factors leading to poor behavioural outcomes. Teaching on developmental psychopathology highlighted the dynamic interplay of multiple levels of influence that underlie development, alongside the poor outcomes for those whose early years are lacking in care and support. In addition, with the recent context of the London riots and debates about the validity of diagnosing young children with conduct disorder, examining early antecedents to behavioural problems seemed like an important context. While it was beyond the scope of this thesis to look further

than the family system to understand behaviour problems, a focus on the relationship between early individual and dyadic factors fitted with this view. The relative lack of research on fathers compared to mothers made this an interesting and current topic.

As one of the researchers visiting families in their homes for the 2-year data collection I was in the privileged position of witnessing first-hand the family context and dynamics. Part of the data collection involved doing SCID interviews with parents and collecting a 5 minute speech sample of parents talking about their child. Through this process I was given insight into the world of the family, not only seeing their homes and watching their interactions, but also talking to parents about difficulties and worries, hearing the range of beliefs about being a parent, and listening to the ways that parents understood their changing relationship with their child. Through these visits I had a taste of the richness and variety of family life with young children and the many influences on parent-child interactions. While I was not involved in data collection for the 3 month visit, I assume that a similar variety was present, with a large number of factors affecting parents' relationship with their new infant.

My involvement in the different stages of this research has given me an interesting and often frustrating insight into the challenges of converting complex, multi-layered family dynamics into discrete, quantifiable variables which can be used to compare with others and potentially predict outcomes. There are a number of key issues which stand out: the restrictions on the environment in order to standardise the research protocol and reduce confounding variables; the impact of the researcher on the process both in terms of the effect their presence has on parents and their own subjectivity in interpreting data; and the process of statistical analysis in reducing the complexity of human behaviour to a few numbers.

The first difficulty comes in the restrictions put on the interaction in terms of time and context. 2-3 minute interactions are inevitably not able to capture the richness of everyday interactions and must take place within a particular protocol designed to standardise methodology across participants. Parents are asked to interact with their child for a limited amount of time without the use of toys which they might usually use to stimulate the child. For the 3-month interactions, a car seat was originally used. For reasons described earlier, this was adapted to use a floor mat. This was an important adaptation which has previously been shown to make a difference to the likelihood of associating interactions with other variables (Ramchandani, et al., 2013) as fathers have more freedom to interact physically with their infant. For the 2-year interactions there was a static camera in the room so fathers had to keep their child in a small area and not play with any toys, a situation which was unlikely to mimic how parents typically interact with their children. For both interactions, only a brief time was used (2-3 minutes) and researchers had to make decisions about the best course of action if the infant/child was distressed (e.g. rescheduling the visit, continuing filming, cutting the interaction short). These restrictions were a necessary part of the research process but nevertheless impacted on the quality of the data. Reviews suggest that they can be minimised by filming in the family home as opposed to the laboratory and being non-directive in terms of tasks to complete during interactions (Gardner, 2000).

For both interactions parents were aware of being filmed and of the researchers' presence in their home. Some families asked us about our level of qualification or background, but many did not and were left with their own fantasies about how we might judge them or compare them with others. In these situations it is likely that there is a certain amount of observer reactivity, for example, parents may

be on their best behaviour or may have increased anxiety during the filming. In future studies, a longer interaction at the 2-year time point would be useful. While this would put an extra burden on coders, it may allow a greater range of behaviours to be displayed and may also allow some habituation to the camera, allowing a more natural interaction to take place. A related point here is the self-selecting nature of the sample. Parents were recruited from two maternity wards and were subsequently sent questionnaires. Those fathers who returned their questionnaires were older and more likely to have been present at the maternity ward than those who did not. It may also be that those who are willing to take part in research on fathers are more involved and have more positive beliefs about fatherhood. Therefore, while this type of recruitment is intended to produce a sample which is representative of the population from which it is drawn, there is often an underrepresentation of certain groups which makes generalisation more difficult.

The coding process adds another layer to the issues of translating interactions to quantifiable data, with two particular issues being the choice of codes to include and the subjectivity of the researcher in interpreting paternal behaviour.

The GRS was used to code the 3 month interactions. This had not previously been used with fathers and thus was not designed with the differences in mother-father play in mind. It is possible that the GRS was not able to pick up differences specific to paternal interactive style such as more tactile movement games and excitatory arousal. For example, Labrell (1994) describes the presence of ambiguous, unexpected paternal behaviours which interrupt the flow of interactions during father-infant play. Sethna (2009) designed a coding scheme (the Paternal-Physicality Affect and Touch Scale; P-PATS) specifically taking into account paternal behaviours which are not assessed within the GRS, for example, tactile stimulation

and excitatory arousal. This scheme identified differences in the way that depressed and non-depressed fathers interacted with their 3 month old infants which the GRS did not pick up. This highlights the importance of moving beyond the use of maternal measures to study fathers and considering ways in which a paternal interactive style can be more accurately measured.

As I was involved in developing the 2-year coding manual and coding the interactions I was able to see the issues around deciding which codes to use and the influence of researcher subjectivity. The concept of researcher reflexivity, whereby the researcher considers their effect on the process and outcomes of research, is an issue which is openly discussed in qualitative research but often not considered in quantitative studies. Nevertheless, the idea that, ‘...there is only interpretation. Nothing speaks for itself’ (Denzin, 1994) is certainly worthy of consideration in this context. Decisions had to be made about how many codes to use, with the particular issue of ensuring there were enough to pick up the range of variability in the data, but restricting them to a manageable amount in terms of time spent coding. Additionally, as the manual was based on a scheme used for coding maternal data, we had to decide what to add to ensure father-specific behaviours were represented. These decisions already introduced a certain amount of bias into the process, depending on the literature we were familiar with and what we understood to be important. At the stage of actually coding the interactions a researcher’s own biases enter the picture even more. How to decide whether a father should score a 4 or 5 for sensitivity? Did that moment of sternness represent lack of sensitivity or good boundary setting? Establishing inter-rater reliability involved many discussions about the possible meanings of parents’ actions and speech acts, as there were often discrepancies between coders due to subjective interpretations of interactions. These discussions

led to refinements of the descriptions of the codes, tightening up the scoring system and sometimes excluding a code where no meaningful agreement could be reached. Even after this, reliability was often still lower than we hoped, reflecting the fact that each individual's interpretation of the interaction they were witnessing is coloured by their own experiences and beliefs.

