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The Mental Health Outcomes of Children Born to Methadone Dependent Mothers: The Role of Out-of-Home Care at Age 4.5-Years

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Abstract

Children born to methadone maintained mothers are at high risk of adverse socio-emotional and behavioural outcomes. However, existing studies inadequately report the extent of maternal methadone and other drug use, focus on a narrow range of outcomes, and have given little consideration to the possible impact of child protection and placement experiences. As part of a prospective longitudinal study, mothers of 53 methadone-exposed (ME) children and 54 non-exposed comparison children were interviewed at four time-points from term to the child turning 4.5-years. Detailed information about infant clinical, maternal and family background characteristics was recorded. The nature of all child out-of-home placements was reported at regular intervals using life history calendar methods. At 4.5 years, all caregivers completed the Strengths and Difficulties Questionnaire (SDQ) and were interviewed using the Developmental and Well-Being Assessment (DAWBA) to examine the extent of child socio-emotional and behavioural adjustment problems as well as risk for a range of clinical disorders.

By age 4.5 years, ME children were rated by their caregivers as having higher levels of emotional (p = .01), peer-relationship (p = .01), hyperactivity/inattention (p = .01), conduct (p = .01) and total problems (p = .01) than comparison children on the SDQ. Between-groups differences persisted for conduct problems (p = .003) and total difficulties (p = .006) even after controlling for a range of covariates associated with maternal methadone maintenance therapy, including single motherhood, maternal educational achievement, family socioeconomic status (SES), and other drug use in pregnancy. On the DAWBA, children in the ME group were also significantly more at risk than comparison children for externalising disorders spanning ADHD (p = .02), hyperkinesis (p =.01), oppositional defiant disorder (p < .001), and conduct disorder (p = .007). Examination of all study children's family situation at 3-monthly intervals over the first 4.5-years revealed that 43% of children in the ME group had experienced at least one foster care placement (range: 1 – 7). In contrast, no comparison children had any placement experience (p < .01). Within the methadone group, maternal risk factors that predicted the likelihood of child placement included maternal methadone dose in pregnancy (p <.01), SES (p = .03), maternal depression (p <.01) and the extent of tobacco (p = .01) and illicit substance use while pregnant (p = .05). ME children exposed to placement showed some increased risk for internalising disorders such as separation anxiety disorder (p = .35) and specific phobia disorder (p = .35), whereas ME children remaining in their biological mothers' care tended to have an increased risk for externalising disorders such as

ADHD, hyperkinesis and oppositional defiant disorder, although these differences did not reach statistical significance (*ps* < .05). Child placement did not appear to be independently contributing to the later mental health risks for ME children, at least to age 4.5-years. Rather, a very similar set of maternal psychosocial risk factors were associated with both out-of-home placement and child adjustment problems, thus highlighting the importance of socio-environmental adversity leading to both child removal from parental care and externalising behaviour problems. Further longer-term follow-up of ME children will be important to fully understand the emerging relationships between out-of-home care and the mental health outcomes of ME children.

These study findings have important clinical and public health implications. First, the increased risk for socio-emotional and behavioural adjustment problems and disorder as observed among the ME group suggests that appropriate clinical support is needed to address the problems experienced by these children, with the preschool years being a timely opportunity for early targeted interventions. Second, given that high risk ME children are also a population likely to encounter considerable early environmental instability, public healthcare protocols should be introduced to meet the specific developmental needs of young ME children as they transition through and adjust to the placement process.

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List of Abbreviations

ADHD	Attention Deficit Hyperactivity Disorder
CCDRG	Canterbury Child Development Research Group
CBCL	Child Behaviour Checklist
CD	Conduct Disorder
CYF	Child, Youth and Family
DAWBA	Developmental and Well-Being Assessment
FAS	Foetal Alcohol Syndrome
HIV	Human Immunodeficiency Virus
ME	Methadone-Exposed
MIPs	Methadone in Pregnancy study
MM	Methadone Maintained
MMT	Methadone Maintenance Therapy
NAS	Neonatal Abstinence Syndrome
ODD	Oppositional Defiant Disorder
POE	Prenatal Opiate Exposure
SDQ	Strengths and Difficulties Questionnaire
VABS	Vineland Adaptive Behaviour Scale

Chapter One

Overview of Opiate Dependency and Methadone Maintenance Therapy

1.1 History and Clinical Description of Opiate Substances

Opiate substances are a cluster of narcotics that include the naturally derived forms of opium, heroin, morphine and codeine, and also synthetic drugs such as methadone and buprenorphine (Concise Medical Dictionary, 2010). Opiates are traditionally derived from the opium poppy and were historically used for their analgesic or pain relieving properties (Coleman, 2009). Collectively, it was the discovery and isolation of morphine and codeine from 1806 to 1832, the invention of the hypodermic needle in 1853, and the industrialised manufacturing of heroin in 1874 that contributed to the rise of opiate use, abuse and addiction (Cornwell and Cornwell, 1993). More recently, there has also been growing public health concern about the wide-spread availability and misuse of prescription pharmaceuticals containing opiates, leading to substantially higher rates of opiate substitution therapy enrolments worldwide (International Narcotics Control Board, 2008).

Opiates are clinically categorised as depressant substances given their sedating effects. Specifically, opiates depress the central nervous system and reduce heart rate, respiration and body temperature (CDHB, 2007; Concise Medical Dictionary, 2010). Opiates also act as an analgesic whilst inducing a temporary euphoric state due to the release of dopamine in the opiate receptors of the brain, subsequently mimicking the effect of the brain's naturally produced endorphins (Cornwell and Cornwell, 1993). Opiates are therefore often misused because of their psychoactive properties that create feelings of wellbeing, pleasure, warmth, and drowsiness. Changes in thought patterns, emotions and behaviours occur rapidly for the user in a psychologically reinforcing cycle that becomes highly addictive over time (CDHB, 2007; Cornwell and Cornwell, 1993). As a result, opiate dependency is commonly described as a consuming and debilitating substance abuse disorder characterised by chronic rates of relapse for the majority of users once tolerance and dependence is established (Deering, Sellman, Adamson, and Campbell, 2008; Rao, Dhawan, and Sapara, 2005).

1.2 Opiate Dependency in New Zealand

In terms of national trends in opiate addiction, recent estimates by Deering *et al* (2008) suggest that approximately 10,000 people in New Zealand were clinically dependent on opiates. Of these, 46% were engaged in community based opiate substitution therapy, including 87 individuals receiving treatment in prison. This report, however, only included users who were dependent on opiates on a daily basis, and excluded occasional users. Therefore, prevalence of opiate use, including both regular and sporadic use, may potentially be higher than this estimate suggests. A second 2007 – 2008 New Zealand Alcohol and Drug Survey conducted by Mason, Hewitt, and Stefanogiannis (2010) found that 4% of an adult sample aged 16 to 64-years (n = 6,500) reported using an opiate for recreational purposes at least once in their lifetime. Recreational use was defined as the use of an opiate for any purpose other than legitimate pain relief. This was estimated to account for approximately 94,000 New Zealanders that had ever misused an opiate at any given time.

Long acting morphine tablets and other prescription pharmaceuticals are the most common opiates abused in New Zealand. This is followed by opium poppies and 'homebake', a composite of heroin and codeine (CDHB, 2007). This is largely because pure heroin is difficult to import into New Zealand due to the country's geographical distance and isolation from large-scale overseas heroin manufacturers (MOH, 2010). Of the small proportion of users that do inject opiates in New Zealand, this tends to occur in late adolescence and within the context of poly-substance misuse (Deering *et al.*, 2008; Mason *et al.*, 2010). Men are significantly more likely to report using an opiate for recreational purposes than women (4.5 – 5.5% versus 3.0 – 3.8%), and first-time use typically occurs in the 25 – 34 year age group (Mason *et al.*, 2010).

By comparison, international trends in opiate dependency are somewhat different to New Zealand. For example, heroin tends to be the most common opiate abused internationally. It was estimated that 810,000 Americans were addicted to heroin in the year 2000 (ONDCP, 2000). Of these addicts, only 20% were officially enrolled in an opiate substitution therapy programme, which is lower than New Zealand rates of opiate substitution therapy (CDHB, 2007; Deering *et al.*, 2008; ONDCP, 2000).

In addition to the above trends, opiate use in New Zealand is similar to overseas samples in terms of gender patterns where males consistently out number females in heroin dependency by a ratio of three-to-one (Cornwell and Cornwell, 1993). Although male heroin users out

number female heroin users, there is also evidence to suggest that females are more likely to misuse a prescription drug than men. In a large American National Household Survey on Drug Abuse (*n* = 3,185), this gender difference was shown to be driven by women's increased risk for non-medical narcotic analgesic use after controlling for social background factors (Simoni-Wastila, Ritter and Strickler, 2004). In addition to this, opiates are the most commonly reported type of illicit substance to be misused by pregnant women addicted to narcotics, thereby making opiate dependent women a primary target group for opiate substitution therapies (McGlone, Mactier, and Weaver, 2009; Vucinovic, Roje, Vucinovic *et al.*, 2008; Yanai, Huleihel, and Izrael, 2003).

1.3 Methadone Maintenance Treatments for Opiate Dependency

To date, the most widely used pharmacological treatment for opiate dependency is methadone maintenance therapy (MMT) which is regarded as the 'gold standard' of clinical treatment (Farid, Dunlop, Tait, and Hulse, 2008). Methadone is a synthetic opiate that is used as an agonistic substance to replace the original opiate with a chemically similar substance that mimics the original opiate's neurobiological effect. It was first used as a maintenance therapy in America during the 1960's after successful efficacy trials, and was later introduced into New Zealand treatment settings in 1971 as the predominant pharmacotherapy method (CDHB, 2007). A recent meta-analysis of randomised controlled clinical trials (*n* = 1,969) of patients enrolled in MMT had significantly higher rates of treatment retention and lower rates of relapse than placebo or non-medicated control patients (Mattick, Breen, Kimber, and Davoli, 2009). To date, other synthetic opiates are either still being tested for efficacy in clinical research settings or are currently unavailable for clinical use in New Zealand (MOH, 2003).

Methadone stabilises the user by occupying the μ-opioid receptors of the brain with an excess of dopamine, facilitating relief from sudden neurological withdrawal (Greenwald, 2006; ONDCP, 2000). Methadone does not provide the same analgesic and euphoric episodes that chemically similar opiates do. Rather, it blocks the intoxication state that other illicit opiates produce. Methadone also relieves symptoms of physiological withdrawal 24 – 36 hours after dosage due to its slow onset and long bodily half-life, thereby stabilising blood-serum levels and reducing an individual's subjective and/or physical cravings for other illicit opiates (CDHB, 2007; Goff and O'Connor, 2007; ONDCP, 2000).

In New Zealand, the MMT is a 'harm reduction' approach aimed at promoting behavioural functioning and stability for the user in an integrated model of care (CDHB, 2007). A comprehensive, multidisciplinary method is used where a patient is treated in a holistic programme utilising both specialist and general practitioner care to address both mental health issues and neuro-physiological opiate dependency (Deering *et al.*, 2008). Opiate addicts are referred to a specialist Alcohol and Drugs Service clinic where their eligibility for MMT is assessed. It is through this service that individuals are provided psychological support and liquid doses of methadone as part of their methadone maintenance programme (CDHB, 2007). Approximately half of all enrolments on the methadone maintenance programme within New Zealand are women of childbearing age, with 25 – 30 enrolments in the Christchurch Methadone in Pregnancy service in any given year (Preston, 1999).

Abstinence-only therapies often result in poorer outcomes due to high relapse rates, whereas pharmacological substitution methods have higher efficacy rates in terms of preventing relapse by maintaining the user on stable and measureable methadone doses (Deering *et al.*, 2008; Greenwald, 2006; Mattick *et al.*, 2009). It is, however, important to note that methadone is as addictive as other more harmful opiates. The user will likely continue to be dependent on methadone throughout their therapy unless a full withdrawal plan is made with regular and supported methadone dose reductions (CDHB, 2007; ONDCP, 2000; Yanai *et al.*, 2003).

1.4 Opiate Maintenance Therapy and Pregnancy

Over the last 40-years, methadone maintenance therapy has increasingly become the primary treatment of choice for pregnant opiate dependent women both nationally and internationally (Jones, Martin, Heil *et al.*, 2008). This shift has occurred despite the scarcity of randomised clinical trials including pregnant women enrolled in methadone maintenance treatment (Minozzi, Amato, Vecchi, and Davoli, 2008) and a current lack of protocols with respect to safe methadone dose levels during pregnancy (Malpas, Darlow, Lennox, and Horwood, 1995; Jansson, DiPietro, and Elko, 2005). In response, interest in the obstetric outcomes and other therapeutic benefits of MMT for opiate-dependent women has increased (Rao *et al.*, 2005). While some attention has also been given to the clinical outcomes of prenatally methadone-exposed infants (Berghella, Lim, Hill, *et al.*, 2003; Kakko, Heilig, and Sarman, 2008; Quick Robb, and Woodward, 2009), the longer term outcomes of children born to methadone maintained women are still relatively unknown. However, given that there are many benefits

associated with maternal MMT, this treatment method continues to be highly regarded and widely used.

1.4.1 Maternal Benefits of Methadone Maintenance Therapy (MMT)

Methadone maintenance therapy for pregnant women is preferred for three main reasons: 1) the reduction of illicit drug use, 2) behavioural benefits, and 3) the stabilisation of the intra uterine environment. As reviewed below, much of this preference stems from evidence-based research that demonstrates significant positive effects on the user's lifestyle coupled with pharmacological stabilisation and a reduction in obstetric risks.

Reduction of Illicit Opiate Use Methadone maintenance therapy is recommended for pregnant women dependent on opiates as it significantly reduces the occurrence of other illicit opiate use. Methadone is metabolised in the body over a longer period than other short-acting opiates such as heroin. The physical effects of withdrawal and craving are minimised, reducing the need for other illicit opiates and in turn, limiting excessive opiate exposure for both the mother and her unborn baby (CDHB, 2007; Hayford, Epps, and Dahl-Regis, 1988; Greenwald, 2002; Greenwald, 2006; Jones *et al.*, 2008, ONDCP, 1998; ONDCP, 2000; Rao *et al.*, 2005; Rose, Branchey, Wallach, and Buydens-Branchey, 2003).

Additionally, liquid methadone prescribed in clinical settings is a carefully regulated and 'clean' dose. The risk of a fatal overdose occurring with unsupported opiate misuse is much reduced as prescribed methadone is free of the unexpected foreign substances that can often appear in illegal street forms of heroin, methadone and other opiates (CDHB, 2007). For pregnant women, the reduced intake of unregulated opiates limits foetal exposure to other additional or unexpected substances during prenatal development. Likewise, the reduction of unsafe intravenous opiate use also minimizes the risk of maternal and foetal exposure to blood-borne viruses, such as Hepatitis B, Hepatitis C, and HIV (CDHB, 2007).

However, it is important to note that although opiate substitution therapy stabilises and reduces opiate misuse, it does not necessarily target or reduce the use of other non-opiate substances (Deering *et al.*, 2008; Greenwald, 2006). Methadone specifically targets the opiate peptide receptors and reward pathways in the brain associated with opiate dependency only. Therefore, the patient may potentially continue to use other teratogenic substances such as alcohol, tobacco or amphetamines throughout their methadone treatments (Beswick, Best, Rees, *et al.*, 2001; Brands, Blake, Sproule, *et al.*, 2004; Brown, Britton, Mahaffy, *et al.*, 1998).

Behavioural Benefits As methadone lessens the subjective cravings for other opiates, the associated illegal or hazardous behaviours related to drug seeking are also indirectly reduced. These behaviours can include sexual promiscuity, stealing, violence and other antisocial behaviours that keep an opiate habit (CDHB, 2007; MOH, 2010; ONDCP, 1998). In addition, as methadone does not mimic morphine or heroin in its intoxicating effects or rapid physical withdrawal, MMT allows the user to better fulfil familial, occupational and treatment obligations without interference from psychoactive opiate use (CDHB 2007; Greenwald, 2006; Jones *et al.,* 2008). By minimizing the harmful behaviours and disruptive effects of regular opiate abuse, clinicians see a positive relationship between methadone maintenance therapy and maternal compliance with prenatal and antenatal care programmes, directly facilitating clinical benefits for the mother and her unborn child (MOH, 2001; Rao *et al.,* 2005; Soeptmi, 1994).

Stabilising the Uterine Environment Finally, MMT is preferable because it can help stabilise the uterine environment by avoiding the effects of erratic opiate misuse. For example, opiate-dependent mothers in MMT have been shown to have fewer obstetric complications than those not in MMT. Such complications can include placental insufficiency or abruption, premature delivery, and still birth (Hayford *et al* 1988; Vucinovic *et al.,* 2008). By alleviating sudden withdrawal symptoms with MMT, the risks contributing to the unfavourable obstetric outcomes resulting from uterine instability are much reduced (MOH, 2001). Methadone maintenance therapy, therefore, increases the likelihood that an opiate-dependent mother will carry her pregnancy to term.

Chapter 2

Direct Drug Effects: Pre- and Postnatal Outcomes of Exposed Infants

Current guidelines and protocols surrounding the clinical use of methadone with pregnant opiate-dependent women are somewhat controversial. Currently, dosage recommendations vary from case-to-case, with the goal being a balance between the needs of maternal physiological stability in conjunction with the level of foetal exposure to methadone (Berghella *et al.*, 2003). Whilst maintenance therapy offers physiological, health and behavioural benefits for the mother, the extent to which maternal methadone dose during pregnancy impacts foetal and infant development is relatively unknown.

