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PRESCHOOL CHILDREN AND BEHAVIOUR PROBLEMS
A prospective study

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Abstract

Toddler/child behaviour problems have received relatively little previous attention. Prior studies have implicated a wide variety of factors in the aetiology of child behaviour problems but many of these factors are correlated and little is known about their independent contributions. Four broad categories of factors have been associated with child behaviour problems: (1) maternal social and economic characteristics; (2) maternal lifestyle; (3) maternal mental state/child-rearing practices; and (4) maternal and child physical health. The study took a sample of 5296 families from the Mater-University of Queensland Study of Pregnancy (MUSP) for whom 5-year prospective data are available. The major predictors of toddler behaviour problems were the mother's and child's health, and the mother's mental state. The mother's sociostructural characteristics and lifestyle made little or no additional contribution to the prediction models. It is, however, salutary to note that the majority of children who are classified as having high levels of troublesome behaviour do not fall into any of the risk categories. A variety of explanations and interpretations of the data is considered.

Keywords: child behaviour problems, child's health, mental health, mother's health, mother's lifestyle, preschool children

Child mental health problems are reflected by a variety of categories of behaviour problems. Such problems are usually identified when they result in distress to either the child or others (Zubrick et al., 1995). It is usual that information about child mental health is sought from teachers and care-givers, and that these respondents' perceptions of children and their behaviours form the basis of mental health assessments. There is growing consensus that behaviour disorders (mental health problems) are apparent in early childhood, and that they often persist into adulthood – particularly those associated with aggressive/externalizing behaviour (Campbell and Ewing, 1990; Egeland et al., 1990; Richman et al, 1982).

A variety of child- and family-related factors have been implicated in the aetiology and maintenance of disordered behaviour in early childhood. Sociologists and public health researchers have concentrated their efforts on the mother's social circumstances (socioeconomic and marital status, mother's lifestyle), while psychologists have had a greater interest in the mother's marital relationships, her mental health and pattern of parenting. Other researchers have focused upon the mother's (or child's) health as a cause of child behaviour problems. While many associations have been observed, there remains a need to determine which of these represent primary effects, that is likely causes or predictors of child behaviour problems, and distinguish them from those which are arguably correlated with the primary effects but of secondary importance. There are no previous studies which examine the combined impact of the wide variety of factors which have been individually implicated in previous studies.

This article examines the behaviour problems manifested by preschool children. It considers the extent to which these behaviour problems appear to be a consequence of (1) the mother's location in the social structure; (2) the mother's lifestyle; (3) the social environment of the child; and (4) biological/physiological aspects of the pregnancy and birth. A large prospective cohort study design is used to determine the contribution of these factors to the preschool child's mental health status.

Social structure

A variety of sociodemographic factors have been implicated in the aetiology of child behaviour problems. Children described as behaviourally problematic are more likely to come from families of lower socioeconomic status (SES). Low family SES may be especially salient in both the early onset of serious conduct disordered behaviour (Offord et al., 1991), and the maintenance of chronic and serious antisocial behaviour (Farrington, 1995; Werner and Smith, 1980). Low family SES is consistently correlated with a range of risk factors for development and maintenance of child behaviour problems including early onset maternal pregnancy, perinatal complications, large family size, family discord and parental psychopathology (Eron et al., 1997; Offord et al., 1989). Typically, when key family correlates of SES are con-trolled, SES shows a much reduced role in accounting for externalizing problems for both preschool and school-age children (Robins, 1978). The effects of low SES may be mediated by associated adverse family factors such as inconsistent parenting and family instability (Elder and Caspi, 1988).

Maternal lifestyle

In examining the impact of maternal health and lifestyle on the development and behaviour of offspring, cigarette smoking and other forms of substance use or abuse (e.g. alcohol) during pregnancy may constitute both a pre- and perinatal risk factor for developmental and behavioural problems. For example, cigarette smoking during pregnancy potentiates the occurrence of other perinatal risk factors such as prematurity and low birth weight (Abel, 1984; DiFranza and Lew, 1995; English and Eskenazi, 1992). It is believed to con-tribute to adverse reproductive outcomes primarily through fetal hypoxia, and may also have direct effects on the developing fetus (Hagino and Lee, 1985; van de Kamp and Collins, 1994). Research on human neonates suggests an association between maternal smoking during pregnancy and increased rates of a variety of neurobehavioural difficulties (Fried and Makin, 1987; Fried et al., 1987; Jacobson et al., 1984), all of which may have relevance to temperamental differences observed from early infancy.

In addition to research illustrating neurophysiological deficits, a number of studies have found an association between maternal smoking during pregnancy and a higher incidence of reported conduct problems in offspring children (e.g. Fergusson et al., 1993; Makin et al., 1991; Weitzman et al., 1992). Several studies have linked maternal smoking in pregnancy with heightened rates of inattention, impulsivity and motor hyperactivity in off-spring during childhood (e.g. Fergusson et al., 1993; Fried et al., 1992; Naeye and Peters, 1984). This suggests that prenatal maternal smoking may be particularly salient as a risk factor for the development of ADHD. However, these studies have not adequately controlled for factors such as socio-economic status, parental psychosocial adjustment and parent–child interaction.

Social environment of child

Maternal mental state

A functional relationship between parental dyadic adjustment and childhood behaviour problems is well established in the literature. Children in families characterized by dyadic instability and conflict consistently demonstrate significantly higher rates of both internalizing and externalizing behaviour problems (Dadds et al., 1987; Emery, 1982; Gottman and Katz, 1989; Grych and Fincham, 1990; Long et al., 1987).

Although dyadic instability and conflict may engender direct effects in the development of

childhood aggression and antisocial behaviour (e.g. learning of aggressive and coercive behaviour), the overall pattern of results suggests that dyadic discord and dissolution represent only modest predictors of chronic behavioural problems (Kazdin, 1987). Rather, evidence suggests that dyadic discord and dissolution impact most strongly by way of their direct effects on parental adjustment (e.g. maternal depression) and parent–child interaction (e.g. inconsistent or dysfunctional parenting).