In terms of analysis, while statistical data reduction and summaries are a necessary part of the process of understanding longitudinal associations in large samples, there are inevitably losses along the way when individual variability is considered to be 'noise' and the number of potentially influential variables is too large to make a concise model.

Following coding, preliminary data analysis involved reducing the number of variables within the coding scheme. This procedure introduced some restrictions on which codes were used. In particular, variables which did not correlate with any other codes were excluded. This was part of the procedure of PCA as these variables are unlikely to weigh onto any underlying factor (Field, 2009). However, these excluded codes included physical interaction and aspects of touching which have previously been found to be important in paternal interactions (Sethna, 2009). The remaining codes were largely similar to those which have previously been devised and used in maternal data and the three factors which were extracted were not dissimilar to those found in the maternal literature. Therefore, it is possible that the paternal codes were picking up something distinctly different about fathers' behaviour which did not fit with the dimensions used in other studies. If this is the case, excluding them prevented us from examining whether they had predictive value for later child outcomes. This highlights issues in the decision making process during data preparation which can impact on subsequent analysis.

In the original design of this study it was intended to use structural equation modelling (SEM). SEM uses factor analysis and multiple regression procedures in a single method, combining a measurement model which analyses patterns of relations between observed variables and their underlying latent factor, and a regression model that analyses relations among underlying latent factors (Burkholder & Harlow, 2003). The use of latent variables differs conceptually from the factors extracted in PCA. SEM assumes that certain latent factors exist that exert causal influence on the observed variables. In contrast PCA is simply a variable reduction procedure. While SEM was ultimately not used due to the lack of correlations in the data, it is debatable whether a single latent variable would have been a useful way to represent the complexity of a father-child interaction, with only a single number representing the emotion, behaviour, speech and quality of a father playing with his 2-year-old child. However, this model would have had several advantages in terms of study design. The cross-lagged design intended would provide information about the strength of the temporal relationship between father-child interactions and child behaviour and allow examination of which variable is a stronger temporal variable of the other. In addition, the model would control for autoregressive paths i.e. longitudinal paths between variables measuring a similar construct. This type of model responds to some of the suggestions that researchers make about designing studies to establish longitudinal associations. For example, Pleck (2010) suggests using autoregression to identify the stable part of the outcome (e.g. associations between father-child interaction at 3 months and 2 years) and cross-lagged designs to look at direction of causality. However, there were very few correlations among the variables; the longitudinal hypotheses regarding autoregressive and cross-lagged correlations were not supported by the data and therefore the next step of applying a

SEM was not indicated. Although there were stronger associations when the file was split by gender, the sample size was too low to run a SEM analysis on boys only.

An additional issue in decisions about analysis is in choosing which confounding variables to use. In this study the decision was based both on previous research with this sample and also on epidemiological studies of risk factors for behavioural problems. However, it would have been possible to include many others variables e.g. marital functioning, antisocial traits, quantity of paternal involvement etc. which also have links to outcomes in the literature. Having too many covariates increases the likelihood of Type I error and introduces extra complexity into interpreting what associations may mean. Even in this study, the associations between 2 year interactions and some maternal variables left questions hanging as to what this may mean for wider family interactions. Researchers have to make decisions about where to focus and what to leave out in order to give a study clear aims and boundaries. This tension between including many contextual factors to make a realistic picture and leaving out important variables to reduce confusion is particularly evident in this study where so many factors may influence outcomes and much of the variance remains unexplained. In future studies it may be useful to include measures of the quantity of paternal involvement as well as the quality as a highly sensitive father may have little impact on child outcomes if his involvement is low. This is particularly relevant with recent changes to family dynamics meaning that fathers are both more involved than they have been in past decades (when they are resident) and also *less* involved (when living apart from their children) (Paquette, Coyl-Shepherd, & Newland, 2013).

In summary, from the everyday father-child interactions that take place in the privacy of the family home, to the brief filmed interactions during a research visit

and on through coding and data reduction lie a multitude of factors which may distort, misconstrue or influence the final number assigned to a father's level of engagement or sensitivity. While observed interactions in the home are certainly a preferred way to measure aspects of paternal involvement over questionnaires or maternal report, they nevertheless come with their own problems. Decisions made by researchers along the way are not only influenced by rational methods for selecting variables and procedures, but also by the researchers' own biases and background which are rarely made explicit in quantitative research.

The discussion so far has been on issues affecting the interpretation of observed interactions. Despite their problems, they remain the preferred way of measuring behaviour within families. In this study it was not possible to use observational measures for child behaviours and instead a parental report questionnaire was used. The CBCL is the most widely used questionnaire for assessing behaviour problems and has good reliability and validity. Nevertheless it suffers from issues with both parental report as a measure (biased reporting, social desirability etc.) and with questionnaires as a measure (ambiguity about question, no opportunity to clarify reasons behind answers). Therefore, characteristics of child behaviour are filtered through the lens of the parents before being subject to the restrictions of the measurement instrument and the reductions of statistical analysis. Some studies have shown low correlations between CBCL scores and observational measures of child behaviour (Stormshak, Speltz, DeKlyen, & Greenberg, 1997) with observations showing better predictive validity for key long-term outcomes such as arrest rates and being placed in care (Patterson & Forgatch, 1995). Future studies may therefore benefit from a more objective measure of child outcomes as has been

used in some studies looking at social outcomes (Feldman & Masalha, 2010; McElwain & Volling, 2004).