2.1 Methadone Transferral to the Foetus: Biological Pathways

Substances that disrupt foetal development by crossing the placental barrier during the gestational period are referred to as teratogens (Jansson *et al.*, 2005; Kail and Cavanaugh, 1996). Recognised as a teratogen, methadone can be transferred to the foetus both directly and indirectly. The direct transfer of methadone occurs at the connecting placental tissues or maternal lobules that join the foetal receptors to the placenta (Gedeon and Koren, 2005). Direct transfer of methadone can also occur through the amniotic fluid and via the maternal blood system moving through the umbilical cord (Nekhayeva, Nanovskaya, Deshmukh, *et al.*, 2005).

It is also important to note that maternal pharmacokinetics can also indirectly influence the level of prenatal exposure to methadone. Maternal pharmacokinetics is the process by which a substance is absorbed, distributed, metabolized and eliminated by the body (Doberczak, Kandall, and Friedmann, 1993). Changes in the maternal gastrointestinal absorption of methadone, concentrations of proteins in the maternal blood system, and the lipid solubility of maternal and foetal fluids can collectively influence the rate of methadone transfer across the placenta (Farid *et al.*, 2008; Gedeon and Koren, 2005). These maternal physiological changes typically occur during the third trimester where maternal bodily fluids increase. This in turn requires an increase in methadone dose to stabilise increasing maternal plasma levels, thereby increasing the level of foetal exposure to methadone (McCarthy Leamon, Parr, and Anania, 2005).

2.2 Foetal Effects of Maternal Methadone Maintenance

Despite the maternal benefits of methadone stabilisation during pregnancy, recent animal and human-based research has suggested that the administration of synthetic opiates may negatively affect the development of the foetal brain and central nervous system, particularly during the first and second trimesters of pregnancy (Yanai *et al.,* 2003). Animal studies using mice and rats have demonstrated direct drug effects on the neurological system. For example, a study of mice (*n* = unreported) born to dams injected with 10mg/kg of heroin on gestational days 9 – 18, reported that the adult offspring had impaired septohippocampal cholinergic innervations. This postnatal effect was said to contribute to the adult offspring performing poorly during maze tests, suggesting that prenatal opiate exposure may affect later neurobehavioural development. Several other rat studies have also demonstrated significant neural impacts resulting from prenatal exposure to methadone. Daily exposure to 5mg of methadone during gestation was shown to result in decreased cerebral weights, reduced cortical thickness and reduced neuronal cells in exposed pups over the first three-weeks of life in comparison to the non-exposed control pups (Ford and Rhines, 1979; Zagon and McLaughlin, 1977; Zagon and McLaughlin, 1982). In addition to the disruption observed in global neurological development, another study also demonstrated central nervous system deficits in methadone exposed rats. Here, three-week old methadone-exposed pups fostered to untreated dams displayed elevated levels of acoustic startle than non-exposed pups. This effect remained after controlling for pup body weight (Hutchings, Zmitrovich, Brake, *et al.*, 1993).

Whilst experimental human studies are not possible, an increasing number of observational studies also suggest that prenatal methadone exposure may affect the nervous systems of neonates born to methadone-dependent women. Methadone-exposed babies have been observed to have poorer state regulation than non-exposed infants, suggesting the presence of subtle nervous system disturbances that could not be accounted for by licit and illicit maternal drug use during pregnancy (Quick *et al.,* 2008). Other studies have also shown that these early nervous system difficulties are evident during gestation based on ultrasound analysis of foetal development, suggesting that these nervous system deficits in direct response to prenatal methadone exposure may in fact be seen earlier than in the postpartum period (Jansson *et al.,* 2005; Ramirez-Cacho, Flores, Schrader, *et al.,* 2006; Wouldes, Roberts, Pryor, *et al.,* 2004).

The New Zealand Ministry of Health (2001) acknowledges that more than 30mg of methadone consumed daily may cause respiratory depression in the foetus, despite the mean maternal dose being closer to 60mg in recent study samples and clinical practice (see Jansson *et al.,* 2005; Quick *et al.,* 2008; Wouldes *et al.,* 2003; Wouldes and Woodward, 2010). Effects on the foetal nervous system can be observed from the onset of methadone dose administration and up to one hour post dosage, as evidenced by a significant decrease in the foetal respiration and breathing movements per breathing episode (Wouldes *et al.,* 2004). The foetal heart rate also slows (Jansson *et al.,* 2005; Ramirez-Cacho *et al* 2006; Wouldes *et al.,* 2004) and there is a significant decrease in foetal motor activity signalled by reduced rates of foetal trunk movements (Jansson *et al.,* 2005; Wouldes *et al.,* 2004). Moreover, due to the restricted availability of oxygen in utero as a result of depressed foetal respiration, foetal hypoxia can occur which may further contribute to adverse clinical and developmental outcomes for infants prenatally exposed to methadone (Rees and Inder, 2005).

2.3 Clinical and Neurobehavioural Outcomes of Methadone-Exposed Infants at Birth

There is growing evidence to suggest that infants born to mothers maintained on methadone tend to be at risk for a range of adverse outcomes. These include premature birth, restricted growth marked by decreased birth-weight, length, and smaller head circumference, and elevated rates of neonatal abstinence syndrome (Brooks-Gunn, McCarton, and Hawley, 1994; Hayford *et al.,* 1988; Quick *et al.*, 2008; Soepatmi, 1994). For example, a study by Quick *et al* (2008) found that that methadone exposed infants (n = 51) were significantly lighter (p <.001), had smaller head circumferences (p = .001), and tended to be slightly shorter (p = .09) than non-exposed infants (n = 42) at birth. Furthermore, the methadone effect was still evident after taking into account the effects of confounding maternal factors. The extent of exposure, or maternal methadone dose, also appears to be an important predictor of neonatal clinical and neurobehavioural outcomes.

Neurobehavioural outcomes at birth are of particular interest in the study of prenatal methadone exposure as they illustrate possible early biological and neurobehavioural effects of methadone on the neonate's central nervous system. One adverse neurobehavioural outcome that has been well documented in infants born to mothers maintained on methadone is the association between maternal methadone dose and Neonatal Abstinence Syndrome (NAS).

Neonatal Abstinence Syndrome. NAS is a common bio-behavioural complication experienced by neonates born to methadone-maintained mothers (Soeptmi, 1994). NAS occurs as the result of the opiate transferring to the foetus via the placenta. This causes a bio-behavioural drug dependency in the neonate similar to that observed in adult opiate users. Once separated from the maternal source shortly after birth, the infant experiences sudden physical withdrawal symptoms (Yanai *et al.*, 2003). The CNS and gastrointestinal symptoms of this syndrome include irritability, sensitive startle responses, hyperactive muscle reflexes, uncoordinated sucking and swallowing, sleep disruption, shrill crying, vomiting, diarrhoea and progressive weight loss. In severe cases of NAS, neonatal seizures may also occur (Brooks-Gunn *et al.*, 1994; Hayford *et al.*, 1988). Higher rates of NAS among ME babies suggests that there are unique infant withdrawal symptoms specifically attributable to methadone in comparison to prenatal exposure to other opiates and their synthetic counterparts (Hayford *et al.*, 1988; Health System Virginia, 2004).

The prevalence of NAS in methadone-exposed infants varies across samples. Generally, NAS is reported in 60 - 80% of clinical samples (Berghella *et al* 2003; Kakko *et al.*, 2008; Quick *et al* 2009), with 40 - 60% of these infants experiencing severe NAS symptoms that requires pharmacological treatment with morphine to manage infant withdrawal symptoms (Berghella *et al* 2003; Hunt, Tzioumi, Collins, and Jeffery, 2008; Kakko *et al.*, 2008; McCarthy *et al.*, 2005; Wouldes & Woodward, 2010). Infants born close to term also appear to be at risk of more severe levels of NAS than preterm infants due to their longer gestational exposure (Doberczak, Kandall, and Wilets, 1991), suggesting that the duration of exposure and foetal maturity may play an important role in the expression of NAS.

Dose-Response Relationships. In addition to the associations between the timing of methadone exposure and risk of NAS, a positive linear relationship has been found between maternal methadone dose and later infant risk of NAS. Specifically, higher maternal methadone doses were correlated with more severe NAS symptoms (Dryden, Young, Hepburn, and Mactier, 2009; Malpas *et al.*, 1995; Wouldes and Woodward, 2010). However, several other studies failed to find a significant relationship between maternal methadone dose and the risk and severity of NAS. Here, low and high maternal methadone dose did not differentiate neonates born to methadone maintained mothers (MM) in terms of cases of NAS diagnosed, required pharmacological intervention and time until hospital discharge (Berghella *et al* 2003; McCarthy *et al.*, 2005). Given these contradictory findings, further research examining dose-response relationships is warranted.

Chapter 3

Overview of the Socio-Emotional and Behavioural Outcomes of Children Born to Methadone Maintained Mothers

As a result of the early medical risks observed in infants born to MM mothers, there have been increasing concerns about the longer term developmental outcomes of children born to mothers maintained on methadone during pregnancy. While several studies have examined the longer term effects of prenatal exposure to heroin, the outcomes of children born to women maintained on methadone in pregnancy are less well understood, particularly with respect to child mental health outcomes. This issue forms the first primary focus of this thesis.

To identify existing published studies concerned with the mental health outcomes of children who were exposed to methadone in utero, a comprehensive database search was conducted. The databases PsycINFO, PubMED, ScienceDirect, and Google Scholar were systematically searched for relevant articles. Study selection criteria included prenatal opiate exposure (heroin, methadone, and/or poly-opiates); children followed to preschool or school-age; and included outcome measures assessing child socio-emotional and behavioural adjustment spanning attachment disorder, anxiety and affective disorders and attention-deficit and conduct/antisocial disorders. Both longitudinal and cross-sectional studies were selected. Using these criteria, six studies were identified, the summaries of which are presented in Table 1 below. Of the selected studies, only one study examined the effects of methadone alone. The remaining studies used poly-opiate exposed samples. Studies that evaluated the impact of foster care placement were deferred for the second literature review, as the outcomes of opiate-exposed children placed in out-of-home care formed the second major focus of this thesis.

3.1 Socio-Emotional Adjustment Outcomes of Children Prenatally Exposed to Opiates

Findings from studies examining the effects of prenatal heroin/methadone exposure research on key child mental health outcomes are reviewed in two parts. First, studies reporting the socio-emotional outcomes of children born to women enrolled in MMT were reviewed. Poor socio-emotional outcome in childhood was defined as insecure parent-child attachment, difficulty with peer interactions, or excessive anxiety and/or mood symptoms causing significant distress and impairment in daily functioning (Achenbach, 1992). Following this

section, the studies examining behavioural outcomes of heroin/methadone exposed children were reviewed.

A recent case-control longitudinal study by Hunt *et al* (2007) examined a range of developmental outcomes of children born to methadone maintained mothers, one of which was social maturity at 18-months old and 3-years of age. Pregnant methadone-dependent women were recruited between 1979 and 1984 from a methadone maintenance therapy (MMT) programme (n = 133), alongside non-dependent women (n = 103) randomly selected from the same hospital antenatal clinic. Both groups were matched for age, ethnicity, obstetric history and height. Exclusion criteria for the MM sample included non-compliance with the MMT programme, defined as a failed urine test for poly-substance use. Follow-up evaluations of these children were conducted at ages 18-months and 3-years, using the Vineland Social Maturity Scale which assesses preschool social competence. Across both time points, ME children obtained significantly lower mean social competency scores than non-exposed children. However, as the study did not report the individual findings for any of the eight subscales, it was unclear what specific aspects of social competence were impaired. Furthermore, this study was also characterised by high sample attrition, with only 67 of the original 113 study children retained to age 3, thus potentially introducing some sample selection bias into the study results. Despite these limitations, findings tentatively suggest that ME children may be subject to delays in social development, and that social communication, socialisation and self-help may be impaired.

A second study that also evaluated the socio-emotional outcomes of cocaine/opiate exposed children was a longitudinal study by Rodning Beckwith, and Howard (1989). This study focused on the socio-emotional development of 32 children prenatally exposed to cocaine and/or opiates (heroin = 8, methadone = 6) alongside 41 premature children born less than 36-weeks as a case-control match for biological risk. Mothers were recruited from the UCLA Medical Centre antenatal unit, where women were assigned to the conditions based on the results of urine tests used to screen for illicit narcotics. Children were then assessed at 18-months corrected age to examine the effect of prenatal drug exposure on mother-infant attachment and infant play. Exposed children were assessed with the Gesell Scales of Infant Development and the premature children were assessed with the Bayley-II Scales of Infant Development, with both groups also observed during a spontaneous play session. Observations of play sessions were scored in situ for manipulation of toys, relational play and symbolic play. In terms of developmental outcomes, the study found that a greater proportion

of exposed infants were in the low to average range on the developmental measures than premature infants. In addition, exposed children were approximately three-times more likely to have an insecure attachment style than the premature infants, and demonstrated higher rates of disorganised play (i.e. more scattering behaviour, switching between toys, and less explorative behaviour). Although the study had a small sample of exposed children, used different developmental measures in each group, and failed to isolate the effects of opiates from other substances, the study suggests impairments across social, cognitive and affective domains of development. It also suggested that these problems appear to specifically reflect the effects of either prenatal drug exposure or living with a drug-dependent mother.

Soeptami's (1994) longitudinal cross-sectional cohort study was the third study identified. A subsample of heroin/methadone exposed children (n = 91) and non-exposed comparison children (n = 66) were recruited at 12-months old and then followed to the ages of 4 to 12-years old depending on their recruitment wave. Independent confirmation of maternal drug use during pregnancy was not reported, and while sample selection criteria was also not reported, both samples were recruited from the same neonatal unit. At follow-up, children were assessed on a range of neurodevelopmental outcomes. Similar to Hunt *et al*'s (2007) study, Soeptami also measured social competence as a key developmental outcome. Using the Child Behaviour Checklist, Soeptami found that 4 – 5-year old heroin/methadone exposed boys (p = .011), and 6 – 11-year old heroin/methadone exposed girls (p = .009) were at increased risk of social competency problems than the comparison children. However, the actual rates of the heroin/methadone children with poor outcome were not reported. The study was particularly limited by its inadequate consideration of contextual confounding factors and did not consider the possible role of poly-opiate exposure. Therefore, any direct effect of heroin/methadone on social competence for these children remained unclear.

To summarise, the three reviewed studies consistently found that children born from heroin/methadone using women experienced more difficulties with peer relationships, were characterised by lower levels of social competence and had higher rates of insecure attachment. Despite the attention given to the socio-emotional development of children prenatally exposed to methadone, very little is known about the rates of internalising disorders present in samples of children born from MM mothers. The majority of past studies have examined the emotional wellbeing of children who are prenatally exposed to substances such as cocaine, alcohol, tobacco and/or marijuana, with very little research focusing on opiates.

Of the research that does exist, prenatal exposure to alcohol, tobacco and/or marijuana in the first and third trimesters of gestation is thought to be a significant predictor of childhood depressive disorders in samples ranging from 5, 6, 10, and 18-years old (Fergusson, Woodward, and Horwood, 1998; Gray, Day, Leech, and Richardson, 2005; O'Conner and Kasari, 2000). Prenatal alcohol, tobacco or cocaine exposure is also thought to be a significant predictor of childhood anxiety disorders such as generalised anxiety and separation anxiety throughout early and late childhood, as well as during adolescence (Fergusson *et al.*, 1998; Morrow, Accornero, Xue, *et al.*, 2009; Simon, Bogels, Stoel, and Schutter, 2009). Furthermore, these relationships have been shown to persist after statistical control for parenting practices, current parental substance use and other environmental factors (O'Conner and Kasari, 2000). Despite the consistency in findings, none of the previously reviewed studies included measures of psychiatric attachment, anxiety or mood disorders. While the reviewed studies have shown that heroin/methadone exposed children are a group affected by subclinical socio-emotional disturbances, it is currently unknown whether this population is also at greater risk of internalising disorders. This thesis addresses this research gap by examining rates of attachment, anxiety and mood disorders in a preschool sample of ME children.

3.2 Behavioural Adjustment Outcomes of Children Prenatally Exposed to Opiates

The second key developmental outcome of interest was the behavioural adjustment of children prenatally exposed to methadone. Poor behavioural adjustment in childhood was defined as persistent patterns of aggressive, noncompliant, hyperactive and/or impulsive behaviours (Achenbach, 1992; Mash and Barkley, 2003). Externalising problems and rates of attention-deficit/hyperactive disorder (ADHD) are particularly prominent in heroin/methadone-exposed samples of children, and these problems may become apparent as early as 3 years of age (Hayford *et al.*, 1988; Soepatmi, 1994). However, less is known about the extent of conduct disorder (CD) and oppositional defiant disorder (ODD) in this population. Three studies examining the behavioural outcomes of heroin/methadone exposed children met the methodological selection criteria and are described below.