Consequences of maternal marital conflict such as depression (Fergus-son et al., 1985; Richman et al., 1982) and anxiety (Bates and Bayles, 1984) have consistently been linked with both maternal and independent observer ratings of problem child behaviour in clinical samples. Children of depressed or anxious mothers appear to be at higher risk for a number of behaviour problems including antisocial, acting-out and withdrawal problems, emotional problems and self-control, poor concentration and cognitive deficits, psychiatric problems and poor school adjustment (Grunebaum et al., 1978; Hammen et al., 1987; Weissman et al., 1984). Additionally, research examining the interaction of indices of maternal depression with maternal perceptions of child adjustment in clinic families has consistently demonstrated that mothers reporting higher levels of depression perceive their children as less well adjusted and more problematic (e.g. Brody et al., 1988; Freidlander et al., 1986; Panaccione and Wahler, 1986). These mothers also appear to interact differently with their children, engaging in significantly higher levels of aversive and coercive parenting behaviour than their non-depressed counterparts (Pannaccione and Wahler, 1986).

Parenting and discipline practices

Research examining family correlates and predictors of problem disordered behaviour in childhood typically point to aspects of the parent–child relationship (e.g. Eron et al., 1991) or to specific aspects of parents' management style and discipline practices (e.g. Patterson et al., 1989). Indeed, there is growing consensus that family disruption or adversity, in the form of maternal depression, marital discord, divorce or other stresses have their major impact on child behaviour indirectly because they disrupt parenting (Belsky, 1984; Hetherington et al., 1989; Snyder, 1991).

In particular, the *quality* of parent–child and family relationships have been implicated as a risk factor for the development of behavioural problems in children. Parents of children with behaviour problems show lower levels of acceptance of the child, and of warmth and affection and report lower levels of attachment and positive feelings than do parents of non-problematic children (Loeber and Dishion, 1983). In particular, a lack of warmth and engagement coupled with negative maternal control appear particularly important as predictors of later non-compliant/aggressive behaviour in young children (Bates and Bayles, 1984; Campbell et al., 1991; Shaw et al., 1994). Parental disciplinary practices characterized by a combination of warmth, firm, but apparently fair control, and the use of explanations and reasoning are associated with child behavioural compliance (Crockenberg and Litman, 1990; Kuczynski et al., 1987). Maccoby (1980: 29) highlights the importance of parental contributions to the child's developing sense of identity in promoting coherence in the child's self-concept, and suggests that a coherent self-concept may function as a means of keeping the child on a relatively steady course, producing consistencies in behaviour in the long-term. Thus, the nature of parent–child interactions may assist in setting a particular trajectory of child behaviour as a consequence of the kind of self-concept the child develops. Song and Hattie (1984) developed a conceptual model of home environment based on various studies that investigated the relative importance of family structure, social status and family psycho-logical characterisitics in the formation of child self-concept. They found that family psychological characteristics such as parental evaluations, interests and expectations, as those aspects which impact most directly and profoundly.

In examining reciprocal effects, research findings show that difficult children more often elicit inconsistent and aversive parenting behaviour from their mothers. For example,

mothers with hyperactive, aggressive or non-compliant children have been shown to be less patient, more power assertive and less consistent (Patterson, 1980; Patterson et al., 1989). Mothers of preschool-age children rated as being more difficult or having more behavioural problems cite their interactions as less positive, more negative and more conflict ridden than do comparison mothers (Barron and Earls, 1984; Richman et al., 1982).

Biological/physiological factors

Maternal and infant health

Prospective studies from infancy have examined a range of biological (i.e. perinatal) risk factors such as low birth weight, anoxia, prematurity and other birth complications as predictors of later developmental and behavioural problems in children. Several studies have linked prematurity (e.g. Rose et al., 1992) and very low birth weight (e.g. McGee et al., 1984; Minde et al., 1989; Szatmari et al., 1990) with somewhat higher rates of attentional and behavioural problems in both preschool and school-age children. However in many of these studies, elevated levels of hyperactivity, attention and behaviour problems are typically accounted for by intervening variables such as developmental delay and aspects of the family environment (McGee et al., 1984; Minde et al., 1989; Szatmari et al., 1990).

Temperament has been investigated as an aetiological factor in child behaviour problems. This term has been used to describe the intensity of particular moods, the susceptibility to emotional situations and the strength and speed of response (Allport, 1961). Children are typically described on a continuum from temperamentally 'easy' to 'difficult'. It has been suggested that temperament is part of an individual's constitution or hereditary make-up, and this view is supported by evidence obtained from observations of infants and studies of twins or of biological vs adoptive parent–child similarities (Singer, 1984). Although early temperament appears to be functionally related to the emergence of early onset behavioural problems and conduct disorder, efforts aimed at predicting such problems from temperamental indices have produced mixed results (Slabach et al., 1991). Only a low to moderate relationship has been found between infant temperament and subsequent behaviour problems (Sanson et al., 1991). Nonetheless, a difficult temperament in early childhood does appear to place a child at increased risk for the subsequent development of antisocial behaviour.

A number of researchers have proposed various interactive models in efforts to describe the process in which both precursors and consequences of temperamental differences might manifest themselves in divergent develop-mental pathways. For example, it has been proposed that hyperactivity is a significant, and perhaps necessary, risk factor for the so-called 'early starter' pathway (Moffitt, 1993). Children who display conduct problems *and* hyper-activity display more serious and higher levels of behaviour problems and have a poorer prognosis than do children displaying either of these problems in isolation (cf. Abikoff and Klein, 1992; Hinshaw et al., 1993). Moffitt (1993) has suggested that subtle neuropsychological variations in the infant's central nervous system resulting from a variety of prenatal, perinatal and postnatal difficulties (e.g. exposure to toxic agents, birth complications, heredity) can increase the likelihood that the infant will be 'temperamentally difficult', displaying such characteristics as irritability, irregularity, hyperactivity and impulsivity.