Many of the issues discussed here were also present in the studies which contributed to the literature review on father-child interactions and child outcomes. Some studies made adaptations to coding schemes while others used the same codes that had been used for mothers; some used brief structured observations while others filmed families during normal activities; some used maternal reports of child outcomes while others used either observations or psychometric tests carried out by researchers. These decisions would have impacted on the paternal behaviours observed and the associations found with child outcome. The heterogeneity among these studies highlights the complexity of designing research in this area and the variety of decisions that researchers make in measuring these variables.

While this appraisal may seem a little pessimistic in looking at the difficulties of capturing complex family dynamics through brief family visits and questionnaires, it is through understanding these difficulties and finding creative ways to overcome them that research can continue to move forward and find more robust ways of measuring these variables. The development of father-specific coding schemes and new statistical methods is a step in this direction. In addition, being more explicit about the influence of the researcher on the process may be an important future direction. While many studies are designed specifically to reduce these confounding influences, it is unhelpful not to acknowledge them or be clear about the ways they may impact on the data, including choices about the focus of the study, any variables which were not included and the reasons why, and the choice of measurement instrument. Furthermore, even within this messy data, patterns can emerge. For some families there were very clear difficulties in family dynamics which came out across

all forms of data collection, from questionnaires, speech samples and filmed interactions. These families numbered very few in our sample and stood out against the backdrop of families where there were low scores on the CBCL and high scores for interactions. Therefore, while these issues of measurement may mean that many individual differences are lost, key differences between families may be robust enough to persist and make useful contributions to the understanding of these complex family dynamics.

Through being involved with the different stages of this research I have gained invaluable insight into the challenges of finding ways to understand and measure the influence that fathers have on their young children. The issues involved in deciding both what to measure and how to measure it have highlighted how complex this area is and also how much of an impact those decisions may have on the outcome. This is particularly important to think about as, despite many null findings in research with fathers, including in this study, few would claim that fathers do not affect the outcomes for their children. Indeed, in my clinical work it is taken for granted when working with children across the age range that relationships with both parents have an impact on presentation and outcome. The challenge then comes in finding robust ways to demonstrate these relationships in research settings so that an evidence base is created which can inform policy, be used in targeted interventions for at-risk groups and further develop theory.

References

- Burkholder, G., & Harlow, L. (2003). An illustration of a longitudinal cross-lagged design for larger structural equation models. *Structural equation modelling, 10*(3), 465-486.
- Denzin, N. (1994). The art and politics of interpretation. In N. Denzin & Y. Lincoln (Eds.), *Handbook of qualitative research*. Thousand Oaks: Sage.
- Feldman, R., & Masalha, S. (2010). Parent-child and triadic antecedents of children's social competence: Cultural specificity, shared process. *Developmental Psychology, 46*(2), 455-467.
- Field, A. (2009). *Discovering statistics using SPSS* (3rd ed.). London: Sage.
- Gardner, F. (2000). Methodological issues in the direct observation of parent-child interaction: Do observational findings reflect the natural behaviour of participants? *Clinical Child and Family Psychology Review, 3*(3), 185-198.
- Labrell, F. (1994). A typical interaction behaviour between fathers and toddlers: Teasing. *Early Development and Parenting, 3*(2), 125-130.
- McElwain, N., & Volling, B. (2004). Attachment security and parental sensitivity during infancy: Associations with friendship quality and false-belief understanding at age 4. *Journal of Social and Personal Relationships, 21*(5), 639-667.
- Paquette, D., Coyl-Shepherd, D., & Newland, L. (2013). Fathers and development: New areas for exploration. *Early Child Development and Care, 183*(6), 735-745.
- Patterson, G., & Forgatch, M. (1995). Predicting future clinical adjustment from treatment outcome and process variables. *Psychological Assessment, 7*, 275-285.

- Pleck, J. (2010). Paternal involvement. In M. Lamb (Ed.), *The Role of the Father* (5th ed.). New Jersey: Wiley.
- Ramchandani, P., Domoney, J., Sethna, V., Psychogiou, L., Vlachos, H., & Murray, L. (2013). Do early father-infant interactions predict the onset of externalising behaviours in young children? Findings from a longitudinal cohort study. *Journal of Child Psychology and Psychiatry*, 54(1), 56-64.
- Sethna, V. (2009). *Father's role in infancy: Examining the influence of paternal depression in the postnatal period on early father-infant interactions*. University of Oxford.
- Stormshak, E., Speltz, M., DeKlyen, M., & Greenberg, M. (1997). Observed family interaction during clinical interviews: a comparison of families containing preschool boys with and without disruptive behaviour. *Journal of Abnormal Child Psychology*, 25, 345-357.

Appendices

Appendix 1. Ethics letter for Oxford Fathers Project



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27 June 2006

Dr Paul Ramchandani
Senior Research Fellow
University of Oxford
Department of Psychiatry
Warneford Hospital
Oxford
OX3 7JX

Dear Dr Ramchandani

Full title of study: Fathers and their children in the postnatal period.
REC reference number: 06/Q1604/63

Thank you for your letter of 16 June 2006, responding to the Committee's request for further information on the above research and submitting revised documentation.

The further information has been considered on behalf of the Committee by the Chair.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised.

Ethical review of research sites

The Committee has designated this study as exempt from site-specific assessment (SSA). There is no requirement for Local Research Ethics Committees to be informed or for site-specific assessment to be carried out at each site.

Conditions of approval

The favourable opinion is given provided that you comply with the conditions set out in the attached document. You are advised to study the conditions carefully.