The first of the three studies reviewed was a cross-sectional study by Ornoy, Segal, Bar-Hamburger, and Greenbaum (2001). This study compared the behavioural outcomes of children aged 5 – 12 years whose mothers (n = 65) or fathers (n = 33) abused heroin to examine the effects of prenatal heroin exposure (maternal-only use) against postnatal heroin exposure (paternal-only use). Two non-exposed comparison groups were also enrolled in the

study. These non-exposed children were categorised by low (n = 32) and average SES (n = 30) to control for environmental deprivation. The sample was consecutively enrolled in the study based on referral to the Jerusalem Institute of Child Development. At the time of assessment, most mothers were enrolled in a methadone maintenance therapy programme. Detailed information about maternal drug use was not reported. Child outcomes assessed included multiple measures of ADHD were used, including the Conners Questionnaire, the Pollack Taper test, and the Child Behaviour Checklist (CBCL). Findings revealed that 54% of children prenatally exposed to heroin (i.e. maternal heroin dependency) raised at home met DSM-IV diagnostic criteria for ADHD, which double the rate of ADHD found in children with heroin dependent fathers only (24%), and non-exposed children from low SES backgrounds (21%, p = 01). Although the study acknowledged many limitations, including retrospective analysis of some cases, inadequate consideration of poly-substance exposure and incomplete data for very high-risk children, it did consider the effects of other socio-familial risk factors such as maternal diagnosis of ADHD. More importantly, this study highlighted the double hazard nature of this population in terms of both adverse pre- and postnatal influences potentially shaping behavioural outcomes. That is, these children are often dually affected by the neurobiological effects of methadone and the socio-familial factors associated with parental methadone dependency.

Similar to the Ornoy *et al* (2001) study, Seuss, Newlin, and Porges (1997) also examined the association between prenatal opiate exposure and ADHD. Attention-deficits were assessed in a sample of 7 – 12-year old boys born to mothers enrolled in methadone clinics during pregnancy. At follow-up, mother-child dyads previously enrolled in the existing longitudinal study were contacted for follow-up by telephone. From previous study assessments, hospital drug records were available to verify maternal drug use. Exclusion criteria included other drug-use in pregnancy. A dyad was also excluded if the child was being medicated for ADHD at follow-up. Of the re-enrolled dyads, the sample was split into two groups, mothers who reported heroin/methadone use during pregnancy (n = 15) and mothers who reported first use within the child's first five-years of life (n = 13). A non-exposed sample matched by socio-economic status (SES) was also recruited (n = 15) for comparison purposes. Initial findings revealed that the prenatally heroin/methadone-exposed boys failed to show suppressed respiratory sinus arrhythmia, a physiological indicator of the parasympathetic nervous system and inhibitory control during the Gordon Diagnostic System-Distractibility (GDS) task. This finding was also supported by prenatally heroin/methadone-exposed boys having fewer correct responses and higher error rates during the GDS than postnatal exposed

and non-exposed boys ($p < .05$). This effect remained after controlling for co-varying alcohol, tobacco and marijuana exposure. However, during the second phase of this study, the respiratory sinus arrhythmia effect was no longer present when the exposed-boys were offered an extrinsic incentive during the tasks ($p < .10$). Instead, increased impulsivity and higher error rates were found to be associated with poly-exposure to alcohol and heroin/methadone rather than heroin/methadone alone. Although these findings were based on a small sample, this study provides some preliminary suggestion that prenatal exposure to heroin/methadone is associated with increased levels of impulsivity. However, there may be other complex neurobiological and environmental mechanisms contributing to these observed behavioural and attentional difficulties.

Extending on these studies, Walhovd, Moe, Slinning, *et al.*, (2007) examined neurological correlates of CBCL scores for adopted heroin-exposed ($n = 14$) and adopted non-exposed ($n = 14$) children as part of a case-control longitudinal study that was the first of its kind to include Magnetic Resonance Imaging (MRI) techniques. The caregivers of these adopted children were recruited from an existing prenatal risk project, and were selected for this study based on concerns surrounding maternal drug use as reported in their antenatal records. These mother-child dyads were recruited when the child was an infant with follow-up between the ages of 9 – 11-years old. Exposed children living in adoptive homes ($n = 29$), those in unknown living conditions ($n = 4$) and those diagnosed with foetal alcohol syndrome ($n = 3$) were excluded. At follow-up, mothers completed the CBCL and the study children underwent a structural MRI scan. Significant between-groups differences were found on the CBCL with exposed children obtaining higher scores on the CBCL Total Problems scale ($p = .02$) and Attention Problems scale ($p = .003$) but not the Externalizing Problems scale ($p = .12$). Second, volumetric MRI analysis revealed that the thickness of right lateral orbito-frontal cortex negatively correlated with the Attention Problem and Total Problem scales ($ps < .05$), after partialling out the effects of gestational age, age at scan and gender. While this study had a considerably smaller sample size than the other reviewed studies and it could not establish cause and effect from correlations, it provides some evidence that prenatal exposure to heroin, and possibly other opiates, may have an effect on brain and behavioural development.

These reviewed studies suggest a clear link between prenatal heroin/methadone exposure and later child attention-deficit problems. While the focus has tended to be on hyperactivity and inattention (e.g. Pulsifer, Radonovich, Belcher, Butz, 2004), little research has also

considered how ME children might be at risk of noncompliant and antisocial behavioural disorders. Therefore, it is increasingly important that research considers a wider range of behavioural difficulties, since noncompliant and antisocial problems in early childhood have been strongly linked with academic underachievement, antisocial and/or promiscuous behaviours and substance abuse disorders during adolescence (Barkley, 2002; Linskey and Hall, 2001). Therefore, the second key mental health outcome of this study is to examine a wider range of behavioural outcomes than previously studied by describing the rates of ADHD, hyperkinesis, ODD and CD in preschool children born from methadone-maintained women.

3.3 Methodological Issues of Opiate Exposure Research

Studies examining the direct effects of prenatal methadone exposure on early emotional and behavioural adjustment consistently suggest a tendency towards poorer outcomes for these children. However, it is important to note that the majority of these studies are limited by a range of methodological problems. These existing limitations include: the recruitment of small and selective samples, (Seuss *et al.,* 1997; Walhovd *et al*., 2007), high rates of sample attrition, (Hunt *et al.*, 2007; Pulsifer *et al.*, 2004), reliance on maternal-self report of maternal methadone dose during pregnancy and for child outcomes (Hunt *et al.,* 2007; Ornoy *et al.,* 2001; Rodning *et al.*, 1989; Seuss *et al*., 1997; Soepatmi, 1994; Walhovd *et al.,* 2007), and limited consideration of the effects of confounding factors (Hunt *et al.*, 2007; Soepatmi, 1994; Rodning *et al.*, 1989).

First, a number of studies are characterised by the use of small and selective samples. For example, Seuss *et al.,* (1997) recruited an exposed sample of 15 children and Walhovd *et al.,* (2007) had a similar sized sample of 14 exposed children, possibly reducing the statistical power needed to detect a significant between-groups difference (Howell, 2007). Other studies have attempted to remedy this problem by recruiting larger poly-opiate (i.e. heroin/ methadone or cocaine/opiate) exposed samples to increase statistical power but fail to consider the confounding effects of poly-substance exposure (Moe, 2002; Ornoy *et al.*, 2001; Pulsifer *et al.*, 2004; Soepatmi, 1994). This becomes a limitation as the extent to which child outcome can be conclusively linked to methadone becomes unclear.

Second, for those studies that are able to recruit larger samples of children, bias can also arise from the high rates of sample attrition. This is particularly problematic for longitudinal studies. Adequate sample retention can be difficult to achieve when studying high-risk

families over longer periods of time, as these families are typically characterised by high levels of environmental instability and often become untraceable (Hunt *et al.*, 2007; Pulsifer *et al.*, 2004). As a result, the most at-risk children are consequentially often lost to follow-up, further limiting the interpretation of study findings.

Third, a reliance on maternal self-report as the primary measure of opiate misuse is another limitation of many studies examining the outcomes of children born to opiate-dependent women (Ornoy *et al.*, 2001; Rodning *et al.*, 1989; Walhovd *et al.*, 2007). Studies that do not include systematic and detailed toxicological records to confirm drug use in pregnancy often fail to adequately capture the true extent of foetal methadone and poly-substance exposure. While Seuss *et al* (1997) implemented a detailed maternal interview accounting methadone use in pregnancy and overall lifetime, hospital records of methadone use were unavailable for all mothers and inconsistencies were found in some records that were available. Self-report as the main measure of maternal drug use is also thought to be particularly unreliable when used retrospectively, as substance-dependent women may either underestimate their level of drug use or withhold the full extent of their drug use for fear of legal intervention by child protective services (Lester, Mahound, Wright, *et al.*, 2001; Seuss *et al.*, 1997).

Fourth, the majority of published studies also use maternal-report as the primary means of assessing child socio-emotional and behavioural adjustment problems. For example, Crea, Barth, Guo, and Brooks (2008), Soeptami (1994) and Walhovd *et al.* (2007) all make use of the parent-report Child Behaviour Checklist or Behaviour Problems Index as the sole measure of socio-emotional and behavioural difficulty experienced by the children in their samples. The lack of an objective clinical measure may mean that the results of these studies could be prone to maternal-report bias, as maternal-reports by mothers with mental health and substance abuse disorders has previously been shown to be unreliable in comparison to reports made by non-disordered mothers (Chi and Hinshaw, 2002; Hennigan, O'Keefe, Noether, *et al.*, 2006; Mash and Johnston, 1983).

Fifth and finally, few existing studies have considered how other mechanisms associated with maternal methadone dependency might also contribute to child outcome, given that children born from methadone-dependent women are acknowledged as being a double jeopardy population. A reliance on bivariate or between-groups analysis (e.g. Hunt *et al.*, 2007; Soepatmi, 1994; Rodning *et al.*, 1989) provides only a limited insight into the complexities of being raised in a home affected by methadone-dependency, and does not consider how other factors may also be contributing to outcome. Covariate adjustment and regression modelling

is often lacking in these types of studies, and would be useful to determine if environmental risk helps explain the poorer emotional and behavioural outcomes of ME children over and above the effects of prenatal methadone exposure.

Table One

Summary of Socio-emotional and Behavioural Adjustment Outcomes in Prenatally Opiate Exposed Children

Study	Design and Recruitment Source	Group(s) of interest	Comparison Group(s)	Research Question	Outcome Measures	Effect, Findings	Design Strengths	Limitations
Hunt *et al.* (2007)	Case-control study from a longitudinal cohort, follow-up at 3-years	Prenatal methadone-exposed (ME) *N* = 133	Non-exposed (NE) *N* = 103	Social development of children diagnosed with NAS at birth	Vineland Social Maturity Scale	ME sample had significantly lower mean social maturity scores than non-exposed at 18-months and 3-years *(p <.05)*	Large sample, prospective, matched comparison sample, poly-substance using mothers excluded from study	No reporting of maternal substance use in pregnancy, methadone dose not reported, bivariate analysis only
Ornoy *et al.* (2001)	Cross sectional, between groups comparisons 5 – 12 years	Heroin-exposed raised at home *N* = 31 Heroin-exposed adopted *N* =34	Non-exposed children born to dependent fathers *N* = 33 Low SES *N*= 32 Control average SES *N* = 30	Focus on prenatal impact of substance using parents, given prenatal exposure to heroin and/or methadone on child behaviour and IQ	The Conners Questionnaire The Pollack Taper Test CBCL	Highest rate of ADHD found in children born to mothers with heroin dependency raised at home *(p = .01)*	Multiple comparison groups, considered maternal prevalence of ADHD	Poly-substance use not isolated in analysis, incomplete data for clinical outcomes at birth for those adopted out, reliance on maternal self-report of drug use, methadone dose not reported, some cases assessed retrospectively

Table One

Summary of Socio-emotional and Behavioural Adjustment Outcomes in Prenatally Opiate Exposed Children

Study	Design and Recruitment Source	Group(s) of interest	Comparison Group(s)	Research Question	Outcome Measures	Effect, Findings	Design Strengths	Limitations
Rodning *et al.*, 1989	Longitudinal follow-up at 18-months	Drug exposed: Cocaine *N* = 14 Heroin *N* = 8 Methadone *N* = 6 PCB *N* = 4	Biologically high-risk sample of preterm children *N* = 41	Prenatal drug exposure on socio-emotional development: representational play, unstructured play, attachment	The Bayley-II Scales of Infant Development, Gesell Scales of Infant Development, The Strange Situation procedure	Representational play significantly less frequent and less varied for exposed group ($p = .0001$) Higher rates of avoidant (50%) and ambivalent (11%) attachment styles in exposed group ($p = .02$)	Prospective, longitudinal, samples from similar SES backgrounds, considered the role of premature birth	Sample contaminated by poly-drug use (N = 30), combined drug-exposure analysis, bivariate analysis due to smaller sample size, methadone dose not reported
Seuss *et al*. (1997)	Longitudinal follow-up, restricted to male children (7 – 12 years old)	Prenatal Heroin/Methadone and Alcohol exposed, *N* = 15	Boys living with a substance dependent mother without prenatal exposure *N* = 13 Non-exposed *N* = 15	The effects of incentive on sustained attention for prenatally-exposed boys Pre- vs.postnatal effects of opiates and alcohol	The Gordon Diagnostic System-Distractibility Task for ADHD diagnosis	With incentive, exposed children had fewer correct responses and higher error rate, approached sig. only *($p < .10$)*	Two comparison groups, considered maternal covariates, direct vs. indirect effects of exposure to opiates and alcohol	Reliance on maternal self-report of drug use, small sample size, comparison groups not randomly selected, methadone dose not reported

Table One

Summary of Socio-emotional and Behavioural Adjustment Outcomes in Prenatally Opiate Exposed Children

Study	Design and Recruitment Source	Group(s) of interest	Comparison Group(s)	Research Question	Outcome Measures	Effect, Findings	Design Strengths	Limitations
Soeptami. (1994)	Case-control longitudinal study (4 – 12 years old)	Heroin and/or Methadone-Exposed (H/ME) *N* = 91	General population reference group *N* = 66	Effects of opiate exposure on child intelligence, behaviour and social competency	CBCL	Poorer Outcome and more School Problems on CBCL for H/ME in foster-care *(p = .03)*	Large H/ME sample, considered large range of maternal confounds: maternal SES, partner status, smoking in pregnancy, prenatal care compliance	No reliable measure of maternal poly-substance use, poor consideration of confounds, methadone dose not reported
Walhovd *et al*. (2007)	Case control longitudinal (9 – 11 years old)	Heroin-Exposed (HE) *N* = 14	Non-Exposed *N* = 14	Volumetric cerebral characteristics of children exposed to opiates and other substances in utero	CBCL	CBCL Total Problems (p = .02), Attention Problems (*p* = .003), and Social Problems, *p* = .001), but not Externalizing (*p* = .12). Thickness of right lateral orbito-frontal cortex correlated sig. with all behavioural subscales *(p < .10)*	Limited sample to exclude environmental events (e.g. foster care) to specify direct drug effects, excluded participants with FAS, considered differences between respondents and non-respondents	Small sample size, no reliable measure or reporting of heroin or other drug use

NB: CBCL: Child Behaviour Checklist, NAS: Neonatal Abstinence Syndrome, Poor Outcome: Composite score of Total Social Competence Score and IQ

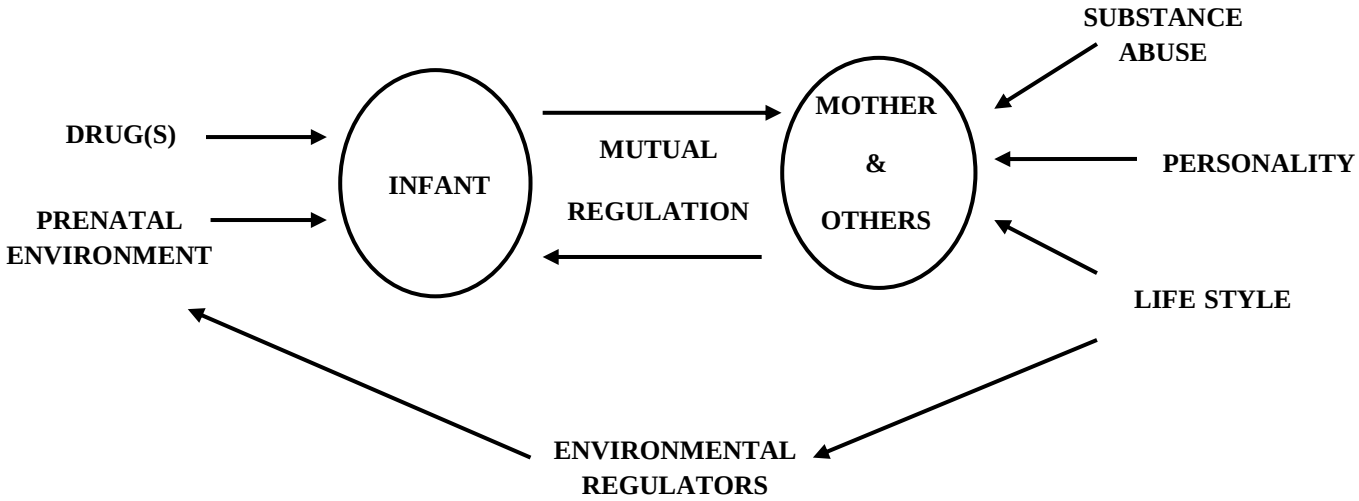
3.4 Systems Approach and Substance Dependent Families

As outlined earlier, ME children can be viewed as a double jeopardy population given that they are subject to both the teratogenic effects of methadone during pregnancy and are also more likely to be raised in socio-economically disadvantaged families by one or two parents affected by opiate abuse disorders. Specifically, in addition to direct methadone exposure during pregnancy, these children often grow up in families characterised by ongoing maternal mental illness and family instability. Such socio-familial risk factors have also been linked to an increased risk of child emotional and behavioural adjustment problems.

The dual hazard of both biological and environmental factors associated with prenatal drug exposure is illustrated in Figure 1 below (Lester and Tronick, 1994). This model illustrates how the complex dynamics seen between prenatal cocaine exposure and environmental factors may interact and shape a child's socio-emotional and behavioural development. Concerns about the multiple pre- and postnatal risk factors that contribute to poorer child outcomes further highlight the need to consider the effects of both sets of factors on child developmental outcomes.