Method

Sampling and procedure

The data for this study were taken from the Mater-University of Queensland Study of Pregnancy (MUSP), a longitudinal study of 8556 women presenting at one of two major obstetric hospitals in Brisbane, Australia. Analysis in the current study involved a subset of 5296 subjects for whom data at 5-year follow-up were available. Details are provided by Keeping et al. (1989), but in brief, the pregnant women were enrolled in the study on average at 18 weeks gestation, then

reinterviewed 3–5 days after the birth of their child, then again when the child was 6 months, 5 years of age and 14 years of age. Data contained in the current study are taken from self-reports of mothers at each phase of the study and the medical record of the birth. The measures used in the current study provide for a multivariate test of the comparative predictive ability of four categories of factors which are believed to cause problematic child behaviour observed in the toddler and early preschool years.

Measures

Child behaviour/mental health: Maternal retrospective reports (when the child was about 5 years of age) of difficult or troublesome behaviour in target children between the ages of 2 and 4 served as the main outcome variable in the current design. Six troublesome behaviours were listed (irregular sleeping habits; irregular eating/bowel habits; difficult behaviour; messy or dirty; tantrums and disobedience; and restlessness at meal times). These items were intercorrelated with a Cronbach alpha reliability coefficient of .74. Children described by their mothers as 'often' manifesting these behaviours were scored 4, 'sometimes' = 3, 'rarely' = 2 and 'never' = 1. This provided a theoretical range of 4–24, and a real range of 5–24. Higher scores reflect children whose behaviour is perceived as more troublesome. For analysis of variance, this score provided the dependent variable. Respondents' answers to all six items were aggregated with approximately the highest decile (11.4 percent) of scores designated as troublesome behaviour for the logistic regression analysis.

While these items are similar to those in a number of existing scales, we have examined their predictive validity in relation to maternal reports on the Achenbach (1991) Child Behaviour Check List (CBCL) internalizing and externalizing subscales (at 14 years of age). We have also examined the extent to which this scale of troublesome behaviour predicts subsequent con-tact with treatment agencies (at 14 years of age). In almost every instance there is a statistically significant and sometimes strong association between troublesome behaviour at 2-4 years of age and indicators of similar behaviour at 14 years of age (see Table 1).

Table 1 Percentage (and relative risk) of youth contact with authorities by age 14 and behaviour problems at age 14 by troublesome behaviour of child (2–4 years)

	Troublesome behaviour (2–4 years)			
	Nil/few (N = *3487*)	*Some* (N = *570*)	*Many* (N = *519*)	*Chi-square* p *value*
Contact by 14 years				
Guidance officer	22.3 (1.0)	30.2 (1.4)	34.5 (1.6)	< .001
Children's services	3.5 (1.0)	6.4 (1.8)	9.7 (2.8)	< .001
Police or juvenile aid	8.3 (1.0)	11.2 (1.3)	10.0 (1.2)	.057
Suspended from school	5.7 (1.0)	9.0 (1.6)	10.0 (1.8)	< .001
Behaviour problems (CBCL)				
Internalizing	6.7 (1.0)	13.7 (2.0)	21.3 (3.2)	< .001
Externalizing	6.2 (1.0)	16.1 (2.6)	23.4 (3.8)	< .001

Maternal socioeconomic status: A range of maternal sociodemographic indices were obtained and assessed within the current design including maternal age and level of maternal educational attainment upon entry into the study (i.e. assessed prenatally), total number of children present in the target child's household at 6-month follow-up and total number of maternal partner changes reported as experienced between the prenatal period and 5-year follow-up. A composite index of chronic family poverty was derived and used in the current design, based on estimates of gross annual income obtained at each assessment phase.

Maternal lifestyle: Due to reports suggesting a functional link between maternal cigarette smoking and child behaviour disorders (Fergusson et al., 1993; Weitzman et al., 1992), degree of maternal cigarette smoking at the first clinic visit was assessed using a smoking index in which number of cigarettes nominated as smoked per day by subjects was multiplied by the number of days per week subjects said they typically smoked. For logistic regression analysis, subjects were classified into one of three categories of prenatal cigarette use as either (1) non-smokers (65.2 percent), (2) light/moderate smokers (27.5 percent) or (3) heavy smokers (7.3 percent). The light/moderate category represents those smoking anywhere between one cigarette per week and 20 cigarettes per day over a weekly period. The heavy category includes those that smoke in excess of the light/moderate upper limit. Degree of self-reported maternal alcohol consumption at the first clinic visit was also assessed by the creation of a drinking index in which number of drinks nominated as consumed on a given alcohol drinking occasion was multiplied by how often subjects said they typically drank. For logistic regression analysis subjects were classified into one of three categories of prenatal alcohol consumption as either (1) abstainers (49.6 per-cent), (2) light drinkers (48.2 percent) or (3) consistent drinkers (1.4 percent). Light drinkers include those who rarely consume alcohol to those who drink less than one glass per day. Consistent drinkers are those who drink one or more glasses of alcohol per day. Additionally, presence or absence of maternal prenatal binge drinking was assessed, based on how often subjects said they had consumed in excess of five drinks on one occasion during the prenatal period. For logistic regression analysis subjects were classified into one of three groups of prenatal binge drinking as either (1) never binge (79.1 percent), (2) occasionally binge (16.9 percent) or (3) binge (i.e. 5+) at least half the time (2.8 percent).

Finally, a measure assessing maternal partner antisocial behaviour was obtained at 5-year follow-up by asking subjects whether their current partners had ever been arrested up to that point in time. A prior arrest history involving current partners was indicated by 16 percent of subjects in the cur-rent sample.

Maternal mental state: Maternal dyadic satisfaction and adjustment was assessed postnatally, and again at 6-month and 5-year follow-up using the dyadic satisfaction items from the Spanier Dyadic Adjustment Scale (DAS) (Spanier, 1976). The DAS is a 32-item scale with published validity and reliability characteristics. While Spanier and Thompson (1982) have argued that the DAS has four subscales, these are observed to be correlated sub-scales. A reassessment of the DAS suggests that all items load on one under-lying factor and that the majority of its 32 items are unnecessary (Sharpley and Cross, 1982). In the current design, the eight items comprising the DAS subscale had alphas ranging from .82 (postnatal) to .86 (6-month and 5-year follow-up). By summing subscale scores across phases, an index of the severity of dyadic instability/conflict was derived for the current study.