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

<i>Document</i>	<i>Version</i>	<i>Date</i>
Application	5.1	29 March 2006
Investigator CV	Paul Ramchandani	28 March 2006
Protocol	v1	28 March 2006
Covering Letter		28 March 2006
Summary/Synopsis	Flowchart	

Letter from Sponsor	University of Oxford	03 April 2006
Letter from Sponsor	University of Oxford	31 March 2006
Peer Review		09 December 2005
Compensation Arrangements	Insurance letter	31 March 2006
Interview Schedules/Topic Guides	v1 (Questionnaire)	28 March 2006
Questionnaire	Dyadic	
Letter of invitation to participant	1 (Father present)	01 June 2006
Letter of invitation to participant	v1 (Non-present fathers)	28 March 2006
Letter of invitation to participant	2 (Non-present father)	16 June 2006
GP/Consultant Information Sheets	2 (with depression)	26 May 2006
GP/Consultant Information Sheets	2 (without depression)	26 May 2006
Participant Information Sheet:	2	15 June 2006
Participant Information Sheet: Initial Contact	2 (Initial contact)	30 May 2006
Participant Information Sheet: For nursery teachers	1	06 June 2006
Participant Information Sheet: For mothers	1	01 June 2006
Participant Consent Form: For nursery teachers	1	26 May 2006
Participant Consent Form: For mothers	1	26 May 2006
Participant Consent Form	v1 (Contact - Mother)	28 March 2006
Participant Consent Form:	2	26 May 2006
Participant Consent Form: Contact - Father	v2	30 May 2006
Response to Request for Further Information		16 June 2006
Outcome measures	v1	28 March 2006
Covering letter	Insurance	04 April 2006
Letter from Funder	Wellcome Trust	03 January 2006

Research governance approval

You should arrange for the R&D department at all relevant NHS care organisations to be notified that the research will be taking place, and provide a copy of the REC application, the protocol and this letter.

All researchers and research collaborators who will be participating in the research must obtain final research governance approval before commencing any research procedures. Where a substantive contract is not held with the care organisation, it may be necessary for an honorary contract to be issued before approval for the research can be given.

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees (July 2001) and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

06/Q1604/63

Please quote this number on all correspondence

With the Committee's best wishes for the success of this project,

Yours sincerely,



Dr Brian Shine
Chair

Appendix 2. Consent form for Oxford Fathers Project



University Department
Park Hospital
Oxford
OX3 7LQ

Tel:

CONSENT FORM **Oxfordshire Research Committee A**

OXFORD FATHERS PROJECT **Fathers and their children in the postnatal period**

- | | Please circle
Yes/no |
|---|-------------------------|
| Have you read the information sheet? | Yes / No |
| Have you had the opportunity to ask questions and discuss the study? | Yes / No |
| Have you received satisfactory answers to all of your questions? | Yes / No |
| Do you understand that you are free to withdraw from the study, at any time, without having to give a reason and without it affecting your future medical care | Yes / No |
| Do you agree to your GP being informed of your involvement in this study? | Yes / No |
| Do you agree to the audio-taping of our conversation? | Yes/No |
| Do you agree that words and phrases you say can be used anonymously in the presentation of this research | Yes / No |
| We would like to video-tape you and your baby playing. Do you agree to us videotaping you and your baby and to us keeping the video for the duration of this study? | Yes / No |
| Do you agree to take part in this study? | Yes / No |

..... YOUR NAME (FATHER) Signature Date
..... RESEARCHER'S NAME Signature Date

Appendix 3. Infant Behaviour Questionnaire



Your baby

We are interested to see how your baby has been behaving in certain situations in the **LAST WEEK**. Please read each question and indicate how often the baby did this during the **LAST WEEK** by circling one of the numbers.

1 Never	2 Very rarely	3 Less than half the time	4 About half the time	5 More than half the time	6 Almost always	7 Always	X Does not apply
------------	------------------	------------------------------	--------------------------	------------------------------	--------------------	-------------	---------------------

The “does not apply” column is used when you did not see your baby in that situation. “Never” should be circled if you did see your baby in that situations but the baby never engaged in the behaviour.

Please **circle** a number for every item.

Feeding									
When having to wait for food or liquids during the last week, how often did your baby:									
1	Seem not bothered	1	2	3	4	5	6	7	X
2	Show mild fussing	1	2	3	4	5	6	7	X
3	Cry loudly	1	2	3	4	5	6	7	X
During feeding, how often did your baby:									
4	Lie or sit quietly?	1	2	3	4	5	6	7	X
5	Squirm or kick?	1	2	3	4	5	6	7	X
6	Wave arms?	1	2	3	4	5	6	7	X
7	Fuss or cry?	1	2	3	4	5	6	7	X
When given a new food or liquid, how often did your baby:									
8	Accept it immediately?	1	2	3	4	5	6	7	X
9	Reject it by spitting out, closing mouth etc.?	1	2	3	4	5	6	7	X
10	Not accept it no matter how many times it was offered?	1	2	3	4	5	6	7	X
Sleeping									
Before falling asleep at night during the last week, how often did your baby:									

11	Show no fussing or crying	1	2	3	4	5	6	7	X
During sleep how often did your baby:									
12	Toss about?	1	2	3	4	5	6	7	X
13	Move from the middle of the cot to the end of the cot?	1	2	3	4	5	6	7	X
14	Sleep in one position only?	1	2	3	4	5	6	7	X
On waking, how often did your baby:									
15	Fuss or cry immediately?	1	2	3	4	5	6	7	X
16	Lie quietly in his/her cot?	1	2	3	4	5	6	7	X
17	Coo or "talk"?	1	2	3	4	5	6	7	X
18	Cry within a few minutes?	1	2	3	4	5	6	7	X
How often did your baby?									
19	Seem angry if left in his/her cot?	1	2	3	4	5	6	7	X
20	Seem happy if left in his/her cot?	1	2	3	4	5	6	7	X
21	Cry or fuss before going to sleep?	1	2	3	4	5	6	7	X
Bathing and dressing									
When being dressed or undressed, during the last week, how often did your baby:									
22	Wave his/her arms and kick?	1	2	3	4	5	6	7	X
23	Squirm?	1	2	3	4	5	6	7	X
24	Smile or laugh?	1	2	3	4	5	6	7	X
When put into the bath how often did your baby:									
25	Startle?	1	2	3	4	5	6	7	X
26	Smile?	1	2	3	4	5	6	7	X
27	Splash or kick?	1	2	3	4	5	6	7	X
28	Look surprised?	1	2	3	4	5	6	7	X
When placed in an infant seat or car seat, how often did your baby:									
29	Wave arms and kick?	1	2	3	4	5	6	7	X
30	Squirm and turn body?	1	2	3	4	5	6	7	X
31	Lie or sit quietly?	1	2	3	4	5	6	7	X