Figure 1:

Systems Approach to Study of Cocaine (Lester and Tronick, 1994)



Because of this complex double jeopardy issue, a second major area of interest in this thesis concerns how these environmental mechanisms may also be contributing to the outcomes of children born from women enrolled in methadone therapies. One such mechanism that has received little attention but may be having an impact on child mental health is environmental instability. As will be discussed below, ME children are at particular high risk of child protection concerns, and in turn, placement in out-of-home care (Hunt *et al.*, 2008; McGalde, Ware, and Crawford, 2009). However, few studies have systematically documented the extent and nature of these child protection and placement experiences or the effects of placement on ME children's mental health outcomes. This issue forms the second central aim of this thesis.

Chapter 4

Overview of Foster Care Research and the Socio-Emotional and Behavioural Outcomes of Methadone-Exposed Children Placed in Care

4.1 Foster Care Placement in New Zealand

Rates of child foster care placement are increasing in New Zealand by about 10 – 12% on average per year (Maharey, 2000). Likewise, the number of Australian children in the general population placed in the foster care system has also increased from 0.33% in 1997 to 0.46% in 2003 (Australian Institute of Health and Welfare, 2004). However, in contrast to Australia and overseas, New Zealand children are more likely to be placed with relatives than non-relative caregivers. For example, Maharey (2000) reported that of the 3,467 New Zealand children in protective care during February 2000, approximately one third were placed in relative or kinship care; of which 42% were Māori. By comparison, children born in European countries are more likely to be placed with non-relative caregivers (Child Welfare Information, 2009).

Several potential explanations may account for the increasing prevalence of foster care placements internationally. First, as Fisher, Burraston, and Pears (2005) suggests, the legal change in the mandatory reporting requirements of child abuse and neglect has seen an increase in the number of investigations made by child protective services. Secondly, this report also suggests that the resources required by social services to fully mitigate the family problems leading to investigation are largely underfunded, often resulting in the removal of a child as the family's difficulties are unlikely to be resolved in the short-term. Lastly, Fisher *et al* (2005) also recognises that more children enter foster care services than are successfully placed due to a lack of suitable and permanent foster care homes. Therefore, as the prevalence of foster care placement is increasing worldwide, more attention is needed to fully understand how this experience might be contributing to the poorer developmental outcomes observed in samples of high-risk children.

4.2 Pathways into Out-of-Home Care

In New Zealand, placement in out-of-home care typically occurs as part of a three stage process:

1) the reporting of suspected child neglect or abuse by a member of the community to the police or other social welfare officials,
2) the gathering of information and evidence by police and other social welfare officials,
3) the formal involvement of these protective services based on any found evidence, either resulting in a family-systems intervention or the removal of the child from the family home (Children's Commissioner, 2008).

Interventions typically involve family and service meetings where protection issues are discussed. Here, kinship care arrangements may be made if a suitable guardian can be identified. Temporary Care Agreements may also be implemented, where with the permission of the child's guardian, the child is placed in temporary or respite care for up to 56 days. If serious concerns about the welfare of the child remain, or if the family cannot agree on an outcome, Child, Youth and Family (CYF) services may present the issue to the Court which may then grant Custody/Guardianship Orders. In this case, the child is placed in custodial care with CYF, an iwi or cultural social service provider, or any other consenting adult as a legal guardian (Children's Commissioner, 2008).

Under the Children, Young Persons and their Families Act (1989), CYF are required to investigate reports of child harm if they receive complaints concerning the occurrence of sexual abuse, serious physical harm, wilful neglect of a child or exposure to intense domestic violence that has the potential to result in the physical or mental harm of the child. Responses to these concerns may depend on the age of the child, pre-existing parental mental health issues, level of family violence, any previous CYF involvement and reoccurring themes of parental substance abuse (MOSD, 2010).

Prenatal exposure to illicit drugs and continued or severe parental substance abuse substantiates a case for 'child maltreatment' in international settings and is therefore often a common motive for placing a child in foster care (Bada, Langer, Twomey, *et al.*, 2008; Brooks-Gunn *et al.*, 1994; Usher, Randolf, and Gogan, 1999). In New Zealand, investigation in relation to parental substance abuse occurs if a clinical practitioner believes that the substance misuse may impact on the health, safety or wellbeing of the child or if it is likely to become a significant problem in the near future. They may then make a referral to the Department of Child, Youth and Family Services where the investigation may lead to child placement as early as the child's birth (MOH, 2002).

In relation to women enrolled in MMT, multiple opportunities where clinicians may express concern about a MM woman's parenting capability exist. For example, if a pregnant woman seen by her GP, case manager or lead maternity carer is considered to be noncompliant with her maintenance therapy (i.e. confirmed other drug use, failing to meet appointments or behaving antisocially in treatment environments), she would be considered to be highly unstable and may therefore be more likely to have her children placed in protective custody (CDHB, 2007; McGalde *et al.,* 2009). Thus, children of born to MM mothers are a sample likely to be exposed to out-of-home care, due to the risks associated with maternal methadone-dependency and the comprehensive monitoring protocols currently implemented by MMT and antenatal clinics (Hunt *et al.,* 2008).

4.3 The Subtle Effects Argument: Methadone-Exposed Children in Foster Care

A child who is prenatally exposed to methadone and who is also placed in foster care highlights the problematic double jeopardy issue. These children are often deemed to be multiply disadvantaged in that they face both biological and environmental risk factors during development. As a result, it becomes difficult for researchers to tease apart the direct opiate/methadone effects from the postnatal environmental risk factors associated with maternal MMT. A conceptual framework suitable for examining the emotional and behavioural adjustment outcomes of prenatally exposed children in foster care has been discussed by Savage, Brodsky, Malmud *et al.,* (2005) and Crea *et al.,* (2008). The Subtle Effects Argument considers how early biological and environmental mechanisms may place children at an accumulative disadvantage where early risk factors compound and have cascading effects on child development. This theory suggests that developmental difficulties relating to prenatal methadone-exposure and the foster care experience are more likely to take effect over time as the cognitive and behavioural demands of the child in the environment increases. An adverse child rearing environment marked by maternal methadone treatment and high levels of placement instability may serve to further magnify the early biological and neuro-developmental problems associated with prenatal opiate-exposure, resulting in high levels of cumulative risk for poor developmental wellbeing in later childhood (Brooks-Gunn *et al.,* 1994). Of particular interest is how these complex mediating and moderating factors may impact on the mental health outcomes of ME children. The emergence of socio-emotional and behavioural difficulties in relation to developmental timing of placement for ME children is still relatively unknown.

4.4 Outcomes of Prenatally Opiate-Exposed Children in Foster Care

The socio-emotional and behavioural outcomes of children prenatally exposed to opiates and who are later placed in protective care are complex in that cause-and-effect models have had difficulty identifying distinct and definitive child mental health outcomes. A second literature review was conducted to investigate the existing evidence linking prenatal opiate/methadone exposure and out-of-home care to child socio-emotional and behavioural development (Table 2). Here, the databases PsycINFO, PubMED, ScienceDirect, and Google Scholar were again systemically searched for relevant articles. Study inclusion criteria included: prenatal opiate exposure (heroin, methadone, and/or poly-opiate), preschool to school-aged samples, exposure to out-of-home care and assessment of socio-emotional and behavioural outcomes. Both longitudinal and cross-sectional studies were considered. This method produced four eligible studies, the summaries of which are presented in Table Two below. Of these, only two recruited samples that were exposed to methadone in conjunction with heroin, while the others used poly-opiate or poly-substance exposed samples.

4.4.1 Effect of Placement on the Socio-Emotional Adjustment of Methadone Exposed Children

Of the four studies examining the mental health outcomes of opiate-exposed children in foster care, only one included a measure of socio-emotional development. Using data from the Maternal Lifestyles Longitudinal Study, Bada *et al.* (2008) examined the socio-emotional outcomes of a large sample (n = 1,092) of children prenatally exposed to cocaine and opiates. Mother-infant dyads were recruited at birth based on maternal self-reported cocaine and opiate use with confirmed positive meconium samples. Exposed and non-exposed children (n = 730) selected for the follow-up assessments of the study were matched for gestational age, sex and ethnicity. At wave 4 of the follow-up assessments when the children were three-years of age, the parent-report CBCL and Vineland Adaptive Behaviour Scale (VABS) were included to assess socio-emotional and behavioural development. Referrals to child protection services and rates of environmental instability were also reported. Findings showed that from birth to 36-months, 41% of the families caring for exposed children had undergone investigation by child protection services, compared to just 2% of comparison families. At birth, 18% of children in the exposed group had been placed directly into protective care. By age 36-months, this rate had increased to 35% of the exposed children. Of

the 166 children in care at this time, 87% had been born to cocaine using mothers and 14% were born to opiate using mothers. Most of these children were placed with relative caregivers. Bivariate analyses showed a tendency for cocaine/opiate-exposed children in care to have higher internalising CBCL scores and lower levels of socialisation on the VABS than both non-exposed/biological care and exposed/biological care children. However, this effect did not hold after adjustment for covariates, suggesting that these risks reflect the effects of other adverse socio-environmental factors rather than a direct effect of foster care placement.

Given the lack of existing studies examining the role of out-of-home-care on the socio-emotional development of opiate/methadone-exposed children, there is a need for systematic research in this area. There is also a need to examine rates of attachment, anxiety and mood disorders and the influence of out-of-home care on these. For example, a large longitudinal retrospective study (n = 419) by Strijker, Knorth, and Knot-Dickscheit (2008) reported that 14% of children in foster care were diagnosed as having an attachment disorder. These children had, on average, 2.3 placements. Children who were not rated as having an attachment disorder had significantly fewer placements changes, with a mean number of 1.2 placements per child (p < .0005). Given that Bada *et al.* (2008) did not examine rates of attachment, anxiety and mood disorders in their study, the findings from Strijker *et al.* (2008) suggest that the relationship between prenatal methadone exposure and later risk of internalising disorders is a critical area in need of further research.

4.4.2 Effect of Placement on Behavioural Adjustment of Methadone Exposed Children

In contrast to the number of studies assessing the socio-emotional outcomes of opiate exposed children, behavioural outcomes of these fostered children have been more commonly examined. However, these studies have tended to focus on adjustment problems only or rates of ADHD in particular, rather than a comprehensive examination of a range of potential externalising behavioural problems. Here, all four studies examined heroin/methadone exposed children's behavioural wellbeing in relation to the placement experience. In the continuation of the Bada *et al.* (2008) study, this study also included the externalising and total problem scales of the CBCL in their analysis. Findings showed that after controlling for covariate factors, the child's living situation significantly predicted children's CBCL total and externalising problem scale scores (p= .04). Children in relative care showed more behavioural difficulties than those in non-relative or biological care. Furthermore, a step-wise

increase was observed in CBCL scores as the number of placement changes increased, suggesting a placement-outcome relationship between the extent of environmental instability and subsequent adjustment risk.

Although the focus of Soeptami's (1994) report was on the global development of heroin/methadone exposed children, as described in the first literature review, a secondary aim of their study was to also examine qualitative differences in outcome for children exposed to out-of-home care. They found that 22% of adopted heroin/methadone-exposed children were characterised by poorer outcome, compared to just 5% of exposed children being raised by their biological parents (p = .03). Poor outcome was defined as having a Total Behaviour Problem Score on the CBCL greater than 90 in conjunction with an IQ of less than 85 on the Snijders-Oomen Nonverbal Intelligence Test. Given that the Total Behaviour Problem Score is a composite scale that includes the externalising difficulties subscale, this finding suggest that heroin/methadone-exposed children in protective care may be at increased risk of poorer cognitive and behavioural outcomes. However, this study had many limitations. First, it was unclear how the level of maternal opiate use during pregnancy was confirmed, as the study does not report using maternal self-report or independent toxicology reports. Secondly, this study had difficulty establishing the relationship between placement and behavioural outcome, as no further analysis other than between-groups comparisons was undertaken.

A more methodologically robust study that examined the behavioural outcomes of opiate-exposed children in protective care was published by Crea *et al.* (2008). This cross-sectional study examined the behavioural adjustment outcomes of children at varying ages 14-years after adoption. At wave 1, the authors mailed 956 questionnaires to homes with adopted children, of which 469 were returned. Children were excluded if they were above six-years old; meaning that the follow-up age was restricted to adolescents between 14 – 20-years old. At wave 4, a subsample of 275 children and adolescents with three previous complete data sets was selected. Approximately 44% of the children retained to wave 4 were prenatally exposed to cocaine, marijuana and opiates. Using the behaviour problems index, the study compared exposed and non-exposed adopted children in terms of levels of behavioural adjustment problems over time. The study found that across all four time points, exposed children in care had elevated levels of antisocial, oppositional and reactive behaviours than non-exposed children in foster care. However, the results also showed a similar rate of decay in problems over time for both exposed and non-exposed children, suggesting that prenatal

drug exposure did not compromise exposed children's ability to adjust to change in primary caregiver by follow-up relative to non-exposed children. The implication of this finding was that although exposed children had more problems, they were not characterised by cascading effects of poor behavioural development as initially hypothesised. However, this finding should be interpreted with some caution, as sample attrition was high with only 23% of the original sample recruited being assessed at wave 4.

The final case-control comparison study reviewed assessed 6-month old to 6-year old children (n = 339) who were referred to the Jerusalem Institute of Child Development by social workers. Ornoy, Michailevskaya, Lukashov, *et al.,* (1996) compared children who were born to heroin/methadone addicted mothers (but not fathers) against those who were born into heroin/methadone addicted fathers (but not mothers), thus contrasting the biological versus environmental effects of opiate exposure. Three comparison groups were also included, categorised by level of environmental deprivation. Of the children born to heroin/methadone addicted mothers (24%), approximately half of these children were placed in adoptive care by follow-up. Outcome measures included the Bayley-II Scales of Infant Development and the McCarthy Scales for Children's Abilities. The outcomes of interest here were the physician and psychologist ratings of ADHD. Results revealed that adopted children born to heroin/methadone dependent mothers had a lower rate of ADHD (20%) than observed among the children born to heroin/methadone dependent mothers raised at home (74%). These rates were significantly higher than those reported for the control groups (p <. 0.5). While placement was not shown to adversely affect the behavioural outcomes of heroin/methadone exposed children, this study does highlight the potential that environmental factors, particularly out of home care, may contribute to mental health risks in later childhood. However, this study was again limited by its inadequate reporting of maternal methadone use during pregnancy.

The review of the above studies, with the exception of Ornoy *et al.* (1996), collectively suggest that children prenatally exposed to opiates during pregnancy are at increased risk of being removed from their mothers care and that this process may potentially contribute to adverse outcomes particularly with respect to poorer social competence, increased risk for internalising disorders such as separation attachment disorder, and increased risk for externalising disorders such as ADHD. However, these studies were typically characterised by poor reporting of maternal methadone dose and failed to consider how exposure to socio-environmental risk prior to placement might also account for adverse child outcomes. In

addition, the detailed reporting of the nature of the children's placement experiences was found to be limited. As a result, the associations between specific aspects of the placement experience with respect to the socio-emotional and behavioural outcomes of ME children placed in foster care are discussed below in the following section.

Table Two

Summary of Socio-emotional and Behavioural Adjustment Outcomes of Prenatally Opiate Exposed Children in Foster Care

Study	Design and Recruitment Source	Group(s) of interest	Comparison Group(s)	Research Question	Outcome Measures	Effect, Findings	Design Strengths	Limitations
Bada *et al.* (2008)	Prospective longitudinal, Follow-up at 3-years old	Cocaine/ Opiate exposed: Parental care *n* = 317 Relative care *n* = 86 Non-relative care *n* = 51	Non-exposed: Parental care *n* = 514 Relative care *n* = 10 Non-relative care *n* = 5	The effect of caregiver type on behavioural problems and adaptive functioning for those with and without prenatal exposure	CBCL, VABS	Relative care and prenatal exposure associated with poorer CBCL and VABS outcomes Effect remains on behavioural scales after covariate control ($p < .04$) Increase in problem behaviours per placement change	Matched cases, large sample size, meconium confirmation of maternal drug use, multiple between groups comparisons	Opiates were not specified, quantity of maternal drug use not reported, combined rather than separate drug-effect analysis, poor condensation of other socio-familial confounds
Crea *et al*. (2008)	Longitudinal Follow-up at four points for 14-years. Analysis of subsample *n* = 275	Cocaine, marijuana and heroin exposed adopted children *n* = 121 M Age at wave 1= 3.8yr M Age wave 4 = 17.2yr	Non-exposed adopted children *n* = 154 M Age at wave 1 = 2.5yrs M Age wave 4 = 15.7 yr	The behavioural outcomes of substance-exposed adopted children 14 years post-adoption in comparison to those remaining in parental care	BPI	Prenatal exposure sig. related to elevated behaviour problems at wave 3 *($p < .01$)* but not at wave 4 *($p > .05$)* Similar rate of decrease on problem scores between exposed and non-exposed children by wave 4	Longitudinal, consideration of prenatal exposure and postnatal environments	Combined analysis of multiple substances, maternal self-report of substance use in pregnancy parental report only, high attrition rate , age difference in cohort at follow-up

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Study	Design and Recruitment Source	Group(s) of interest	Comparison Group(s)	Research Question	Outcome Measures	Effect, Findings	Design Strengths	Limitations
Ornoy *et al*. (1996)	Cross sectional, between groups comparisons of children 0.5 – 6 years old	Maternal heroin exposed *n* = 83 Paternal heroin exposed *n* = 76	Low SES *n*= 50 Moderate-High SES *n*= 50 Healthy Children *n* = 80	Specific role of prenatal vs. environmental heroin exposure on behavioural development and IQ	McCarthy Scales for Children's Abilities, Bayley Scales of Infant Development Psychiatric ratings of ADHD	Significant effect of placement on ADHD prevalence; 20% of Exposed/Adopted rated as having ADHD in comparison to 74% of Exposed/Home group *(p < .05)*	Matched controls, multiple control groups, direct comparison of prenatal and postnatal heroin exposure	Inadequate records of maternal poly/substance use during pregnancy, no control for maternal health confounds, use of maternal self-report for drug use, some cases assessed retrospectively
Soeptami. (1994)	Longitudinal, cohort recruited 1974 – 1983, follow-up 1986, 3– 12 years old	Heroin and/or methadone exposed *n*= 91	General population reference group *n*= 66	Effect of prenatal drug exposure on child intelligence, behaviour and social competencies	CBCL, SON,WISC-R	Poor Outcome and School Problems sig related to exposure and foster-care *(p = .05)*	Maternal confounds: SES, relationship status, smoking in pregnancy, prenatal care compliance; large sample, considered	Lack of an appropriate control group, no reporting of exposure levels

NB: CBCL: Child Behaviour Checklist, BIP: Behaviour Problems Index , SON:Snijders-Oomen Nonverbal Intelligence Test, WISC-R: Wechsler Intelligence Scale for Children – Revised, NAS: Neonatal Abstinence Syndrome, Poor Outcome: Composite score of Total Social Competence Score and IQ

4.5 Effects of Individual Foster Care Factors

While past research has evaluated the possible impact of exposure to out-of-home care more generally, it is still relatively unknown how specific foster care factors might influence the emotional and behavioural development of high-risk drug-exposed children. Factors relating to the foster care experience such as; child protection concerns, age at first placement, length of first placement, and rate of caregiver change, may well be important in determining child outcome. However, little is known about how these placement factors may contribute to adjustment outcomes of children born to mothers maintained on methadone during pregnancy.