Maternal reports of anxiety and depression were assessed at each phase using established subscales for each measure obtained from the Delusions Symptoms-States Inventory (DSSI) of Bedford et al. (1976). The DSSI was developed for detecting persons who are disturbed and living in the community (Bedford and Foulds, 1978), and has been validated against groups with diagnosed mental illness. It is intended to detect signs and symptoms of mental illness that limit the ability of a person to function and maintain relationships (Bedford and Foulds, 1975; Foulds and Bedford, 1975). The symptoms included in the DSSI/sAD were derived from clinical practice and initial validity was suggested by a study of 25 senior clinicians who were able to reliably allocate symptoms and signs to 12 syndromes (Bedford and Foulds, 1978). Morey (1985) found the DSSI to have good discriminant ability, and the correlation between the DSSI measure of depression and other similar scales is reasonably strong (Condon and Corkindale, 1997; Schnurr et al., 1976). For the current cohort, the seven-item depression subscale had Cronbach alphas ranging from .77 (prenatal) to .86 (5-year follow-up), with alphas for the seven-item anxiety subscale ranging from .76 (prenatal) to.84 (5-year follow-up).

In addition, the four-item Los Angeles Stress Scale was used (Reeder et al., 1973). It had Cronbach alpha coefficients ranging from .84 (6-month follow-up) to .88 (postnatal). Based on these three subscales, two measures for each subscale were derived and utilized in the current design. Maternal reports of *current* anxiety, depression and subjective stress were obtained at 5-year follow-up. In each case, a yes/no symptom count ('yes' = all the time + most of the time + some of the time) was used to dichotomize the sample into currently anxious (16.3 percent) and non-anxious, depressed (6.8 per-cent) and non-depressed, and subjectively stressed (11.1 percent) and non-stressed groups.

For a history of anxiety, depression and stress experienced prior to the 5-year follow-up, a similar approach was used. For anxiety and depression, global indices were used to create three clinical groupings based on presence of (1) 'nil' (78.8 percent and 77.8 percent respectively), (2) 'some' (9.1 per-cent and 11.8 percent) or (3) 'many' (12.1 percent and 11.1 percent) symptoms at previous phases. The subjective stress index obtained was used to create three groupings of past stress based on presence of (1) 'little or no stress' (82.4 percent), (2) 'some stress' (9.0 percent) or (3) 'much stress' (8.6 percent) reported.

Maternal attitudes to child and parenting/discipline practices: The degree to which the target pregnancy was planned and/or wanted was assessed prenatally with a four-item index (Cronbach alpha = .89) asking mothers to what degree the pregnancy was planned, wanted, and/or whether the subject's method of family planning had failed. Subjects were then classified into one of three categories of pregnancy intent as either (1) unplanned/unwanted pregnancy (19.3 percent), (2) unsure (24.1 percent) or (3) planned/wanted pregnancy (56.6 percent).

Maternal attitude towards caregiving during early infancy was also assessed with a six-item index (Cronbach alpha = .76) obtained at 6-month follow-up, in which subjects were asked how positively they currently felt about interacting with and caring for their baby. Subjects were then classified into one of three categories as feeling either (1) not always (5.8 per-cent), (2) mostly (54.7 percent) or (3) always (39.5 percent) positive about caring for their child.

A measure assessing the degree to which mothers attempt to stimulate or teach their babies during infancy was obtained at 6-month follow-up using a four-item index (Cronbach alpha = .70) in which subjects were asked how often they try to encourage their baby to be interested in things, talk to or play with their baby, or spend time actively teaching their babies. This index was then used to dichotomize the sample into 'not always' (14.4 per-cent) and 'always' (85.6 percent) teaching or stimulating groups.

Two measures of parenting were obtained at 5-year follow-up. The degree to which subjects utilized a controlling parenting style was assessed with a five-item index (Cronbach alpha = .66) in which subjects were asked how often they: (1) supervise child's activities very carefully; (2) expect child to do as told without explanation; (3) watch everything child does; (4) expect child to do as told immediately; (5) believe strict discipline is good. Subjects were classified into one of three categories as utilizing either low (13.7 percent), moderate (75.2 percent) or high (11.1 percent) rates of maternal control. Degree of maternal supervision was assessed with a five-item scale (Cronbach alpha = .84) in which subjects were asked at what age they would allow the target child to engage in a variety of unsupervised socially related activities (e.g. going out; going on holiday; staying home alone; drinking alcohol). Subjects were then classified into one of three categories as allowing (1) little (8.9 percent), (2) some (83.8 percent) or (3) a lot (7.3 percent) of unsupervised 'freedom'.

Maternal discipline style was also assessed at 5-year follow-up by presenting subjects with a range of five situations involving their child (i.e. refusing to clean up room, taking something belonging to another, making fun of a crippled person, touching hot stove, being non-compliant and consequently breaking something), and asking them to nominate in each case how likely it was that they would utilize one of three discipline strategies: (1) smacking the child; (2) using

explanation or reasoning; and (3) by taking away something enjoyed by the child. We were particularly interested in assessing the potential differential impact of maternal use of physical punishment on observed incidence of child behaviour problems in the current sample. Based on the above items, the three discipline subscales derived in the current design were (1) smacking child (Cronbach alpha =.74), (2) reasoning with child (Cronbach alpha = .82) and (3) taking things from child (Cronbach alpha = .90). Finally, the degree of outside childcare used (e.g. daycare, preschool) was obtained at 6 months and at 5-year follow-up, and assessed in terms of number of hours per week the target child spent in such care.

Maternal and child health: Several measures assessing maternal health and well-being surrounding the pregnancy and delivery of the target child were obtained postnatally. Maternal health problems experienced during the target pregnancy were assessed with a seven-item index in which subjects were asked if and to what degree they experienced a range of common pregnancy-related difficulties (e.g. morning sickness, constipation, backache, leg cramps, vaginal problems). Three categories measuring degree of complication experienced during pregnancy were created, with subjects classified as reporting either (1) few (14.9 percent), (2) some (80.7 percent) or (3) many (4.4 percent) symptoms experienced during pregnancy. Maternal global perceptions of the study pregnancy were also assessed with a three-item index asking subjects (1) whether the pregnancy was straightforward, (2) whether they experienced complications and (3) whether they were physically well during the pregnancy. This index was then used to create three categories, with subjects classified as reporting either (1) few (84.2 percent), (2) some (13.5 percent) or (3) a lot (2.3 percent) of medically related difficulties experienced during the pregnancy.