32	Show distress at first then quiet down?	1	2	3	4	5	6	7	X
When you returned from having been away, and your baby was awake, how often did s/he:									
33	Smile or laugh?	1	2	3	4	5	6	7	X
When introduced to a strange person, how often did your baby:									
34	Refuse to go to the stranger?	1	2	3	4	5	6	7	X
35	Never "warm up" to the stranger?	1	2	3	4	5	6	7	X
36	Smile?	1	2	3	4	5	6	7	X
Soothing techniques									
Have you tried any of the following soothing techniques in the last two weeks? If so, how often did the method soothe your baby? Circle X if you did not try the technique in the LAST TWO WEEKS									
37	Rocking	1	2	3	4	5	6	7	X
38	Holding	1	2	3	4	5	6	7	X
39	Singing or talking	1	2	3	4	5	6	7	X
40	Walking with your baby	1	2	3	4	5	6	7	X
41	Giving the baby a toy	1	2	3	4	5	6	7	X
42	Showing the baby something to look at	1	2	3	4	5	6	7	X
43	Patting or gently rubbing some part of your baby's body	1	2	3	4	5	6	7	X
44	Offering food or liquid	1	2	3	4	5	6	7	X
45	Offering baby his/her dummy or security object	1	2	3	4	5	6	7	X
46	Changing your baby's position	1	2	3	4	5	6	7	X
47	Other	1	2	3	4	5	6	7	X

In a typical week how many times would **you** do the following?

Bath your child _____
 Feed your child _____
 Change your child's nappy _____
 Take sole responsibility for your child _____

How many hours per week would you say that **you** take sole responsibility for your child?

Appendix 4. Global Rating Scales

Global Rating Scales

Father						
Warm/positive	5	4	3	2	1	Cold/Hostile
Accepting	5	4	3	2	1	Rejecting
Responsive	5	4	3	2	1	Unresponsive
Non-demanding	5	4	3	2	1	Demanding
Sensitive	5	4	3	2	1	Insensitive
Non-intrusive behaviour	5	4	3	2	1	Intrusive behaviour
Non-intrusive speech	5	4	3	2	1	Intrusive speech
Non-remote	5	4	3	2	1	Remote
Non-silent	5	4	3	2	1	Silent
Happy	5	4	3	2	1	Sad
Much energy	5	4	3	2	1	Low energy
Absorbed in infant	5	4	3	2	1	Self-absorbed
Relaxed	5	4	3	2	1	Tense

Infant						
Attentive	5	4	3	2	1	Avoidant
Active communication	5	4	3	2	1	No active communication
Positive vocalisations	5	4	3	2	1	No positive vocalisations
Engaged with environment	5	4	3	2	1	Self-absorbed
Lively	5	4	3	2	1	Inert
Happy	5	4	3	2	1	Distressed
Non-fretful	5	4	3	2	1	Fretful

Interaction						
Smooth/easy	5	4	3	2	1	Difficult
Fun	5	4	3	2	1	Serious
Mutually satisfying	5	4	3	2	1	Unsatisfying
Much engagement	5	4	3	2	1	Self-absorbed
Excited engagement	5	4	3	2	1	No engagement
Happy	5	4	3	2	1	Quiet engagement

Appendix 5. Child Behaviour Checklist

This appendix has been removed for copyright purposes

Appendix 6. Coding manual for 2 year interactions

ID:

CODER:

	Free play	Play session
PATERNAL RATINGS		
Sensitivity (1-5)		
Following child's attention (1-5)		
Withdrawal (1-5)		
Intrusions (1-3)		
Educational references (1-3)		
Elaboration (1-3)		
Strong verbal control (1-5)		
Facilitating child's attention (1-3) or 99		
Father's pos. expressed emotion		
Father's neg. expressed emotion		
Warmth (1-5)		
Direct warm touching (1-5)		
Emotional tone (1-5)		
Self-referential/helplessness		
Anxiety (1-5)		
Paternal attention (1-5)		
Physical interaction (1-3)		
Instrumental touching (1-5)		
Imitation of the child		
Acknowledgement of the child as a separate agent		
Cognitive state comments		
Emotional processes		
Physiological state comments		
CHILD RATINGS		
Child's emotional tone (1-5)		
Child's disregard (1-5)		
Referencing (1-3)		
Withdrawal (1-5)		
Off task behaviour (1-5)		
Imitation of the father		
JOINT RATINGS		
Reciprocity and synchronicity (1-5)		
Conflictuous behaviour (1-5)		

Guide to Manual

This coding scheme was developed to analyse interactions between fathers and their 2 year old children. The interactions on which the scheme is based were filmed in the home using two scenarios.

For the first part of the interaction fathers were instructed to play with the child on a blanket for 2 minutes without any toys. Fathers were asked to keep the child on the blanket as this is where the camera was focussed.

For the second part of the interaction the father was given a book and told to share it with the child for 5 minutes, again remaining on the blanket.

Fathers were scored on each item for both the free play session and the book interaction.