4.5.1 Caregiver Type and Foster Care Drift

In New Zealand, relative or Whānau care can occur either informally or formally with Child Youth and Family (CYF) service intervention when a child or young person is deemed by CYF to be unable to continue living with their biological mother. Relative care is typically provided by extended family members who have a close involvement with the immediate family and agree to provide short or long term care for the child. Non-relative placements occur only after a Needs Assessment has been completed by CYF and a suitable relative caregiver cannot be found (MOH, 2002; NZ Family and Foster Care Federation, 2010). The outcomes of children placed with relatives or non-relatives may be of concern, given that relative caregivers typically tend to be more financially disadvantaged and strained for resources (Farmer, 2008).

To date, few studies have successfully tracked children's movements between caregivers as children in foster care often move unpredictably between caregivers, a process termed *foster care drift* (Strijker *et al.*, 2008). While some studies have more generally compared the outcomes of children raised in biological parental care against those in foster care homes (e.g. Crea *et al.*, 2008; Ornoy *et al.*, 2001), others have attempted to examine within-care differences in terms of the outcomes of children in relative and non-relative care. One such study that has examined the familial relationship in a foster care context was that by Bada *et al.* (2008). As previously discussed, relative care was found to be more favourable than parental and non-relative care in terms of cocaine/opiate exposed children having lower levels of behavioural problems. Another study by Farmer (2008) replicated the findings of Bada *et al.* (2008), with relative care being significantly associated with lower behavioural problems for non-exposed children. However, a fundamental problem present the Bada *et al.*

(2008) study and the previously discussed Crea *et al*. (2008) study is that although the child-caregiver relationship was reported at the time of each follow-up assessment, they were unable to report changes in primary caregiver that occurred between assessments. Therefore, both studies may have underestimated the true extent of caregiver instability experienced by these children in care.

4.5.2 Age at First Placement on Child Wellbeing

In addition to the familial relationship between guardian and child, previous research has also suggested that age at first placement may influence child outcome. Child wellbeing may be strongly influenced by the timing of first placement in terms of prolonged exposure to child maltreatment prior to placement, and whether the placement occurs during a potentially crucial stage of developing parent-child attachment (Crea *et al.,* 2008). Multiple studies of both exposed and non-exposed samples of children suggest that earlier first placement is associated with better longer-term cognitive and behavioural wellbeing than placement first occurring later childhood or adolescence (Crea *et al.,* 2008; Rutter, 1998; Soepatmi, 1994; Zill, 1990). For example, Soepatmi (1994) found that placements occurring prior to the age of 36-months were significantly associated with less severe behavioural problems in children born to heroin/methadone dependent women than exposed-children placed later than 36-months old, as these children were removed from the influences of suboptimal environments much earlier and able to re-establish stable parent-child attachments. Placements occurring in later childhood have been shown to result in adverse developmental outcomes, including repeated placement failures, greater risk of antisocial behaviours, self-harm, and increased involvement in the youth justice system (Fisher *et al.,* 2005). Although children born to methadone dependent women are a high-risk clinical group that are likely to be removed from maternal care (Hunt *et al.,* 2008; McGalde *et al.,* 2009), it is unknown when first placement is likely to occur for these children to what extent age at first placement is related to longer-term wellbeing.

4.5.3 Length of Placement on Child Wellbeing

Thus far, only one study has examined the effect of length of placement on child wellbeing (Redding, Fried, and Britner, 2000). This study found that children subject to rapid replacements that occurred unexpectedly were at increased risk of insecure attachment aggressive behaviour. Length of placement, as a marker of environmental instability, may

therefore be related to the emotional and behavioural outcomes of children born to MM mothers who are subsequently placed in protective care.

4.5.4 Multiple Placements on Child Wellbeing

The foster care factor that has been most widely studied is the number of placement changes or rate of environmental instability. The number of placement changes that a child experiences in the foster care process has been shown to have a significant impact on child emotional and behavioural wellbeing. Both internalising and externalising problem behaviours have been shown to increase with each placement move per-year (Bada *et al.*, 2008; Redding *et al.*, 2000; Proctor, Skriner, Roesch, and Litrownik., 2010), demonstrating the subsequent and accumulative effects of multiple placements.

Furthermore, the increasing levels of child adjustment problems in response to placement can also increase the likelihood that children will re-enter the foster care system. As children's emotional and behavioural symptoms become more severe as a result of higher levels of environmental instability, caregivers may become increasingly unable to cope with difficult or temperamental children and relinquish guardianship (Stanley, Riordan, and Alaszewski, 2005). This has been shown to be particularly true of non-relative caregivers (Farmer, 2008). In addition to the circular relationship between multiple placements and adverse child outcomes, multiple placements may also negatively affect child wellbeing as the child moves through different types of foster care homes. While a single successful placement may remove the child from an adverse child rearing environment, multiple and rapid placement changes may further expose the child to unfamiliar and inconsistent caregivers, parenting practices and home environments, potentially compounding the risks associated with prenatal methadone exposure and exposure to out-of-home care. As a consequence, the extent of environmental instability experienced may be a key mediating factor on child wellbeing.

4.6 Methodological Issues in Research on Prenatal Opiate-Exposure and Foster Care Placement

Although the literature reviewed has consistently shown that exposure to out-of-home care is associated with poorer emotional and behavioural outcomes for both non-exposed and heroin/methadone-exposed children, there are a number of limitations that pose challenges for understanding the how this experience affects longer-term child wellbeing. A summary of studies affected by these limitations is presented above in Table Two. Two particular

methodological issues commonly found in studies assessing exposed children in protective care are the inclusion of poly-exposed children and high rates of sample attrition across assessment points.

First, it is difficult to generalise the findings of the reviewed studies to fostered methadone-exposed children, as the majority of the reviewed studies have used samples of non-exposed or poly-substance exposed children (Bada *et al.,* 2008; Crea *et al.,* 2008). While Soeptami (1994) included a heroin/methadone exposed fostered sample, it was still unclear whether there were separate effects attributable to either heroin or methadone. Despite these studies having recruited very large samples of poly-exposed children, studies examining the effects of placement for high-risk children born to mothers maintained on methadone during pregnancy are non-existent.

Second, of the few studies reporting the foster care experiences of opiate-exposed children, most studies are subject to high sample attrition, and therefore sample selection bias. For example, Crea *et al.* (2008) encountered substantial sample loss that resulted from being unable to successfully follow children experiencing high levels of environmental instability from birth. In addition, the same study also noted that mothers who were re-awarded custody of their children were highly resistant to further follow-up for fear of being reported to child protection services. As a result, sample attrition can be particularly problematic for prospective longitudinal studies following high-risk children placed in protective care, as children deemed the most at-risk are often lost from follow-up. The outcomes of these children are therefore relatively under-reported or unknown, thereby missing a crucial opportunity for assessment and intervention.

Review of Methodological Issues and Strategies of the Current Study

As outlined previously, many of the mental health studies reviewed are subject to methodological problems that limit the interpretation of their findings. These limitations are summarised in Table 3 below. These limitations include: the use of small and selective samples, the absence of an appropriate comparison group, high sample attrition and data loss, reliance on maternal self-report, inadequate reporting of methadone and other opiate use, and limited consideration of confounding poly-drug and socio-environmental risk factors.

Table 3

Summary of Methodological Limitations Common to both Methadone and Placement Literature

Limitation	Authors
Small and selective samples	Cash & Wilke, 2003; Fernandez, 2008; Moe, 2002; Seuss *et al.,* 1997; Walhovd *et al.,* 2007
Lack of an appropriate comparison group	Crea *et al.,* 2008; Luthar *et al.,* 2003; Soeptami, 1994
High sample attrition	Crea *et al.,* 2008; Hunt *et al.,* 2007
High rate of data loss for highest-risk cases	Cash & Wilke, 2003; Crea *et al.,* 2008; Ehrensaft *et al.,* 2003
Partial use of retrospective data collection	Ornoy *et al.,* 1996; Ornoy *et al.,* 2001; Soeptami, 1994
Reliance on maternal-self report of methadone/opiate use; or poor quantitative reporting of maternal methadone dose	Bada *et al* 2008; Cash & Wilke, 2003; Crea *et al.,* 2008; Ehrensaft *et al.,* 2003; Moe, 2002; Ornoy *et al.,* 1996; Seuss *et al.,* 1997; Soeptami, 1994; Walhovd *et al.,* 2007
Reliance on brief maternal-self report of child socio-emotional and behavioural problems	Crea *et al.,* 2008; Soeptami, 1994; Walhovd *et al.,* 2007
Combined substance analysis/poly-substance samples	Bada *et al.,* 2008; Crea *et al.,* 2008

Research Aims and Hypotheses

Against this general background, this study aims to undertake a comprehensive examination of the socio-emotional and behavioural adjustment of children prenatally exposed to methadone at age 4.5 years, while taking into account the potential influence of maternal risk factors. In addition, this study aims to assess the influence of the placement experiences from birth to 4.5-years old on the mental health outcomes of these high-risk children. This study will employ a number of methodological strategies to remedy the limitations of previous studies. First, the use of large a methadone-exposed sample and a regionally representative, randomly selected non-exposed comparison sample will ensure the sample size is adequate and non-selective. Secondly, the prospective and longitudinal scope of the study with a comprehensive tracking system of all study children will ensure a high rate of sample retention and data collection from birth through to the 4.5-year follow-up. Thirdly, this study will use objective and detailed hospital toxicology records of maternal methadone dosage

throughout the pregnancy in conjunction with maternal self-report. Fourth, this study will consider the effects of socio-familial factors highly associated with maternal methadone therapy by collecting a wide range of maternal social variables from detailed maternal lifestyle interviews. Furthermore, detailed information about children's protection and placement experiences will be collected in these interviews using recent-tense life-history calendar methods. Sixth and lastly, this study will employ both bivariate and multivariate analyses to fully evaluate the possible impact that prenatal methadone exposure, exposure to socio-familial risk and placement in foster care has on the mental health wellbeing of high-risk preschool children.

The specific study aims and hypotheses are as follows:

1. To compare the socio-emotional and behavioural adjustment of ME and non-exposed comparison children. Study measures included the parent completed Strengths and Difficulties Questionnaire (SDQ) and the Developmental and Wellbeing Assessment (DAWBA). Based on these measures, a range of outcomes were examined, spanning separation anxiety disorder, specific phobia disorder, generalised anxiety disorder, depression, attention/hyperactivity disorder, hyperkinesis, conduct disorder and oppositional defiant disorder.
   Hypotheses: 1) On the SDQ, ME children will obtain significantly higher emotional, hyperactivity, conduct, peer-relationship problem and total difficulties scores than non-exposed comparison children; 2) These increased levels of adjustment problems will remain after controlling for maternal confounds; 3) The DAWBA will detect increased risk for both internalising (separation anxiety disorder, specific phobia disorder, generalised anxiety disorder and depression) and externalising disorders (attention deficit/hyperactivity disorder, hyperkinesis, oppositional defiant disorder and conduct disorder) among the ME group.

2. To describe the foster care experiences of ME and non-exposed preschool children. Child protection and placement factors examined included 1) CYF contacts, 2) the total number of social welfare agencies involved with the family in the last 12-months, 3) age at first placement, 4) length of first placement, and 5) the total number of placement changes to age 4.5-years.
   Hypotheses: ME children will have substantially higher rates of CYF and other social agency contact in the last 12-months and more out-of-home placements from

birth to age 4.5-years than non-exposed children. It is also hypothesised that ME children will likely have been placed at a younger age and experience shorter and more rapid caregiver changes than comparison children.

3. To identify the maternal risk factors that predict the likelihood of child placement within the methadone group.
   Hypothesis: It is anticipated that increased methadone dose during pregnancy, younger age at delivery, lower SES, poorer mental health and increased poly-substance use during pregnancy will be the key predictors of the loss of maternal custody for methadone maintained mothers.

4. To describe the mental health outcomes of methadone-exposed children in relation to their foster care experiences. ME children with and without exposure to out-of-home care will be compared on the emotional and behavioural domains of both the SDQ and DAWBA.
   Hypotheses: ME children subject to an out of home placement will obtain significantly higher emotional, hyperactivity, conduct, peer-relationship problem and total difficulties scores than ME children without exposure to out-of-home care and the non-exposed children. Similar findings were anticipated for the DAWBA.

5. To examine within the ME group the extent to which placement makes an independent contribution to children's later risk of mental health problems after taking into account other factors correlated with maternal methadone treatment during pregnancy.
   Hypothesis: Exposure to out-of-home care, or rate of environmental instability, will significantly predict disorder risk on the DAWBA over and above the effects of maternal methadone pregnancy dose and socio-familial risk.

Chapter 5

Methods

5. The Canterbury Methadone in Pregnancy Study

The current study forms part of an existing prospective longitudinal study, drawing participants and data from the larger Canterbury Methadone in Pregnancy (MIP) study (Woodward, Inder, McKie, *et al.,* 2002). Ethical approval for all procedures and measures was obtained from the Ministry of Health Upper South Regional Ethics Committee (*Ethics reference*: 00/02/007, Appendix A). As part of the larger MIP study, all participants were assessed at birth and ages 18-months, 2-years and 4.5-years. The primary focus of this thesis was the 4.5-year data wave, for which I participated in the data collection. Specifically, data analyses reported in this thesis is confined to the first 107 children (ME = 53, non-exposed = 54) consecutively enrolled in the existing MIP study as they turned 4.5-years old.

5.1 Participants

As noted above, the sample for this study (n = 107) consisted of two groups of women recruited during their second or third trimester of pregnancy between 2003 and 2006. The first group consisted of 53 opiate dependent women who became pregnant and were subsequently enrolled in the Christchurch Methadone Programme that works in partnership with Christchurch Women's Hospital to provide antenatal support through the Methadone in Pregnancy Clinic for these women. The second group consisted of 54 women booked for delivery at Christchurch Women's Hospital. Both groups of women were identified from the maternity booking schedule of the Christchurch Women's Hospital, and were assigned to the methadone or comparison groups based on their clinical records of methadone dependency. Exclusion criteria across both groups included infants born very preterm (≤ 32 weeks), with HIV, foetal alcohol syndrome or any other congenital abnormality, mother non-English speaking or unable to give informed consent and families who resided outside of the Canterbury region.

5.1.1 Methadone Sample

As Figure 2 (page 56) shows, 57 methadone-exposed (ME) children were eligible for inclusion in the current round of 4.5-year follow-up assessments. However, two children who were confirmed for assessment were not seen by December 2010[1], one was excluded due to a diagnosis of pervasive developmental disorder, and one was deceased; leaving a total ME sample of 53 children. This produced a sample retention rate of 93% from term to the 4.5-year follow-up.

Detailed information about each mother's daily methadone dose over the course of the pregnancy was collated from both hospital and Methadone in Pregnancy service records. The majority of the sample consisted of existing MMT patients, with 53% of MM mothers being engaged in treatment for methadone dependency prior to the pregnancy. Of those who enrolled in MMT after falling pregnant, 11 women were enrolled in MMT during their first trimester, 11 during their second trimester and a further three were enrolled during their third trimester. Table 4 displays the mean maternal methadone dose prescribed per trimester. As a group, the MM women had a mean methadone dose of 58.28mg per day across the pregnancy (SD = 33.97, range: 6.16 – 195mg).

Table 4

Mean (SD) Maternal Daily Methadone Dose (mg) per Trimester (n = 53)

	Trimester 1	Trimester 2	Trimester 3
Daily Dose	53.37 (41.17)	57.70 (33.66)	62.64 (31.66)
Dose Range	0 – 195	0 - 195	12.50 - 195

Of the ME children retained to the 4.5-year follow-up, complete data sets[2] were unavailable for six children. Three mothers were unable to complete the 2.5-hour maternal interview and three CYF appointed caregivers were unable to provide sufficient information due to unfamiliarity with the child. As children with incomplete data sets were not excluded from the study to maximise sample retention, reported sample numbers may vary accordingly throughout the study.