Maternal report of problems and complications experienced during the target delivery was assessed with a six-item index based on postnatal measures asking subjects whether they had experienced a range of common delivery-related experiences (e.g. pre-delivery enema/pubic shave; severe pain during labour; labour inducement; vaginal episiotomy/tear). This index was used to create three categories of problematic delivery, with subjects classified as reporting either (1) few (20.3 percent), (2) some (71.2 percent) or (3) a lot (8.5 percent) of problems associated with the study delivery.

Table 2 Troublesome behaviour of child (2–4 years) by mother's social structural characteristics (analysis of variance)

		Unadjusted mean	*Adjusted mean*[a]	p *value adjusted mean*
Age at entry				
13–19 years	(627)	12.8	12.5	NS
20–34 years	(4005)	12.7	12.7	
35 years plus	(215)	12.3	12.6	
Income – 5 year				
Consistent poverty	(250)	12.7	12.5	NS
Consistent middle income	(4047)	12.6	12.7	
Consistent middle–high	(550)	12.7	12.7	
Number of children				
Study child only	(1946)	13.0	13.0	< .001
Two to four	(2740)	12.5	12.5	
Five or more	(161)	11.9	11.9	
Partner changes				
Nil	(3986)	12.6	12.5	< .001
One	(452)	13.3	13.3	
Two plus	(409)	13.0	13.0	
Education of mother				
Left school 16 years or less	(816)	12.7	12.7	NS
Left school 17–18 years	(3101)	12.6	12.6	
Further education post-school	(930)	12.9	12.9	

[a] Adjusted for all the other variables in the table.

Note: Variance in troublesome behaviour explained by the above variables = 0.9 percent.

A range of infant neonatal biological indices obtained from the target children's medical records were assessed. Birth weight of subject children was obtained and used to create two categories with subjects classified as either (1) low birth weight (4.2 percent) or (2) normal birth weight (95.8 per-cent). The cohort of children comprises 52.2 percent male subjects and 47.8 percent female subjects. The degree to which target children experienced post-delivery medical problems was assessed with a five-item index. Subjects were asked if and to what degree their newborns had experienced a range of symptoms since delivery (e.g. skin rash, sticky or infected eye, medical problems, feeding difficulties, needing special care nursing). This index was used to dichotomize the sample into subjects reporting either (1) none/few (90.4 percent) or (2) some/many (9.6 percent) post-delivery infant medical problems.

Several measures assessing general child medical status and constitutional predisposition during the first 6 months of life were obtained at 6-month follow-up. Subjects were asked how often target children had needed medical attention during the first 6 months, with this measure used to classify subjects into three categories based on reporting either (1) no medical visits (18.9 percent), (2) one to five visits (70.5 percent), or (3) six or more visits (10.5 percent).

General child health during the first 6 months of life was assessed with a nine-item index asking subjects how often target children had experienced a range of infant medical complaints (e.g. colic, sleeplessness, vomiting, diarrhoea, feeding problems, skin problems, overactivity, cough/cold and convulsion/fits). This index was then used to classify subjects into three categories of reporting either (1) few (85.7 percent), (2) some (7.6 percent) or (3) many (6.7 percent) infant medical difficulties during the first 6 months of life.

Table 3 Troublesome behaviour of child (2–4 years) by mother's lifestyle (analysis of variance)

		Unadjusted mean	*Adjusted mean*[a]	p *value adjusted mean*
Cigarette smoking FCV[b]				
Nil	(3170)	12.5	12.5	< .001
Light/moderate	(1303)	13.1	13.1	
Heavy	(347)	12.8	12.7	
Alcohol use FCV[b]				
Abstainer	(2402)	12.5	12.5	.02
Light	(2350)	12.9	12.8	
1+ per day	(68)	13.0	12.7	
Binge drinking				
Never	(3876)	12.6	12.7	NS
Occasionally	(813)	12.8	12.6	
Half time +	(131)	13.2	12.9	
Partner ever arrested				
No	(4038)	12.6	12.6	< .01
Yes	(782)	13.1	13.0	
Breast feeding at 6 months				
Still feeding	(1549)	12.6	12.7	.06
2 weeks–6 months	(2337)	12.8	12.7	
Nil breast feed	(934)	12.4	12.4	

[a] Adjusted for all the other variables in the table.

[b] FCV = first clinic visit.

Note: Variance in troublesome behaviour explained by the above variables = 1.1 percent.

Results

Table 2 illustrates the relationship between the sociodemographic characteristics of the mother and troublesome child behaviour. Two factors are significantly but weakly associated with maternal reports of troublesome behaviour. Mothers with fewer children are more likely to describe the study child as having problems and mothers who have changed partners over the first 5 years also report that their children have higher rates of troublesome behaviour.

Table 3 illustrates the relationship between maternal lifestyle and child behaviour problems. Only two relatively weak effects warrant comment. Mothers who smoke in the first trimester and mothers who report that the father of the child has previously been arrested more often report trouble-some child behaviour.

Table 4 Troublesome behaviour of child (2–4 years) by mother's dyadic adjustment and maternal mental health (analysis of variance)

	Unadjusted mean	*Adjusted mean*[a]	p *value adjusted mean*
Dyadic adjustment			
Good	12.3	12.4	< .001
Some conflict	13.6	13.5	
Conflict	14.0	13.4	
No partner	12.9	12.7	
Symptoms anxiety phases 1–3			
Nil	12.4	12.6	.07
Some	13.5	13.1	
Many	14.0	13.0	
Symptoms depression phases 1–3			
Nil	12.5	12.7	NS
Some	13.3	12.9	
Many	13.9	12.9	
Symptoms Stress Phases 1–3			
Nil	12.5	12.7	NS
Some	13.7	13.1	
Many	13.9	12.8	
Anxiety – 5-year follow-up			
Not anxious	12.4	12.6	< .001
Anxious	14.3	13.4	
Depressed – 5-year follow-up			
Not depressed	12.6	12.7	NS
Depressed	14.6	13.1	
Stress – 5-year follow-up			
Not stressed	12.5	12.6	< .001
Stressed	14.6	13.8	

[a]Adjusted for all the other variables in the table.