For some codes, examples are given from the original interactions. Where this is the case the ID of the participant is given e.g. 5678.

There are 3 types of scale within the coding scheme: a 3 point scale, a 5 point scale, and an event count.

For the majority of items, higher scores reflect better outcomes. This is not the case for items 4, 7, 10 and 16 in the paternal codes.

PATERNAL CODES

1) Sensitivity

Overall, how sensitive is the father towards the child's needs? This includes both *Emotional* and *Attentional* sensitivity, and involves acceptance, warmth, and responsiveness.

How aware is the father of his child's needs and what they require? Does he pick up on the verbal/ non-verbal cues? Does the father acknowledge the child's emotional state and respond to it? Is there any evidence of criticism or intrusiveness?

- 1- Father is not at all sensitive to child's needs
- 2- Father is sometimes sensitive to child's needs
- 3- Father is sensitive to child's needs at least 50% of the time
- 4- Father is sensitive to child's needs the majority of the time
- 5- Father is sensitive to every one of his child's needs

Example: ID5902

2) Following of child's attention

Does the father follow the child's attention? Does he notice if the child's attention is elsewhere during play or if they become distracted by something else?

- 1- Father is not at all aware of child's attention
- 2- Father is sometimes aware of child's attention
- 3- Father is aware of the child's attention at least 50% of the time
- 4- Father is aware of the child's attention the majority of the time
- 5- Father is always aware of the child's attention

3) Withdrawal

Is there a lack of engagement or paternal responsiveness with the child? Father may appear quiet and detached, behaving as an 'observer' in the interaction, and may seem lost in his own thoughts with few attempts to gain the child's interest. When the father responds to the child is his response delayed or dulled? Is his emotional tone lower than that of the child? If the child is withdrawn does the father try to animate and/or engage the child in the interaction?

- 1- Father is very withdrawn and is not at all responsive to his child. Does not acknowledge child's vocalisations or behaviours and makes few or no attempts at physical contact.
- 2- Father is withdrawn from interacting with his child the majority of the time, but there are a few instances where he does interact and engage with his child
- 3- Father is withdrawn for approximately half of the session
- 4- Father interacts and engages with the child throughout most of the session, responding to the child's behaviours and vocalisations, and initiating/participating in activities, but there are brief occasions when he becomes withdrawn and non-responsive
- 5- Father is always attentive and responsive and at no time during the session does he emotionally or physically withdraw from the child.

Examples: ID8215 (Free play), ID7265 (Free play)

4) Intrusions

Intrusions occur when the father inappropriately cuts across a child's activity and takes over or disrupts that activity, sometimes by being very directive in the play. It is usually a behavioural action, but can also take the form of a very *forceful vocal action*, and can include cutting across the infant's communication. Interruption and distraction of the child's activity can also be included. Examples include abruptly moving the child's hand away from book or continuing to tickle the child when he/she seems upset and is pushing father's hand away.

- 1- Not at all
- 2- Sometimes (Up to 4 times)
- 3- Frequently

Example: ID5691 (Free play & Play session)

5) Educational references

Does the father introduce a specific educational learning component into the interactions by asking questions which tend to elicit a response from the child? E.g. how many animals do we have here? Which one is the cow? Where is the ladder? What sound does this animal make?

- 1- Father does not specifically introduce any educational learning component into the dyad's interaction
- 2- Father makes a few educationally specific references during the interaction (up to 4)
- 3- Father is frequently making specific comments and asking questions that contain distinctly learning content

6) Elaboration

Elaboration entails the use of questions and statements that add new information to the narrative. The new information must be added to something that the child has already said. Open-ended and closed (yes/no) questions can be coded as elaboration if they introduce new information (Fivush, Reese, and Haden, 2006).

Examples

Father: 'What's that?'

Child: 'Shark'

Father: 'It's a big blue shark'.

Father: 'What's under here?'

Child: 'Star'

Father: 'Yes it's a yellow star'

- 1- Father does not specifically use elaboration in the dyad's interaction
- 2- Father uses elaboration up to 4 times
- 3- Father is frequently using elaboration in the dyad's interaction

7) Strong control

Does the father use strong verbal control by ordering the child to do something? E.g. 'Put the ladder there!', 'Come here!' Does he use behavioural control e.g. aggressively bringing the child back to the play area? The key feature is that it is a command, not a suggestion. It is usually accompanied by negative facial expressions and a firm tone of voice.

- 1- Father does not use strong verbal control
- 2- Father sometimes uses strong verbal control (1 to 2 times)
- 3- Father uses strong verbal control half the time (3 to 5 times)
- 4- Father uses strong verbal control the majority of the time (6 to 8 times)
- 5- Father consistently uses strong verbal control throughout the session.

Examples: ID6969 (play session), 6679 (play session)

8) Facilitating child's attention verbally/ non verbally

This involves encouragement of the child's attention (verbal & non-verbal). How well can the father keep his child's attention on a specific toy or task and help the child to stay focused? Does the father generally facilitate his child's attention (whether successful or not)?

If the child is reluctant to play but not off task then father's attempts to play and engage the child in the interaction count as facilitation. (e.g. 6758 FP)

- 1- Father never attempts to facilitate the child's attention and get it back on task
- 2- Father makes a few attempts to facilitate the child's attention
- 3- Father frequently attempts to facilitate the child's attention and keep it on task.

88. There is no need for facilitation as the child is attentive throughout the interaction.

9) Father's positive expressed emotion

Verbal

Any positive, affectionate or complimentary comment made by the father towards the child's action or person. This must be a positive statement, e.g. 'There's a clever girl' (action) or 'You are so beautiful' (person)

Vocal non-words

Any positive, affectionate or affirming noise/intonation made by the father towards the child e.g. 'Yeah!', 'Yay', 'Uh-huh' with positive intonation, laughter

Non-verbal

Any positive, affectionate or affirming expression made by the father towards the child, e.g. smiling, laughing, nodding, clapping etc.