[1] Civil State of Emergency declared due to the Canterbury Earthquake on 4th September 2010.
[2] Data from term (infant clinical and maternal social background), SDQ, DAWBA or placement history

5.1.2 Non-Exposed Comparison Sample

The second group enrolled in the study consisted of the first 54 children born to women randomly selected from the delivery booking schedule of Christchurch Women's Hospital from 2003 to 2006. These women were identified by a random number generator and were approached for possible participation in the study. Of the 57 mother-child dyads who were eligible for follow-up by 4.5-years, two children were excluded due to a diagnosis of pervasive developmental disorder and one was missed for follow-up by December 2010[3]. At follow-up, two comparison children had incomplete data sets. As children with incomplete data sets were not excluded from the study, reported sample numbers for the analysis of the control children may vary accordingly.

5.2 Procedure.

5.2.1 Sample Recruitment at 4.5-Years

Close to the time children were approaching age 4.5-years, contact with the caregiver-child dyads for follow-up assessments was made by telephone. A research group team member contacted the caregivers to gauge interest in participating in the current round of 4.5-year follow-up assessments, and confirmed the appointments either by telephone call or mobile text-message the week prior to the follow-up session. Appointment sessions were ideally made two-weeks either side of the child turning 4.5-years old.

5.2.2 Obtaining Consent at 4.5-years

For the 4.5-year follow-up assessment, successfully recruited caregivers and children were brought into the Canterbury Child Development House situated at the University of Canterbury campus for a 2.5-hour maternal interview and child assessment. A thorough explanation of the assessment process was given prior to the interview and written consent obtained (see Appendix B). It was explicitly stated that any disclosed information would be confidential, that the caregiver was participating on a voluntary basis and that the caregiver had the right to withdraw from the study at any time. At this time, the caregiver was also asked to consent on behalf of their child. Participants were provided with contact details to the research team if they had any concerns upon the completion of the assessment. To ensure

[3] Civil State of Emergency declared due to the Canterbury earthquake 4th September 2010.

anonymity, participants were assigned a study identification number for all data purposes. Caregivers who consented to the 4.5-year follow-up assessment were thanked for their participation with a $20.00 The Warehouse, Westfield Shopping Centre or Progressive Food Enterprises voucher. For participants that had to travel a significant distance, they were also partly reimbursed with petrol vouchers.

5.3 Longitudinal Data Collection

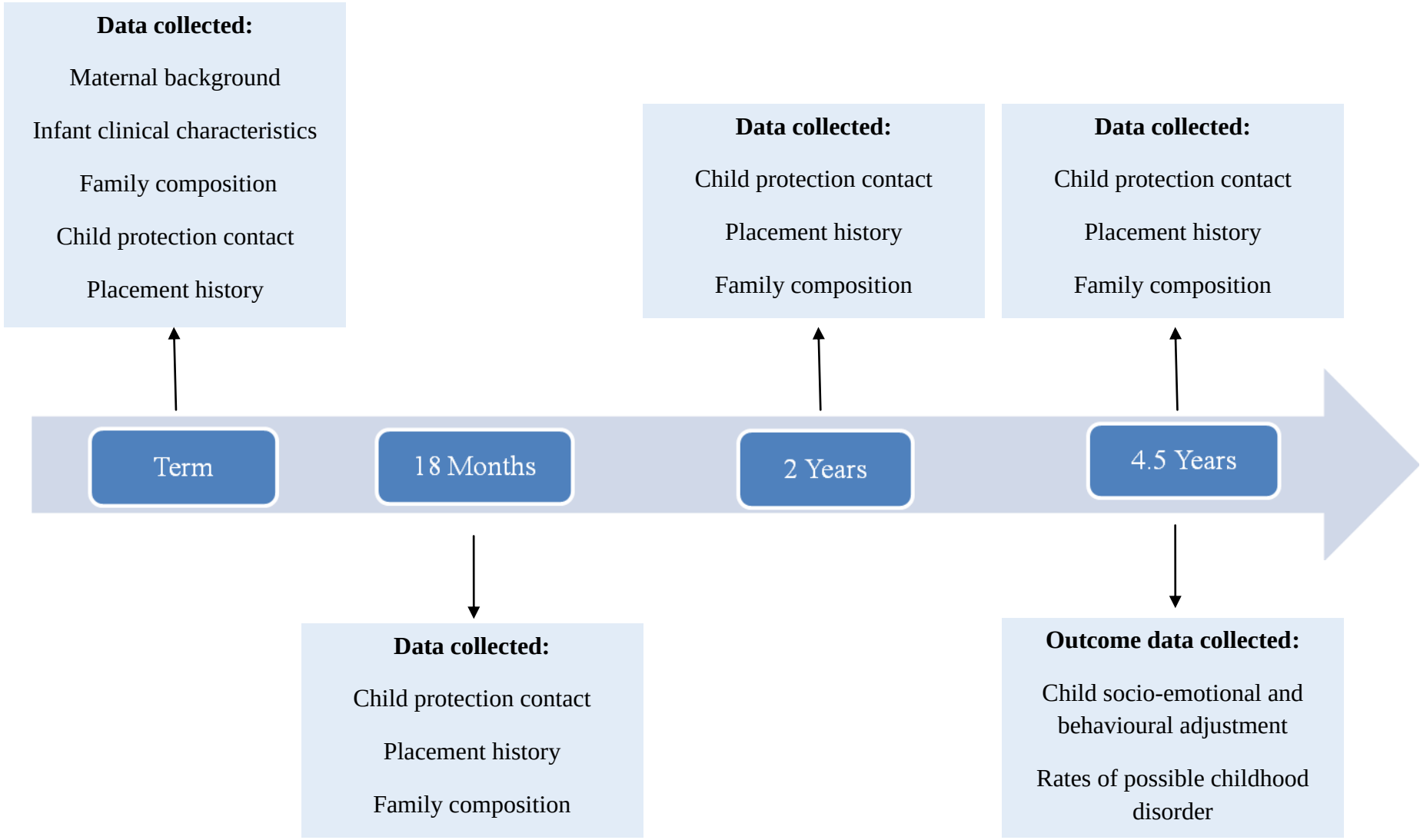
As shown in Figure 2 below, the independent and dependent variables were collected across four longitudinal assessment points spanning 4.5-years. Shortly after birth, all of the children's mothers completed a detailed maternal lifestyles interview administered by a registered nurse affiliated with the Canterbury Child Development Research Group (CCDRG) based at the Canterbury Neonatal Unit at Christchurch Woman's Hospital. Variables of interest included infant clinical, maternal social background and family characteristics.

At 18-months post-delivery, the sample was invited to participate in a second maternal interview conducted at the caregiver's home. This interview was administered by a trained interviewer, where information concerning the family circumstances, child protection issues and changes in primary caregiver of the study child was collected.

A third caregiver interview was conducted as the child approached two years old (± 2 weeks), which was completed at the CCDRG research facility situated at the University of Canterbury. This was again administered by a trained interviewer. During this interview, any change in family circumstance and the nature of child protection concerns leading to child placement was reported.

Finally, a fourth maternal interview was completed during the 4.5-year follow-up, again at the CCDRG research facility. Information concerning family circumstances, child protection issues and exposure to out-of-home care was again collected. In addition, the key child socio-emotional and behavioural outcome measures were also administered during this session by the trained interviewer via a two-tired method. First, the Strengths and Difficulties Questionnaire was completed, followed by the Developmental and Well-Being Assessment.

Figure 2: Collection of Independent and Dependent Variables from Term to 4.5-Years Old



5.4 Characteristics of the Sample at Term

5.4.1 Maternal Background at Term

A wide range of maternal background information was collected as part of the term interview (see Appendix C). This interview assessed characteristics of interest including maternal age, ethnicity, marital status, maternal educational achievement, SES, mental health, the extent of poly-substance use across the pregnancy and family composition. In terms of educational achievement, mothers were asked to report their highest level of recognised qualification, with responses ranging from early school leaving between 13 and 16 years-old to holding a university degree. Socio-economic status was determined from the 6-point Elley-Irving socio-economic index scale (Elley and Irving, 2003). From this measure, methadone-maintained and comparison mothers were classified into SES brackets representing professional, managerial, semi-skilled, trade-skilled, manual labourer, and low-skilled employment brackets or being the recipient of a social welfare benefit. To account for women who were stay-at-home-mothers with working partners, the socio-economic circumstance of the family was determined from the highest SES rating of the two parents. Maternal mental health was assessed with the Edinburgh Postnatal Depression scale (Cox, Holden, & Sagovsky, 1987) which provides a measure of the extent TO which new mothers may be experiencing symptoms of postnatal depression. Frequency and quantity of licit and illicit drug use during pregnancy was also a key characteristic of interest. This information was collated from both the maternal interview and Christchurch Methadone Programme records. Particular substances of interest were alcohol, tobacco, cannabinoids, benzodiazepines, stimulants and the opiates other than prescribed methadone. Mothers were asked to report their weekly consumption level of these substances. Finally, information concerning family composition was also collected. Here, the parental-relationship (married, cohabitating, casual or no partner) was reported, along with the number of children previously born to the mother, the custody status of these children and the number of non-biologically related children also living in the household.

5.4.2 Infant Clinical Characteristics at Term

At birth and during their hospital stay, a number of infant clinical characteristics were recorded. Variables included in the analyses were gender, gestational age and weight. In addition, the number of days from birth to discharge from the Neonatal Intensive Care Unit

was noted for all study infants. For all infants born to methadone maintained mothers, any diagnosis of Neonatal Abstinence Syndrome was reported in the clinical case notes.

5.5 Child Mental Health Outcomes by Age 4.5-Years

The current study employed a two-tiered method of assessment of ME children's socio-emotional and behavioural development. Unlike previously published studies (Soeptami, 1994; Walhovd *et al.*, 2007), the current study incorporated a screening measure to assess children's adjustment problems, followed by a structured parent interview of child mental health disorder. A detailed description of these two measures is provided below.

5.5.1 The SDQ: Strengths and Difficulties Questionnaire

The 25-item Strengths and Difficulties Questionnaire (SDQ) provided an initial measure of child socio-emotional and behavioural adjustment problems (See Appendix D). This tool is a standardised and widely accepted parent-report questionnaire suitable for use with children and adolescents aged 3 to 16 years old (Goodman, 1997).

The SDQ consists of five subscales, each with five items that detect pro-social, peer-relationship, emotional, conduct and hyperactivity/inattention problems experienced by the child (Goodman, 2001). Items for each subscale are summed to provide an overall scale score. Higher scores are desirable on the pro-social scale, and lower scores are desirable on the emotional, peer-relationship, conduct and hyperactivity/inattention subscales. Borderline cut-points were developed by Goodman (1997) from large samples of British children to create developmentally appropriate boundaries at which children's scores fall into age-defined normal and abnormal ranges (Goodman, 1997; Goodman, Meltzer and Bailey, 1998, Meltzer, Gatward, Goodman, and Ford, 2000). Rates of clinically significant problems are calculated using these cut-point boundaries, which are described in greater detail below.

In terms of screening for socio-emotional adjustment problems, three of the five SDQ subscales assess pro-social behaviours, peer-relationship quality and affective symptoms. Pro-sociability is observed by the child's ability to show consideration, act helpfully and voluntarily with adults, and be kind to and share with peers. Subscale scores less than five indicate marked problems with pro-social skills. Peer-relationship problems are indicated by a child's reported preference for solitary play, marked unpopularity with peers, having few good friends, and preferring to interact with adults rather than similarly aged peers. A subscale score above three suggest that these children have substantial difficulties developing

and maintaining appropriate relationships with children their own age. The emotional items focus on the presence and timing of substantial negative affect which may be characterised by frequent and excessive worrying, anxiety, depression, tearfulness, feeling scared and the presence of psychosomatic symptoms. Scores above four on the emotion subscale indicates that the child may have significant internalising difficulty.

The conduct and hyperactivity/inattention problem scales of the SDQ are the two subscales measuring behavioural adjustment. The conduct problems subscale consists of items that focus on a wide range of antisocial behaviours such as noncompliance, reactivity, bullying, lying, cheating and stealing. Scores above three on the conduct subscale indicate the presence of a significant problem with appropriate behavioural conduct. The SDQ also measures problems concerning hyperactivity and/or inattention. These items examine problems with extensive restlessness, fidgeting, distractibility, poor concentration and high levels of impulsivity. Scores above six fall within the abnormal category for hyperactivity and inattention. When taken together, the conduct and hyperactivity/inattention scales are indicative of externalising disorders such as attention deficit/hyperactive disorder, oppositional defiant disorder and conduct disorder (APA, 2008; Becker, Steinhausen, Baldursson, *et al.,* 2006; Goodman, Ford, Simmons *et al.,* 2000; Goodman and Scott, 1999; Hudziak, Copeland, Stagner, and Wadsworth., 2004).

In addition to the socio-emotional and behavioural subscales described above, the SDQ also offers a measure of general psychosocial development. The total difficulties score acts as composite scale of the emotional, peer-relationship, conduct and hyperactivity/inattention problem scores. This subscale is a measure of the overall level of difficulty characterising the child. Total difficulty scores falling above 16 indicate that the child may have a clinically meaningful level of adjustment problems in need of further attention.

The SDQ is often used in developmental research not only because it has been established for use with large samples of children (Hawes and Dadds, 2004; Meltzer *et al.*, 2000; NHIS, 2001), is concise, easy to administer, and is phrased in way that is positive for parents (Goodman and Scott, 1999; NHIS, 2001), but also because of its reliability and validity. Firstly, in terms of reliability, the SDQ is shown to have good internal consistency. Item reliability correlations are reported to range from α =. 70 to α =.73 (Goodman, 2001; Goodman and Scott, 1999; Muris, Meesters, and van den Berg., 2003). These significant internal item relationships reflect the high item and construct agreement of the SDQ.

Secondly, the temporal stability of the SDQ is also well documented. Over two to six month periods, the test-retest reliability correlations of the SDQ are reported to range from r = .41, r = .62 to r =.81 with some individual variation between reports attributed to parental and teacher report differences and length of time between testing (Goodman, 2001; Goodman and Scott, 1999; Mellor, 2004; Muris *et al.*, 2003). Nonetheless, these test-retest correlations suggest that the SDQ is a robust and reliable measure that accurately and consistently measures socio-emotional and behavioural adjustment problems relatively independently to normal fluctuations in child behaviour. Thirdly and lastly, the SDQ is theoretically meaningful in terms its ability to detect similar rates of problematic symptoms CBCL. As a measure of convergent validity, child problem scores between the SDQ and CBCL were significantly related across multiple studies, with strong correlations found ranging from r = .70 to r = .87 (Goodman, 2001; Goodman and Scott, 1999; Muris *et al.*, 2003). Therefore, the SDQ is an empirically established and meaningful measure of child socio-emotional and behavioural adjustment problems.

5.5.2 The DAWBA: The Developmental and Wellbeing Assessment

After the SDQ was completed by the caregiver during the 4.5-year interview, the trained interviewer administered the Developmental and Well-Being Assessment (DAWBA) (see Appendix E). The DAWBA provides a measure of specific emotional/internalising and behavioural/externalising DSM-IV/ICD-10 disorders in children between the ages of 5 – 17 years old. Internalising disorders span separation anxiety disorder, specific phobia disorder, generalised anxiety disorder, and depression; whereas externalising disorders include attention deficit/hyperactivity disorder, hyperkinesis, conduct disorder, and oppositional defiant disorder (Goodman, Ford, Richards, *et al.*, 2000b). The DAWBA is a well validated clinical tool that further describes the psychological profiles of children with SDQ scores falling within the abnormal range regarding the nature of the emotional or behavioural problem that they are experiencing.

The DAWBA was administered by a highly trained interviewer who records the parent responses during the interview. The DAWBA itself is structured to first present screening items, followed by specific items about the severity and impact of the symptoms. If the screening item is positive, the interviewer continues with the structured, semi-structured and open-ended items to gain more detailed clinical information about the onset, duration and effect of the emotional and/or behavioural problem. For younger children, caregivers also

complete items describing the consequential impact that these symptoms have on the child's daily functioning, distress levels and burden experienced by family and/or others because of the emotional or behavioural problem (Fombonne, Simmons, Ford, *et al.*, 2001; Foreman, Morton, and Ford, 2009; Goodman, Yude, Richards, and Taylor, 1996; Goodman *et al.*, 2000b). The inclusion of the impact items determines the persistence and impact of the emotional or behavioural difficulty, which is equally as important as collecting information about the severity of the symptoms (Goodman *et al.*, 1996). If the symptom screening item or follow-up question is negative, a 'skip rule' is implemented and the latter items are omitted from the interview as no problem is detected (Goodman *et al.*, 2000b). If the DAWBA screening question is negative but the child's SDQ score on the complimentary emotional or behavioural construct is in the borderline or abnormal range, the skip rule is ignored and the interviewer continues with the symptom and impact items (Goodman *et al.*, 2000b).

Following the completion of the DAWBA interview, the responses were entered into the automated online computer scoring programme (www.dawba.net) where a provisional computer-generated diagnosis was produced. Each child was assigned one of six computer predicted risk of disorder scores depending on the nature of the reported problems, indicating the likelihood that the child meets the criteria for a psychiatric disorder. Low probability of disorder is classified by the 0.1% – 3% likelihood of disorder bands. The probability band of 15% indicates a moderate risk of disorder, whereas the 50% and greater likelihood band suggests that the child has a high risk of clinical disorder. Typically, a child psychiatrist reviews the diagnosis and either accepts or rejects the computer predicted risk of disorder based on the additional case notes recorded verbatim during the interview. Given that a child psychiatrist was not available to complete these ratings, the current study selected children in the moderate to high likelihood of disorder bands (i.e. $\geq$ 15%) for analysis of child mental health outcomes at age 4.5-years.