Note: Variance in troublesome behaviour explained by the above variables = 4.4 percent.

Table 4 illustrates the relationship between marital quality, maternal mental health and child behaviour problems. The unadjusted means suggest that all indicators of maternal mental health are related to rates of toddler troublesome behaviour. These indicators of maternal mental health are inter-correlated. The multivariate analysis (adjusted means) indicates that dyadic adjustment, maternal stress and maternal anxiety are the best independent predictors of child behaviour problems. Mental health problems experienced by the mother over the first three phases of the study (first prenatal visit, 3–5 days and 6 months after the birth) are not significantly associated with subsequent behaviour problems after adjustment for mental health at the 5-year follow-up. Clearly indicators of concurrent mental health are the best predictors of child behaviour problems when the child is 2–4 years of age.

Reports of child behaviour offered by emotionally impaired respondents may be biased, as we have indicated in a previous article (Najman et al., 2000). About 4.4 percent of the variation of troublesome behaviour of the child is accounted for by maternal mental health problems experienced at the 5-year follow-up.

Table 5 Troublesome behaviour of child (2–4 years) by maternal reports of attitude to child and child-rearing (analysis of variance)

	Unadjusted mean	*Adjusted mean*[a]	p *value adjusted mean*
Pregnancy planned/wanted FCV[b]			
Unplanned/unwanted	12.6	12.6	NS
Unsure	12.7	12.6	
Planned/wanted	12.8	12.8	
Positive about caring for baby (6 months)			
Not always	14.5	14.5	< .001
Mostly	13.1	13.1	
Always	12.0	12.0	
Spent time teaching baby			
Not always	12.8	12.5	NS
Always	12.7	12.8	
Baby controlled or free			
Controlled	13.1	13.0	< .01
Some freedom	12.8	12.8	
Lot of freedom	11.9	12.0	
Reason with baby			
Always	12.8	12.8	NS
Sometimes	12.7	12.7	
Never	12.0	12.2	
Take things			
Always	12.8	12.8	< .001
Sometimes	13.0	12.9	
Never	12.3	12.4	
Smack baby			
Always	12.8	12.7	NS
Sometimes	12.8	12.8	
Never	12.4	12.5	

Table 5 *cont.*

	Unadjusted mean	*Adjusted mean*[a]	p *value adjusted mean*
Childcare at 6 months			
4 hours or less	12.7	12.7	NS
5–10 hours	13.3	13.2	
11 hours plus	12.7	12.7	
Childcare at 5 years			
0–10 hours	12.5	12.5	< .001
11 hours plus	12.9	12.9	

[a]Adjusted for all the other variables in the table.

[b]FCV = first clinic visit.

Note: Variance in troublesome behaviour explained by the above variables = 6.2 percent.

Table 5 illustrates the association between the extent to which the mother states she wants the child (at first visit, at 6-month follow-up) and the child's subsequent behaviour. Mothers who at the 6-month follow-up expressed positive statements about the child, stating they wanted to spend more time with the child, were more likely subsequently to report that the child did not manifest troublesome behaviour. There is a clear and consistent association here between the feelings the mother expresses towards the child at 6 months and the mother's subsequent perceptions that the child has behavioural problems. Of equal interest is the lack of an association between the initial feelings of the mother towards the pregnancy, that is whether the pregnancy was planned and/or wanted and subsequent reports relating to the behaviour of the child.

Unplanned/unwanted (around the time of conception) pregnancies do not appear to be more likely to lead to reports that a child manifests troublesome behaviour.

Table 5 also considers the association between a variety of indicators of child-rearing practices and subsequent reports of troublesome behaviour. Three significant but weak independent effects are observed. Mothers who reported that they gave a child greater levels of freedom subsequently reported fewer instances of troublesome behaviour. Mothers who punished their children by taking things from them similarly reported that their children manifest fewer behaviour problems. However, children who are reported to have longer periods in childcare (at 5 years) were subsequently described as having higher rates of troublesome behaviour.

Mothers who report that they were ill in pregnancy (questions asked 3–5 days after the birth), that is that the pregnancy was difficult for them, were also more likely to report that the child had troublesome behaviour (Table 6). Male children are observed to manifest troublesome behaviour more often than female children. Children who, at the 6-month follow-up, are described by the mother as having more symptoms were also subsequently more likely to be described as subsequently manifesting trouble-some behaviour.

Table 6 Troublesome behaviour of child (2–4 years) by mother's health during pregnancy and outcomes of pregnancy (analysis of variance)

	Unadjusted mean	*Adjusted mean**	p *value adjusted mean*
Mother ill in pregnancy			
Few symptoms	11.9	12.1	< .001
Some symptoms	12.7	12.7	
Many symptoms	13.8	13.5	
Problems with delivery			
Few	12.5	12.6	NS
Some	12.7	12.7	
Many	12.9	12.8	
Pregnancy went well			
Few	12.6	12.6	NS
Some	13.2	12.9	
Many	13.6	13.0	
Birth weight at delivery			
Low birth weight	13.6	13.4	.02
Normal range	12.6	12.6	
Sex of child			
Male	12.9	12.9	< .001
Female	12.4	12.4	
Child health at birth			
Few problems	12.6	12.6	NS
Some/many problems	13.3	12.9	
Child health at 6 months			
0–3 symptoms	12.4	12.5	< .001
4 symptoms	13.6	13.5	
5+ symptoms	14.7	14.5	
Doctor visits at 6 months			
No visits	12.2	12.4	.06
1–5 visits	12.7	12.7	
6+ visits	13.2	12.7	

*Adjusted for all the other variables in the table.