EVENT COUNT

10) Father's negative expressed emotion

Verbal

Any critical, negative, derogatory comments made by father towards the child's action or person, e.g. 'That was a very clumsy way of doing that' (action) or 'You are so stupid' (person)

Vocal non-words

Any critical or negative noise/intonation made by father towards the child, e.g. 'Tsk tsk', 'Uh-uh', 'ooh' with negative intonation.

Non-verbal

Any critical or negative expression made by the father towards the child, e.g. shaking head, frowning, sighing, swat of hand.

Examples: ID 6244 (Play session)

EVENT COUNT

11) Warmth

This captures the father's display of affectionate warmth to his child throughout the session. Positive regard and emotional support are included. Do the father's face and tone express affection and endearment? Is he critical towards the child? Does he appear emotionally disengaged?

- 1- Father is not warm or affectionate to his child. He may be critical and appear cold and unaffectionate throughout the interaction.
- 2- Father is briefly warm and affectionate
- 3- Father is intermittently warm to his child (half the time). There is only moderate affection and the father may occasionally appear critical or withdrawn
- 4- Father is frequently affectionate and warm to his child but there are few periods of lack of warmth or neutral emotion
- 5- Father is warm and affectionate to his child throughout most of the session. His face and tone of voice constantly express affection towards the child.

12) Imitation of the child

When the father directly imitates:

The child's vocalisations and utterances (words, statements or noises. The father might not repeat the exact sentence/words of the child but he might imitate his/her voice.)

The child's facial expressions, e.g. imitates child smiling or an expression of surprise etc.

The child's non-verbal actions (gestures or body movements).

EVENT COUNT

13) Direct Emotional/Warm Touching

How frequently does the father demonstrate warmth, caring, and affection through touch? E.g. father stroking the child's cheek, giving the child a cuddle, tickling, etc.

- 1- Dyad does not touch at all
- 2- Dyad touches a few brief times (~4 times)
- 3- Dyad touch intermittently (5 to 7 times)
- 4- Dyad touches frequently (8 to 10 times)
- 5- Dyad touches throughout the session

14) Emotional tone

This measures the father's expressed happiness/unhappiness as demonstrated in his vocalisations, facial expressions and animated behavioural responses

- 1- Father seems unhappy, negative or irritable throughout most of the session
- 2- Father seems generally unhappy but there are one or two happier or more neutral occurrences during the session
- 3- Father appears to be relatively happy but in a subdued and muted way. Fathers may look intermittently preoccupied without seemingly actually sad, or shows a mixture of happy/unhappy episodes
- 4- Father appears happy but may not be as overtly expressive of his mood as in a 5 rating. Fathers who are not very vocally expressive but who appear perfectly happy may be coded here.
- 5- Father seems very happy, expressed vocally, through smiles and animated responses to his child throughout the session.

15) Anxiety

This assesses expressed anxiety of the father. It can be behavioural or verbal expressed anxiety and may include jumpy movements, nervous laughter, speaking very quickly, or several glances at the camera. Overall, does the father appear uncomfortable and not at ease in the interaction?

- 1- Father seems very anxious, (anxious behaviours such as touching his hair, biting his lips, etc.) throughout most of the session
- 2- Father seems generally anxious but there are one or two neutral occurrences during the session
- 3- Father is displaying anxious behaviours for around half of the session
- 4- Father is generally not anxious but he may display one or two occurrences of anxious behaviour.
- 5- Father does not display any anxious behaviours throughout the session

Example: ID 5455 (free play)

16) Self-referential/helplessness

Does the father make any negative comments specific to his performance or to difficulties experienced during play? This includes negative self-evaluation of

failure, helplessness and lack of control of the infant's behaviour (if distressed or avoidant).

Examples:

600949 FP 'I'm struggling to play with you'

600318 FP 'This isn't going to look very good, is it?'

EVENT COUNT

17) Paternal attention

This rates the number of times the father looks away from his child or the task (distractibility, sustained attention) and focuses on something else/goes off task. Is the father able to stay focused during the interaction with constant gaze towards the child or does his attention wander away from the interaction? The father is not scored negatively if he is distracted by a sound or a person external to the interaction.

- 1- Father rarely/never focuses on the child.
- 2- Father sometimes focuses on the child.
- 3- Father focuses on the child for half of the session
- 4- Father focuses on the child for most of the session (1-2 looks away)
- 5- Father focuses on the child throughout the session

Examples: ID5455, ID6244

18) Physical interaction during play

E.g. father picking the child up, swaying or swinging the child etc. It is an excited kind of physical interaction which is part of the play.

- 1- No physical interaction between father and child during play.
- 2- The interaction between father and child involves some physical interaction (a few episodes)
- 3- Father physically interacts with child throughout the play.

Example: ID5691

19) Instrumental touching

This measures the frequency of father-child contact for non-emotive, mechanical reasons. I.e. how often do the father and child physically contact in a purposeful manner? Touch can either be initiated by the father or the child, e.g. moving the child, holding the child on the lap to prevent the child from moving off of the rug; child reaches for father to steady himself as they are attempting to walk.

- 1- Dyad does not touch at all
- 2- Dyad touches a few brief times (~4 times)
- 3- Dyad touch intermittently (5-7 times)
- 4- Dyad touches frequently throughout most of the session (7-10 times)
- 5- Dyad touches throughout the session

21) Acknowledgement of Child as a separate agent.

The father ascribes a mental state to the child and treats the child as a mental agent, i.e. to understand the infant's will, imagination, wishes, desires, emotions, thoughts, feelings and attitudes. It is through this capacity that parents treat their child as a mental agent.

Cognitive state

The father may comment on the child's thought processes, memory intentions, and imagination. He may refer to the child's wants, wishes, desires, needs and beliefs.