Multiple studies are in agreement that the DAWBA is a valid and reliable measure most effective in identifying children with conduct and behavioural disorders, followed by affective disorders (Fombonne *et al.*, 2001; Foreman *et al.*, 2009; Meltzer, Gatward, Corbin, *et al.*, 2003; Messer, Goodman, Rowe, *et al.*, 2006). The DAWBA can significantly discriminate prevalence of disorder from community and clinical samples of children, and it is also sensitive to the detection of concurrent disorders (Ford, Goodman, and Meltzer 2003; Goodman *et al.*, 2000b). For example, the DAWBA was able to detect disordered cases at a rate of 89% specificity (the probability of correctly identifying a negative case) and 92%

sensitivity (the probability of correctly identifying a positive case) in both clinical and community samples in a recent study by Goodman *et al.* (2000b). Secondly, the DAWBA also demonstrates a high level of concurrent validity with independent psychiatric case notes made by clinical psychologists. The same study by Goodman *et al.* (2000b) found that the DAWBA had identical diagnoses of child psychopathology in 93% of cases from a large sample of children assessed at an established British psychiatric clinic.

In terms of reliability, the DAWBA has also demonstrated temporal stability and test-retest reliability. As the questionnaire's items are framed in recent past and present tense by focusing on twelve, six and one-month periods as opposed to a longer lifetime prevalence, the DAWBA's ability to detect a disorder is not compromised by the timing the interview in relation to the onset of the child's disorder (Goodman *et al.*, 2000b). In terms of test-retest stability, the DAWBA remains a reliable measure across longer-term longitudinal assessments. For example, a large scale (n = 2587) British study by Meltzer *et al.* (2003) assessed the onset and persistence of mental illnesses in British children and adolescents across a three-year period. The DAWBA correctly identified a significant proportion of those with a disorder at time-one again at time-two at the conclusion of this study, indicating that its ability to detect disorder is not compromised by the timing of its administration

5.6 Exposure to Out-of-Home Care

Five measures were included in the current study to examine the child protection and placement experiences of all study children from birth to age 4.5-years. These include 1) the social welfare and Child Youth and Family (CYF) service involvement with the families from birth to age 4.5-years, 2) the child's relationship to their primary caregiver at age 4.5-years, 3) the age at which the child was first placed in out-of-home care, 4) the length of time (months) between first and second placement, and 5) the total number of changes in primary caregiver experienced by the child from birth to age 4.5-years.

5.6.1 Social Welfare and Child Protection Contact from Term to 4.5-Years

Information regarding the contact between the families and numerous types of social welfare agencies was collected during each of the maternal interviews from term to 4.5-years. Caregivers were also asked to report if they had been in contact with or seriously investigated by CYF within the last 12-months prior to the 4.5-year interview and what prompted these investigations. This aimed to separate caregivers of ME children who were facing current

and serious investigations about the quality of their parenting practices from those who were CYF-appointed caregivers by which CYF contact was part of their customary foster care routine. At age 4.5-yers, caregivers were also asked to report if they had sought out the services of other social welfare agencies within the last 12-months prior to the 4.5-year interview as an indicator of the socio-environmental circumstances of the household.

5.6.2 Exposure to Out-Of-Home Care from Term to 4.5-Years

Caregiver Type at 4.5 years. Caregiver-child relationship (i.e. maternal, relative or non-relative) was recorded at the 4.5-years interview. This specified whether the study child was in maternal care or in formally appointed protective care. Maternal care was defined as the biological mother being the primary caregiver of the child. Other caregiver classifications included the child being in either biological-relative care, or in CYF appointed non-relative care. Caregiver responses ranged from natural parent, step-parent, adoptive parent to non-relative or other, where responses were later classified as maternal, relative and non-relative care. Step-parent responses were coded as relative care if the other primary caregiver of the child was the biological parent.

Age at First Placement. At each follow-up assessment, the age at which the study child first entered the foster care system was recorded at all assessment time points using life history calendar methods retrospectively spanning 4-month periods. The caregiver completing the interview was asked to report if and when the child had experienced any change in primary caregiver to determine age (in months) at first placement. If the placement was planned before or at the birth, CYF reports were available to track very early placement changes and minimise data loss.

Length of First Placement. From the completed 18-month, 2-year and 4.5-year interviews, length of time between first and second placement (months) was calculated as a measure of initial placement stability.

Rate of Environmental Instability. Rate of environmental instability or total number of caregiver changes occurring from term to 4.5-years was recorded as part of the 18-month, 2-year and 4.5-year interviews. This information was systematically cross-checked with additional items throughout the interviews as a measure of consistency. Detailed information was also collected about why these replacements occurred. A placement change was counted as any physical change in primary caregiver from birth to 4.5-years. For example, if a child

was in maternal care at birth, placed into care for any period of time, and then returned to the biological mother by the time of assessment, this was coded as two separate placement changes. If a child had been removed from maternal care into and placed into permanent relative care, this was considered as one placement change.

5.7 Data Entry and Planned Data Analysis

The data was managed using a range of computer programmes. Information collected from the maternal interviews was entered into Microsoft Access 2010 for Windows XP and subsequently imported into Statistical Package for Social Sciences (SPSS) version 17.0 for Windows XP. The parent-report SDQ and DAWBA were entered into the online DAWBA system (www.dawba.net) and imported into SPSS. SPSS was used for all data analyses.

Power for the current study was excellent. Based on recommendations that a total sample size of 100 would enable the detection of effect sizes $\geq d = 0.3$ with 80% statistical power (Cohen, 1988). Post-hoc power calculations for a two-tailed t-test at the 95% significance level, for a total sample of 107 and desired medium effect size of $d = 0.5$, and power of .72 (Soper, 2011). This is considered to be sufficient to detect statistically significant between-groups differences.

Across all analyses, the 95% confidence level (i.e. a significance level of $p < .05$) was used to detect statistically significant results. Where appropriate, variables were examined for violations in distribution and homogeneity of variance using visual inspections and Levene's tests. The analysis for the research aims of the study proceeded in six steps using specific univariate and multivariate methods, which are described below.

First, infant clinical characteristics and maternal social background characteristics at term were examined for group differences, with maternal MMT being the primary grouping variable. For continuously distributed variables, two tailed independent samples t-tests were used. For dichotomous variables, chi-square tests of independence were used.

Second, between-groups comparisons of ME and comparison children's emotional and behavioural outcomes were examined using either a two tailed independent samples t-test for continuous variables or the chi-square test of independence for dichotomous variables. Odds ratios and/or 95% confidence intervals from the chi-square risk estimate analysis were also conducted as a measure of the association between prenatal methadone exposure and later emotional and behavioural adjustment problems.

Third, analysis was then extended to include covariate factors using univariate analysis of covariance. This assessed the extent to which child emotional and behavioural adjustment problems associated with maternal MMT remained after controlling for the effects of maternal age at delivery, education, SES and solo motherhood.

Fourth, the family circumstances, child protection and placement experiences of all study children by age 4.5-years were described. Again, t-test and chi-square tests of independence were used depending on the distributional properties of the outcomes of interest. Next, a linear regression model was developed to identify key maternal background factors that placed children born to mothers maintained on methadone during pregnancy at increased risk of placement in out-of-home care in the first 4.5-years of life.

Fifth, the sample was then categorised into three groups (comparison, ME without exposure to placement, ME with exposure to placement). Between-groups differences on the SDQ were compared using a one-way analysis of variance and chi-squared tests for independence. Odds ratios were also calculated using a binary logistic regression method.

Six and finally, the relationship between exposure to placement and mental health outcome was examined in two steps. As no children in the comparison group had a foster care placement, this analysis was confined to the methadone sample. First, one-tailed Pearson's product moment correlations describe the bivariate relationships between individual child protection and placement factors and SDQ and DAWBA scores. Second, a linear regression model examines how exposure to placement might be predictive of mental health outcome for ME children. All three predictor variables (maternal methadone dose, maternal social risk and child placement changes) were treated as continuous variables. Maternal methadone dose was coded as: $\leq$ 40mg = 1, 40.1 – 60mgs = 2, $\geq$ 60.1mg = 3, to represent low, medium and high dose groups. Maternal social risk was a composite score a scale of 0 – 6 based on education, SES, age at pregnancy, solo motherhood, depression, and other drug use in pregnancy. Higher scores reflected higher levels of maternal social risk. Placement instability was coded as; No placement = 1, Low instability = 2[4], High instability = 3. The key outcome variable in this model was the DAWBA's composite Any Disorder subscale. The results are presented in the following chapter according to these research aims.

[4] A single placement change into out-of-home care

Chapter 6

Results

6.1 Characteristics of the Sample

6.1.1 Infant Clinical Characteristics at Term

Table 5 below presents a descriptive profile of the infants at birth. Results show that despite both groups being born at similar gestational ages (p = .12), infants born to MM mothers were characterised by a lower mean birth weight than non-exposed comparison infants (p <.001), being on average 409.73 grams lighter. Both groups had similar proportions of male and female infants (p = .56). Infants born to methadone maintained mothers spent approximately two-weeks longer in the Christchurch Woman's Hospital prior to discharge than comparison infants on average (p <.001). After birth, 87% of ME infants were diagnosed with Neonatal Abstinence Syndrome and received pharmacological treatment with morphine, and in some instances, phenobarbitone (p <.001).

6.1.2 Maternal Health and Social Background at Delivery

With respect to maternal health and social background, Table 5 displays the characteristics of all mothers at the birth of their child. Methadone maintained mothers gave birth at a significantly younger age than comparison mothers (p = .05). No between-groups differences were found in terms of ethnic background, as mothers across the two groups mostly identified as being New Zealand European, followed by New Zealand Māori (p = .10). However there was a tendency for Māori to be over represented in the methadone group from the 2006 New Zealand Census data for the Canterbury region where the ethnic makeup for the region sits at approximately 77% European and 7% Māori (Statistics New Zealand, 2006).

In terms of the socio-economic circumstances of the sample, 92% of women maintained on methadone during pregnancy fell into the low socio-economic bracket compared to 21% of the comparison mothers (p <.001). With respect to maternal educational achievement, approximately three-quarters of methadone mothers had no formal qualifications in contrast to a quarter of the comparison mothers with similar levels of attained qualifications (p <.001).

Significant between-group differences were also found with respect to maternal mental health. Methadone maintained mothers reported significantly higher mean Edinburgh Postnatal Depression (EPD) scores both during pregnancy (p <.001) and after childbirth (p

<.001). Furthermore, nearly half of the MM mothers were rated as having a clinical EPD score for depression at the time of the birth (p <.001).

In terms of licit and illicit drug use, mothers who were maintained on methadone were more likely to continue to smoke tobacco (p <.001) and smoke more cigarettes on average per trimester (M = 13.60, SD = 9.12) than comparison mothers (M = 1.91, SD = 4.40, p <.001). In contrast, both groups of mothers reported similar rates of alcohol use during pregnancy (p =.60). In terms of illicit drug use, methadone maintained mothers were almost 30-times more likely than comparison mothers to report using an illicit psychoactive substance while pregnant (p <.001). Of the 66% of MM mothers that reported using at least one illicit substance during this time, cannabis (43%) was the most common. This was followed by benzodiazepines (28%), opiates other than their prescribed methadone (26%), and lastly, stimulants (19%). These were all significantly higher rates than the comparison mothers (ps < .001), for whom illicit drug use was rare (2%).

6.1.3 Family Composition at Term

As shown in Table 5, there were also clear between-group differences in the family circumstances of the sample at birth. Mothers who were maintained on methadone during their pregnancy were more likely to be in a de-facto or casual relationship at the time of the birth, whereas comparison mothers were more likely to be married (p <.001). Methadone maintained mothers also had more biological children than the comparison mothers (p = .01). However, mothers maintained on methadone were also around 15 times more likely to have lost legal and/or physical custody of one or more of these previously born children (p = .01).

Table 5

Infant Clinical, Background and Family Characteristics of All Study Children at Birth

Measure	Non-Methadone Comparison (n = 54)	Methadone-exposed (n = 53)	X^2/t	*p*
Infant Clinical Characteristics				
% Male	50.0	56.7	0.47	.56
M (SD) Gestation age (wks)	39.18 (1.47)	38.75 (1.42)	-1.56	.12
M (SD) Birth-weight (gms)	3437.59 (519.02)	3043.58 (415.72)	-4.33	<.001
M (SD) Days in hospital	2.81 (1.55)	16.67 (13.44)	7.38	<.001
% NAS treatment	0	86.8	82.21	<.001
Maternal Background Factors				
M (SD) Age at birth	31.54 (5.1)	29.62 (12.03)	-2.00	.05
Ethnic Status				
% NZ-European	83.3	84.9		
% Māori	7.4	15.1		
% Samoan	1.9	0		
% Asian	7.4	0	6.33	.10
Family Socio-Economic Status				
% Professional	33.9	1.9		
% Skilled	44.6	5.6		
% Unskilled	21.4	92.6	56.76	<.001
% Mother no formal educational qualifications	25.0	77.4	29.86	<.001
Maternal Mental Health				
M (SD) EPD score in pregnancy	7.41 (4.76)	13.04 (6.15)	5.34	<.001
M (SD) EPD score at birth	4.96 (4.54)	11.57 (6.58)	6.11	<.001

Measure	Non-Methadone Comparison (n = 54)	Methadone-exposed (n = 53)	X^2/t	*p*
% Maternal depression	5.6	47.2	23.98	<.001
% Tobacco in pregnancy	20.4	94.3	59.71	<.001
% Alcohol in pregnancy	13.0	17.0	0.31	.60
% Cannabis in pregnancy	1.9	43.4	26.53	<.001
% Benzodiazepines in pregnancy	0	28.3	17.78	<.001
% Opiates in pregnancy	0	26.4	16.41	<.001
% Stimulants in pregnancy	0	18.9	11.24	<.001
% Any illicit drug use in pregnancy	1.9	66.0	49.47	<.001
Family Circumstances				
Marital Status				
% Legally married	67.9	1.9		
% Cohabitating	21.4	54.7		
% Casual	7.1	28.3		
% No Partner/ NA	3.6	15.1	52.08	<.001
M (*range*) Parity	1.05 (0 – 7)	1.87 (0 – 7)	3.16	.01
% Custody of previous children				
Sole/Shared	62.5	57.4		
None	0	14.8		
N/A	37.5	27.8	9.21	.01

6.2 The Mental Health Outcomes of ME Children at Age 4.5-Years

6.2.1 The Strengths and Difficulties Questionnaire

Table 6 describes the emotional and behavioural adjustment of all study children on the Strengths and Difficulties Questionnaire (SDQ) at age 4.5-years. Outcomes examined

included emotional, hyperactivity/attention, conduct, peer-relationship problems, prosocial behaviour and overall total difficulties.

The results reveal clear between-group differences across all subscales of the SDQ with the exception of the pro-social scale. Specifically, ME children were rated by their caregivers as having significantly higher mean levels of emotional (p = .004), hyperactivity/attention (p <.001), conduct (p <.001), and peer-relationship (p = .01) scale scores, as well as overall adjustment problems (p <.001). Although there was a tendency for ME children to be rated as having lower levels of prosocial behaviours, this difference did not reach statistical significance (p = .16) and was subsequently dropped from any further analysis.

Consistent with the pattern of findings observed on the SDQ scale scores, Table 6 also shows that ME children were significantly more likely to fall within the clinical adjustment problem range, as specified by Goodman (2000) (see Appendix D). Almost nine times more ME children than comparison children were rated as having clinically significant conduct problems (p < .001), the odds ratio being 13.4. ME children were also nearly three times more likely (OR = 3.7) than comparison children to have hyperactivity/attention problem scores in the clinical range (p = .03), and twice as likely (OR = 1.9) to have peer-relationship problems at a similar level of difficulty (p = .01). Although there was a tendency for ME children (13%) to have clinically significant emotional problems than comparison children (4%), this difference did not reach statistical significance (p = .18). Not surprisingly, children born to methadone maintained mothers were just over nine times more likely to have a total difficulty score in the clinical range than comparison children (p <.001, OR = 12.3) by age 4.5-years.