Note: Variance in troublesome behaviour explained by the above variables = 4.0 percent.

Table 7 provides a logistic regression of those factors taken from the earlier analyses, which provided significant independent predictions of troublesome behaviour. The strongest associations (based upon the explained sum of squares) from each group of variables were chosen but, where more than one variable from each group made a substantial contribution, then more than one variable from the group was selected. In this logistic regression model, seven of the factors remain independent predictors of trouble-some behaviour. Children who had more illness symptoms at 6 months were subsequently more likely to manifest troublesome behaviour. Mothers who described themselves as anxious or stressed at the 5-year follow-up were also much more likely to report their children have troublesome behaviour. If the baby was described

as unwanted at the 6-month follow-up it is much more likely to manifest troublesome behaviour. Mothers who were ill in pregnancy are almost twice as likely to describe their child as manifesting troublesome behaviour and male children are found to have higher rates of troublesome behaviour. Relationships characterized by problems (either poor dyadic adjustment or partner change) are also associated with higher rates of behaviour problems. These are all significant and independent predictors of troublesome behaviour.

Table 7 Troublesome behaviour of child (2–4 years) (multivariate model – logistic regression)

		Unadjusted percentage with troublesome behaviour	*Adjusted odds ratio of troublesome behaviour*
Number of children (6 months)			
Study child only	(1589)	12.5	1.0
Two to four	(2149)	11.1	0.9
Five or more	(120)	10.1	0.9
Smoking at FCV[a]			
Nil	(2576)	10.2	1.0
Light/moderate	(1018)	14.4	1.2
Heavy	(264)	14.6	1.3
Dyadic adjustment over time			
Good	(2418)	9.1	1.0
Fair	(642)	14.2	1.3*
Poor	(349)	20.2	1.5*
No partner	(449)	15.5	1.3
Anxiety at 5-year follow-up			
No	(3263)	9.3	1.0
Yes	(595)	24.2	1.9*
Stress at 5-year follow-up			
No	(3441)	9.8	1.0
Yes	(417)	26.8	2.2*
Baby wanted (6 months)			
Always	(1522)	8.3	1.0
Mostly	(2128)	12.9	1.4*
Not always	(208)	23.0	2.0*
Child-rearing – take things to punish			
Never	(1396)	10.5	0.9
Sometimes	(2289)	12.2	1.0
Always	(173)	13.8	1.0
Mother ill in pregnancy			
Few symptoms	(584)	7.4	1.0
Some symptoms	(3118)	12.0	1.4*
Many symptoms	(156)	21.4	1.9*

Table 7 *cont.*

		Unadjusted percentage with troublesome behaviour	*Adjusted odds ratio of troublesome behaviour*
Sex of child			
Male	(2038)	12.6	1.0
Female	(1820)	10.7	0.8*
Child symptoms (6 months)			
None to three	(3323)	10.0	1.0
Four	(284)	14.9	1.2
Five +	(251)	29.0	2.6*

*$p < .05$ p value for odds ratio for category compared to reference category.
•FCV = first clinic visit.

Table 8 presents a composite model of risk. The seven independent risk factors from Table 7 were put together in an additive model. Of the mothers who have no risk, 8.3 percent report their child to have troublesome behaviour. Of the mothers who have a few risk factors, 16.0 percent report their child has troublesome behaviour, while some 32.6 percent of those mothers who have some/many risk factors report their child manifests troublesome behaviour. Children in the some/many risk factors category have a rate of troublesome behaviour some five times that of children who have no risk factors. It is, however, interesting that while the rate of behaviour problems is very high in those mothers who share a number of characteristics identified in Table 7, these mothers account for only a minority of the child behaviour problems observed in our sample. Of the 486 children classified as having troublesome behaviour problems at 2–4 years of age, 122 (25.1 percent) are from the high risk group and 110 (22.6 percent) are in the moderate risk group. Some 52.3 percent of the children with behaviour problems manifest few or none of the seven risk factors. The evidence tends to suggest that children who manifest troublesome behaviour do so for a wide variety of reasons. Only a subset of these have been identified in the multivariate models we have presented.

Table 8 Troublesome behaviour of child (2–4 years) by composite risk score*

	N	*Rate of troublesome behaviour*	*Odds ratio*	*(95 percent CI)*
Nil/few	(3052)	8.3	1.0	
Some	(689)	16.0	2.1*	(1.6–2.7)
Many	(374)	32.6	5.3*	(4.1–6.9)

*Includes baby wanted (6 months), anxiety at 5-year follow-up, stress at 5-year follow-up, mother ill in pregnancy, sex of child and child symptoms (6 months).

Discussion

There has been a great deal of interest in the mental health and behaviour problems manifested by children and toddlers. Numerous studies have identified a wide variety of variables that are implicated in the aetiology of child behaviour problems. These have focused on such factors as the child's social background, the mother's lifestyle and mental health, the mother's attachment to the child and her approaches to child-rearing, and a range of indicators of the physical/biological health of the mother and child.

Many of these variables are intercorrelated. Previous studies have implicated many 'causes', but neglected to assess the relative contribution of particular variables or their separate and independent effects. It is to this issue of separate and additive effects that the analysis has been directed.

The results are consistent in showing that children with troublesome behaviour differ in a wide variety of ways from children without such behaviour. For example, there is a weak but significant negative association between troublesome child behaviour and the number of children in the home. Maternal cigarette smoking and a previous history of the father being arrested are also related to maternal reports of troublesome child behaviour.

Stronger associations are observed with indicators of dyadic adjustment, maternal mental health and troublesome child behaviour. Three aspects of this association warrant comment. First, there is clearly an association between earlier and concurrent measures of maternal mental health. Mothers who are currently emotionally distressed frequently manifest evidence of distress in earlier phases. Second, the models clearly show that measures of concurrent distress have the strongest association with trouble-some child behaviour. Third, these associations leave open the possibility of two causal sequences: that troublesome child behaviour may cause maternal emotional distress and that maternal emotional distress may lead to troublesome child behaviour. Indeed, the most plausible interpretation of these associations is that there is a complex reciprocal effect with maternal emotional distress and troublesome child behaviour influencing and even rein-forcing each other. It is also noted that part of the association between maternal distress and child behaviour reflects observation bias.