Examples: 'You didn't want to see the fireworks, did you?', 'I think you probably remember Josh's more than you remember yours', 'And you thought he was very scary, didn't you?'

Emotional state

The father may comment on the child's emotional temperament, emotional state, emotional experience of feelings. More specifically, he may make comments referring to happiness, irritability, sadness, excitement, etc.

Examples: 'You're alright?' (ID 5729. 0.14), 'You're not bothered' (ID 5377), 'You've had enough' (ID 8139)
'Does it scare you Eddy?' (ID 5401)

Physiological state

The father may comment on the child's physiological state such as hunger, thirst, tiredness, boredom, satisfaction, etc.

Examples: 'It was painful but you didn't feel that painful', 'You were feeling poorly last week when you got your injections'

Examples: 'Are you getting tired?' (ID 6305)

EVENT COUNT

CHILD CODES

1) Child's emotional tone

This measures the child's expressed happiness/unhappiness as demonstrated in his/her vocalisations (laughs, excited vocal utterances), facial/body expressions and animated behavioural responses.

- 1- Child seems very unhappy during the whole session; gets upset; cries and fusses for most of the session; strong protest
- 2- Child is rather unhappy and whining/fussy/short verbal protests but responds happily to encouragement
- 3- Child appears to be neither happy nor unhappy, not demonstrating much emotion at all, somewhat flat affect or may have equal **mix of** happy and unhappy emotional displays
- 4- Child smiles and vocalises positively for half of the time, appears to be primarily in a happy state, smiles, happy vocalisations dominate but there may be some short periods of more neutral mood or brief moments of upset.
- 5- Child appears to be very happy, excited, animated and is expressively happy both vocally and in facial expression. Child is never upset.

Example: ID8230 (Play session)

2) Child's disregard of interaction attempts

Does the child ignore the father's attempts to interact? This is measured throughout the interaction when the child is on task but also when the child goes off task and the father tries to get him/her back on task.

- 1- Child ignores all father's attempts to interact
- 2- Child ignores almost all father's attempts to interact (6-8 times)
- 3- Child ignores father's attempts to interact several times (3-5 times)
- 4- Child ignores father's attempts to interact once or twice
- 5- Child does not ignore father's attempts to interact at all

3) Referencing

If the child is engaged with a toy or game do they stop playing and address the father in relation to the play?

Non-verbal examples in book interaction: ID 5936, ID 6305

It can be either verbal or non-verbal.

- 1- Child never does it
- 2- Sometimes (Up to 4 times)
- 3- Frequently. Throughout the interaction.

4) Imitation of the father

When the child directly imitates:

The father's vocalisations and utterances (words, statements or noises including intonation);

The father's facial expressions e.g. smiling or an expression of surprise etc;

The father's non-verbal actions (gestures or body movements).

EVENT COUNT

5) Withdrawal

This measures the child's lack of engagement and responsiveness with the father or the surroundings. Does the child appear quiet and detached, behaving as an 'observer' in the interaction? Does the child respond to the father's attempts to interact? The child might play with the toys happily but may appear lost in his/her own thoughts.

- 1- Child is very withdrawn and is not at all responsive to her/his father or toys
- 2- Child is withdrawn from interacting with her/his father or toys the majority of the time, but there are a few instances where she/he does interact and engage with his/her father or toys
- 3- Child is withdrawn for around half of the session
- 4- Child interacts and engages with the father or toys throughout most of the session, but there are brief occasions where he/she becomes withdrawn and non responsive
- 5- Child is always attentive and responsive and at no time during the session does she/he emotionally withdraw from her/his father or surroundings.

6) Off task behaviour

This assesses the number of times the child goes off task during the interaction. This includes:

Leaving the play area to do something else;

Getting distracted during the interaction for at least 2-3 seconds. This might include talking about something else or pointing at something else.

NB. If the child is momentarily distracted by the researcher or mother in the room, this would not be included as 'off task'.

- 1- Child is persistently distracted and/or is seldom in the play area.
- 2- One or two instances of being able to play without going to do something else
- 3- Child is there and engaged approximately half the time.
- 4- Child goes off task once or twice during the interaction for short periods.
- 5- Child consistently plays in a continuous manner

JOINT CODES

1) Reciprocity and Synchronicity

This refers to the extent of *mutual interchange* (e.g. laugh together) between father and child. Child's input is received and responded to by father and vice versa. Specifically, the degree of joint *orientation and coordination* of the actions between father and child is rated. Shared coordination and *turn taking* (level of participation-passiveness) is of primary interest. Does the father try and synchronise his play with the child's pace and mood etc?

- 1- Hardly any reciprocity is observed; there is no turn taking or communication. Father and child engage in different things at any given time and shared coordination is hardly ever observed. Father does not synchronise play with child at all
- 2- Reciprocal interaction rarely occurs. Only occasionally do father and child incorporate the other's interactions or suggestions, and there is little turn taking. It is rare that father and infant are manipulating the same aspect of a task or that they are coordinating their efforts. Father sometimes synchronises play with child.
- 3- Moderately half of the session is characterised by reciprocal interaction. Father synchronises play with child 50% of the time.
- 4- Much of the session is characterised by reciprocal interaction. Most of the exchanges are mutual and characterised by turn taking. There is joint engagement. The majority of the father's play is synchronised with the child.
- 5- Very much of the session is characterised by reciprocal interaction. Exchanges are mutual, finely tuned, coordinated and smooth throughout. All of the father's play is synchronised with the child.

2) Conflictuous behaviour

The climate of the father-child interaction: do they present with a smooth relationship during their interaction? Do they disagree on how to play? How do they get along?

Does the child get upset with something that the father does or vice versa?

- 1- All the time
- 2- Most of the time
- 3- Half of the time
- 4- Few episodes
- 5- No conflict

Example: ID8230 (Free play)