Children described as being unplanned and/or unwanted at the first clinic visit do not manifest higher rates of troublesome behaviour. This finding would seem to challenge one of the main rationales for pregnancy termination. By contrast children described as less wanted at 6 months of age are likely to be subsequently identified as manifesting troublesome behaviour. Such 'less wanted' children differ from others in terms of the way they are reared and possibly even in their temperaments and health. By 6 months of age the mother is presumably responding to the child's emerging patterns of behaviour.

The associations between patterns of child-rearing and troublesome behaviour are relatively weak. Children in childcare for longer periods of the day are described as having more troublesome behaviour. Again, the cause–effect sequence here is ambiguous, and it may be that children with higher levels of troublesome behaviour are placed in care for longer hours.

Finally, it is apparent that poor maternal health during the pregnancy and poorer child health and behaviour at the 6-month follow-up predict later troublesome child behaviour. Poor maternal health in pregnancy is associated with poor emotional health and may point to a mother who views the prospect of rearing the child with less enthusiasm. The association between poorer child health at 6 months and subsequent troublesome behaviour suggests that there is a continuity of child health and behaviour problems from 6 months to 2–4 years. The implication here is that much troublesome child behaviour begins in infancy. While it could be inferred that this trajectory is primarily a consequence of biological factors, the role of social influences cannot be dismissed. Poor child health necessarily imposes additional difficulties for mothers beyond those normally associated with child-rearing. Arguably, it may be that there is a tendency for mothers of sick infants to view such children as being troublesome due to the increased stress and worry the mother experiences as a consequence of the child's ill health. Such a perception of the child in infancy may impact on mother–child interactions in both the short and long term. As the relative contributions of physical ill health and social responses to health problems are unable to be determined, and since these variables are likely to be interrelated, this study supports the view that there are environmental (social and cultural) as well as biological/constitutional components to much troublesome behaviour observed in children.

We have also found that while it is possible to identify some predictors of troublesome child behaviour, the majority of cases of troublesome child behaviour remain outside of the risk factors we have observed.

In discussing these findings, some cautions need to be noted. We have relied on maternal retrospective reports of troublesome child behaviour when the child was aged 2–4 years. The mother could be expected to pro-vide the most informed view of the child's behaviour. Achenbach et al. (1987) note that the correlations between different informants describing a child's behaviour range between .28 and .60. Thus, different informants manifest only a moderate level of agreement when describing child behaviour. In particular, it must be noted that previous validations of maternal reports are generally on children older than in this sample, where teacher, peer, or observer assessments are available. We did not seek independent assessments of the child's behaviour, and are therefore restricted to interpreting results according to maternal reports. It could be argued that the child's behaviour is context specific and that child may be 'difficult' from the mother's point of view, but not from the view of his or her teacher and/or peers. Moreover, reliance on maternal reports of child behaviour may be deemed to provide information that merely reflects the mother's perceptions of child behaviour problems, rather than actual child behaviour. Hence, the continuity of the mother's feelings towards the child at 6 months and subsequent maternal perceptions of child behaviour problems could be an effect of consistency in maternal bias in relation to the child.

A second caution relates to the difficulty of disentangling the cause–effect sequence. The main associations found are between maternal mental and physical health and troublesome child behaviour. The most that can be claimed here is that these are related variables, but that the cause–effect sequence remains to be disentangled.

For those concerned with the policy and/or treatment implications of our research, the findings suggest a number of possibilities. First, the fact that child and maternal health are related to subsequent child behaviour problems argues for early treatment and support programmes for the mother. In a climate in which economically driven considerations dominate health decision-making, a reduction of services to mothers and their children may reduce health care delivery costs but may lead to higher social and economic costs when these children become old enough for their troublesome behaviour to become disruptive.

Second, it is clear that the mental and emotional state of mothers is strongly associated with reports of troublesome child behaviour. While this study is not able to disentangle the cause–effect sequence, it seems likely that troublesome child behaviour and maternal/mental emotional state are interacting factors – with each influencing the other. Thus, mothers who are emotionally disturbed or who have children with troublesome behaviour (or both) require support and possibly may benefit from skills training. An absence of such support at this apparently crucial period in the child's development may enhance the violent/aggressive behaviour manifested by youth.

Third, the bulk of the troublesome behaviour observed in 2- to 4-year-old children is unrelated to the known risk factors we have considered. This suggests that the causes of troublesome child behaviour are both many and disparate. Additionally, patterns of child behaviour emerge in infancy. In these circumstances, early case finding may be a more effective strategy than programmes aimed at primary preventive interventions.

Conclusion

Children as young as 2–4 years can be distinguished by their mothers as manifesting (or not) mental health/behaviour problems. There is previous evidence which indicates a high level of continuity between toddler/child mental health/behaviour problems and those experienced by youth and adolescents. In this context, this study represents one of the first to provide a multivariate model of predictors of toddler/child mental health. The results indicate that

maternal social background and lifestyle are relatively unimportant in predicting troublesome child behaviour. Rather, the major predictors are associated with maternal mental and physical health and the child's health.

Three health policy considerations derive from the findings of this study. First, early case finding is possible and the reliability of the scale used suggests mothers are consistent in their descriptions of their children. It is possible to obtain very early evidence indeed of a toddler/child whose mental health and behaviour are perceived to be problematic.

Second, the mother's and child's physical and mental health are the strongest predictors of child mental health/behaviour problems. This at least raises the possibility that greater attention needs to be paid to addressing and enhancing the health and well-being of the mother and child than to such factors as parenting styles and prescriptions for effective parenting.

Third, we have noted that early measures of child mental health and behaviour indicate that the socioeconomic and lifestyle factors are of relatively minor importance. As the child grows up and is exposed to these factors for a longer period of time, does their contribution to child behaviour/mental health problems increase? It remains to be determined whether continued exposure to an adverse social situation or parental lifestyle changes the contribution of factors having a negative impact on the mental health of the child.

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