Table 6

Emotional and Behavioural Scores of All Study Children at Age 4.5-Years and Proportions of Children with SDQ Scores in a Clinical Range

Subscales	Non-Exposed Comparison (n = 54)	Methadone-exposed (n = 53)	X^2/t	p	Mean Group Difference/ OR (95% C.I.)
M (SD) Emotional problems score	1.26 (1.42)	2.26 (2.00)	3.00	.004	1.01 (0.3 - 1.7)
% Emotional problems	3.7	13.2	3.45	.18	3.96 (0.8 - 20.0)

Subscales	Non-Exposed Comparison (n = 54)	Methadone-exposed (n = 53)	X^2/t	*p*	Mean Group Difference/ OR (95% C.I.)
M (SD) Hyperactivity/ attention problems score	2.46 (2.22)	4.40 (2.44)	4.28	<.001	1.93 (1.0 - 2.8)
% Hyperactivity/attention problems	7.4	22.6	6.75	.03	3.66 (1.1 – 12.2)
M (SD) Conduct problems score	1.00 (1.12)	2.64 (1.77)	5.74	<.001	1.64 (1.1 - 2.2)
% Conduct problems	3.7	34.0	20.01	<.001	13.37 (2.9 – 61.3)
M (SD) Peer-relations problems score	1.00 (1.15)	1.81 (1.73)	2.85	.01	0.81 (0.3 - 1.4)
% Peer relationship problems	7.4	13.2	8.88	.01	1.90 (0.5 – 6.9)
M (SD) Pro-social score	8.46 (1.21)	8.11 (1.58)	-1.29	.16	-0.35 (-0.9 - 0.2)
% Pro-social problems	0	1.9	3.04	.22	-
M (SD) Total difficulties problems score	5.72 (4.08)	11.11 (5.46)	5.78	<.001	5.39 (3.54 - 7.24)
% Overall difficulties	1.9	18.9	16.12	<.001	12.33 (1.5 – 100.1)

6.2.1.1 Socio-Emotional and Behavioural Problems after Covariate Adjustment

The above findings indicate that children born to mothers engaged in methadone maintenance therapy during pregnancy are at increased risk for peer-relationship, hyperactivity/attention and conduct adjustment problems. However, it is also possible that these significant between-groups differences might reflect the effects of other potentially confounding factors also correlated with MMT (Ornoy *et al.,* 1996; Pulsifer *et al.,* 2004). To assess the extent to which between-groups differences in SDQ scale scores were associated with maternal risk spanning age at delivery, educational achievement, SES, and solo motherhood, and licit and illicit drug use while pregnant, the SDQ was re-examined after statistical adjustment for these covariates.

Table 7 below displays the SDQ mean emotional and behavioural adjustment problem scores for ME and comparison children after controlling for maternal social risk and poly-substance use during pregnancy. As shown, between-groups effects remained on the conduct problems (p = .003) and total difficulties (p = .006) subscales of the SDQ after adjustment for covariates. However, after covariate adjustment, there was no longer an observable effect of group on the emotional (p = .08), peer-relationship (p = .06) or hyperactivity/attention (p = .25) subscales. Together, these findings suggest that ME children's conduct and overall level of adjustment problem continues to exist after consideration for the effects of maternal risk factors, thereby revealing a possible causal relationship between maternal methadone dependency and later child behavioural adjustment problems by 4.5-years old.

Table 7

Mean SDQ Scores for All Study Children After Covariate Adjustment

Subscales	Non-Exposed Comparison (n = 54)	Methadone-Exposed (n = 53)	*F*	*p*
Emotional problems score	1.33	2.20	3.08	.08
Hyperactivity/Attention problems score	3.04	3.81	1.35	.25
Conduct problems score	1.84	2.45	9.28	.003
Peer-relationships problems score	1.01	1.80	3.62	.06
Total difficulties problems score	6.56	10.26	7.80	.006

6.2.2 Risk of Clinical Disorder by Age 4.5-Years

Table 8 shows the proportions of children in each group with moderate-high risk ratings for DSM-IV/ICS-10 clinical disorder on the DAWBA at age 4.5-years. Disorders examined included separation anxiety disorder, specific phobia disorder, generalised anxiety disorder, depression, attention deficit/hyperactivity disorder, hyperkinesis, conduct disorder and oppositional defiant disorder.

The results show that there was a tendency for some ME children to have higher rates of disorder than non-exposed children across a range of emotional/internalising and behavioural/externalising disorders. In terms of emotional disorders, no significant between-groups differences were found in terms of separation anxiety (p = .36) specific phobic disorder (p = .36) or depression (p = .50). No children in either group met criteria for generalised anxiety disorder, thus this was subsequently dropped from further analysis.

In terms of behavioural disorders, ME children had significantly higher rates of attention deficit/hyperactivity disorder (OR = 9.4, p = .016), hyperkinesis (p = .013), oppositional defiant disorder (p < .001) and conduct disorder (OR = 10.8, p = .008). Most notably, 32% of the ME group was identified by the DAWBA as having a moderate to high risk of ODD. This was followed by high rates of conduct disorder, where ME children were approximately nine times more likely than comparison children to have increased risk for conduct disorder.

Moreover, examination of Any Disorder on the DAWBA revealed that children from the ME group were at increased risk for a DSM-IV/ICD-10 disorder (OR = 8.9). Almost half (42%) of ME children compared to only 7% of comparison children were identified as being at risk for a clinical disorder (p < .001), suggesting that children born to women maintained on methadone throughout pregnancy may experience particular difficulties with internalising and externalising problems even in their preschool years.

Table 8

Rates of Clinical Disorder (DAWBA) Scores for All Study Children

Subscales	Non-Exposed Comparison (n = 54)	Methadone-exposed (n = 53)	X^2	OR (95% CI)	p
% Separation Anxiety	1.9	5.7	1.08	3.18 (0.3 – 31.6)	.36
% Specific Phobia	1.9	5.7	1.08	3.18 (0.3 – 31.6)	.36

Subcales	Non-Exposed Comparison (n = 54)	Methadone-exposed (n = 53)	X^2	OR (95% CI)	*p*
% Generalised Anxiety	0	0		-	
% Depression	0	1	1.03	-	.50
% ADHD	1.8	15	6.09	9.42 (1.1 – 78.2)	.016
% Hyperkinesis	0	11.3	6.48	-	.013
% Oppositional Defiant	0	32.1	20.59	-	<.001
% Conduct Disorder	1.8	17	7.23	10.84 (1.3 – 88.9)	.008
% Any Disorder	7.4	41.5	16.91	8.87 (2.8 – 28.2)	<.001

6.3 Family Composition at Age 4.5-Years

The family circumstances of children in both study groups at age 4.5-years are shown in Table 9. Similar to findings at term, nearly half of all MM mothers were sole parenting compared to only 6% of comparison mothers ($p < .01$). At the time of the 4.5-year assessment, about three in four ME children were living with their biological mothers with one in four living with a CYF-appointed caregiver. Of the 15 ME children in out-of-home care at the time of assessment, 53% ($n = 13$) were living with relatives care and 47% ($n = 12$) with non-relative carers. In contrast, all of the comparison children were living with their biological mothers ($p < .01$) at age 4.5-years.

Table 9

Family Situation of all Study Children at 4.5 years

	Non-Exposed Comparison (n = 54)	Methadone-exposed (n = 53)	X^2	*p*
Parental Relationship				
% Legally married	72.2	19.2		
% Cohabitating	20.4	25.0		
% Casual	1.9	9.6		
% No Partner	5.6	46.2	36.31	<.001
Child Family Circumstance				
% Living with biological mother	100	71.7		
% Living with family relative		15.1		
% Living with non-relative		13.2	17.78	<.001

6.4 Child Protection and Social Welfare Circumstances by Age 4.5-Years

Table 10 shows the proportions of methadone and comparison families involved with social welfare and child protection services from birth to age 4.5-years.

A significantly higher proportion of families caring for methadone-exposed children reported having at least one contact with CYF due to concerns surrounding child maltreatment by the 4.5-year follow-up. From birth to 18-months old, methadone families were ten-times more likely to have had contact with CYF than comparison families ($p < .001$). Of the families that were involved with CYF from birth to 18-months, most (67%) were methadone maintained mothers being investigated on suspicion of child neglect. From the 32 reported CYF investigations during this time, 12 resulted in formal removal of the child from maternal care. The remaining families involved with CYF were relative (15%) and non-relative (18%) caregivers of methadone-exposed children for whom CYF contact was a component of their custodial care arrangement.

Between 18-months and 4.5-years, a further 16% of parents/caregivers of ME children reported a contact with CYF, summing to three-quarters of caregivers of ME children ever having been investigated by CYF services ($p < .001$). Of the CYF investigations that occurred between 18-months and 4.5-years ($n = 26$), a further ten ME children were removed from maternal care. No CYF investigation of comparison families resulted in the formal removal of the child from the home environment. In addition, ME families (51%) were approximately nine-times more likely to report contact during the past year than comparison caregivers (6%, $p < .001$).

In addition to increased rates of CYF contact, a higher proportion of the caregivers of ME children (92% vs. 56%) reported having accessed the services at least one social welfare agency within the 12-months prior to the interview than compassion mothers ($p < .001$).

Table 10

Involvement with Child Protection and Welfare Services for all Study Children from Birth to Age 4.5-Years

	Non-Exposed Comparison (n = 54)	Methadone-exposed (n = 53)	X^2	*p*
% CYF contact 0 – 18-months	5.5	59.3	48.12	<.001
% CYF contact 0 – 4.5-years	9.3	75.5	25.81	<.001
% CYF contact in last 12-months	5.5	50.9	29.21	<.001
% Contact with a Social agency in last 21-months	55.6	92.2	17.97	<.001

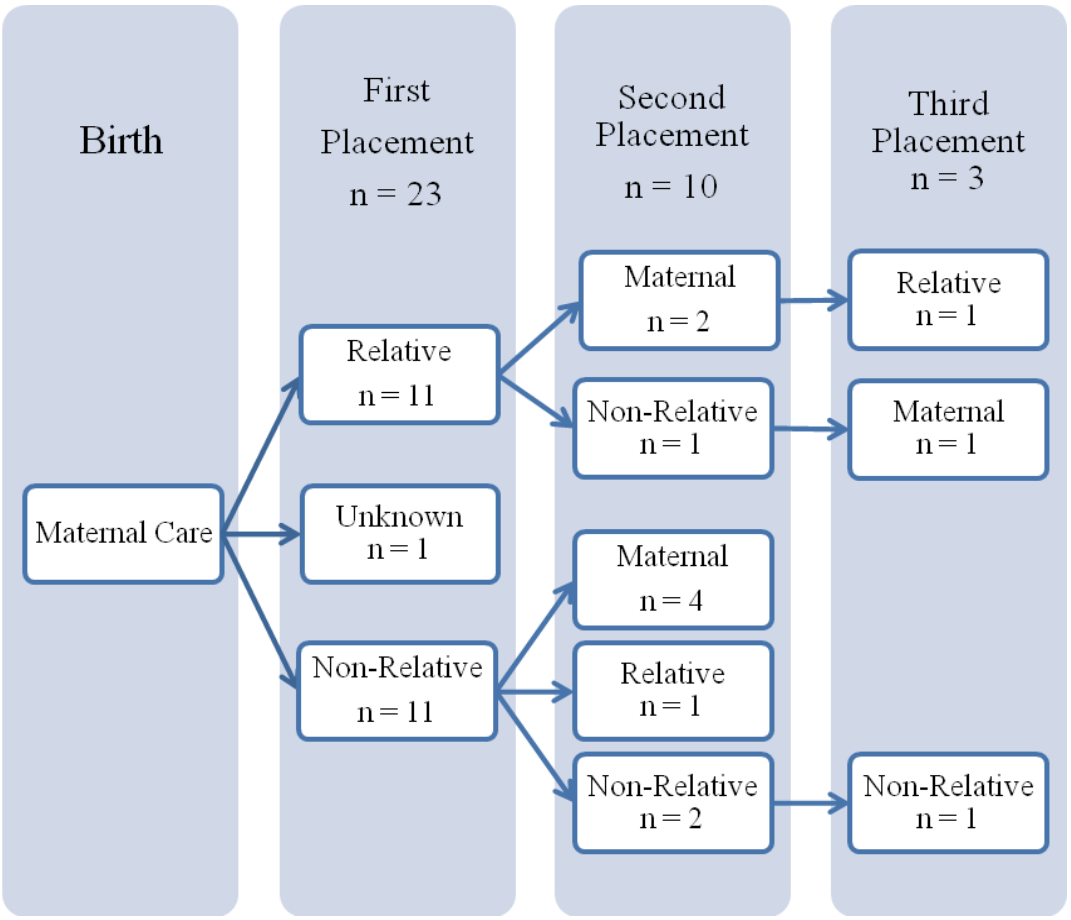
6.5 Preschool Placement Experiences of Children Born to Mothers Enrolled in MMT during Pregnancy

Examination of the placement experiences of all study children from birth to 4.5-years, findings revealed that just over 40% of the children born to MM mothers had experienced at least one of out of home placement from birth to 4.5-years old (range: 1 – 7). In contrast, none of the comparison children had been removed from maternal care ($p < .001$). Where the foster parent was able to provide sufficient information, severe maternal substance abuse was cited as the most common reason for the child being placed in protective care (12%),

followed by neglect (3%) and maternal imprisonment (2%). A complete placement history profile was unavailable for one child in the ME group.

Figure 3 below illustrates the placement pathways reported for ME children removed from maternal care across their first three placement changes, as this was where the highest rate of re-placement occurred. At first placement, the same proportion of ME children were placed with relative caregivers and CYF-appointed non-relative caregivers. Children that were initially placed with non-relatives tended to show more movement, with seven of these children going on to a second placement compared to only three children in relative care. A more detailed examination and discussion of these placement comparisons is presented in Table 11 following Figure 3.

Fig. 3: Placement Pathways of ME Children across the First Three Placement Changes



As reported above, almost one in two children born to MM mothers were exposed to out-of-home care by age 4.5-years (p = .00). On average, the mean age of first placement occurred at

16-months old. However, most placements were planned by CYF during the pregnancy where the child was removed from maternal care immediately following the birth. While 11 children had a single placement change, 12 children experienced higher levels of environmental instability by having multiple placement changes (see Table 11 below). Three ME children experienced a very high level of caregiver instability with four or more placement changes, with one child having a total of seven changes by 4.5-years old. Of the methadone mothers that lost custody of their children, approximately one third (n = 8) were subsequently rewarded custody of their child by 4.5-years.

Table 11

Details of Placement History of ME and Comparison children by Age 4.5-Years

	Non-Exposed Comparison (n = 54)	Methadone-exposed (n = 53)	X^2	p
% Children with placement	0	43.3	29.85	<.001
Age at first placement (months)				
M (SD)	-	16.45 (19.31)		
Mode		0		
Range		0 - 64		
Number of placements				
M (SD)	-	2.12 (1.74)		
Mode		1		
Range		1 – 7		
Frequency of placements				
1	-	11		
2		7		
3		2		
4		1		
7		2		
% Children returned to maternal care by 4.5-years	-	34.8		

6.5.1 Maternal Background Predictors of Child Out-of-Home Placement

Findings from the previous analysis clearly show that children born to MM mothers are at significantly higher risk of being placed in protective out-of-home care than comparison children. The following section examines the individual maternal risk factors associated with maternal methadone treatment that might predict child placement.

To identify the maternal clinical and social background characteristics that placed all families (n = 103) at increased risk of childcare concern and subsequent child removal from maternal care, all maternal characteristics were entered into a linear regression in a forwards and backwards fashion to identify the best fitting and most parsimonious model. All maternal health and socio-familial were factors were treated as continuous variables, and variables that did not significantly contribute to the model ($p \geq .17$) were removed throughout. Level of education (p = .82) was removed from the model. Marital status (p = .12) was also removed from the last block of the model, as it was the only non-significant variable otherwise remaining in the model.

The final fitted model is shown in Table 12 below. This model accounted for 71% of the variance (adjusted R^2 = .70) attributable to maternal loss of child custody and subsequent child placement. Key predictors included maternal methadone dose (p <.001), maternal age at delivery (p < .01), SES (p = .03), depression (p < .00), cigarette smoking during pregnancy (p = .01), and other psychoactive substance use during pregnancy (p = .05). These results suggest that mothers engaged in MMT who were younger at delivery, from lower SES backgrounds, who were subject to higher levels of depression, and used nicotine and other illicit substances across the pregnancy were at increased risk of losing custody of their children.

Table 12

Summary of Linear Regression: Maternal predictors of child foster care placement (n = 103)

	B (SE)	β	*p*
Methadone dose in pregnancy	.01 (.00)	.34	<.001
Depression	.03 (.01)	.21	.002
Maternal age at term interview	-.01 (.01)	-.17	.005
Cigarette use in pregnancy	.02 (.00)	.19	.01
Socio-economic status	.05 (.02)	.16	.028
Poly-substance use in pregnancy	.11 (.05)	.13	.046
R^2 = .71, Model F (6, 97) = 40.39, p <.001			

6.6 Socio-Emotional and Behavioural Adjustment Problems of ME Children Exposed to Out-of-Home Care

Findings to date indicated that ME children were characterised by elevated levels of conduct problems (p = .01) on the SDQ that remained after statistical adjustment for confounding factors associated with maternal methadone treatment. Furthermore, ME children were significantly more likely to be placed in protective care during their preschool years than non-exposed children (p < .001). A range of maternal health and social factors predicted out-of-home care. However, it is still unclear whether such exposure to out-of-home care might further add to ME children's later risk of emotional and behavioural adjustment problems by age 4.5-years. To examine the possible effects of out-of-home experiences on ME children's risk of disorder, previous analyses with the SDQ and DAWBA were extended to include measures of child placement. Although desirable, interaction effects were unable to be examined as no comparison child had a single placement experience.

For this analysis, all study children were categorised into three groups according to prenatal methadone-exposure and exposure to out-of-home placement. These groups consisted of a) no prenatal methadone-exposure or out-of-home placement experience, b) ME children without placement, and c) ME children with placement. Chi-squared tests for independence were used to examine between-groups differences in the proportions of children identified as

being at risk of a clinical disorder on the SDQ and DAWBA (presented in Tables 13 and 14). Odds ratios derived from a binary logistic regression were also reported.

Emotional Adjustment Problems. As shown in Table 13, comparison children and ME children who remained with their biological mothers to 4.5-years were found to have similar rates of emotional adjustment problem (4% vs. 3%), which suggests that ME children were no more likely to experience emotional difficulty than their non-exposed peers. However, ME children exposed to out-of-home care were approximately seven-times more likely to have emotional adjustment problems in the clinical range relative to the other two groups (p = .003). Inspection of the odds ratios suggested that increased risk of emotional adjustment problem appeared to be directly related to the placement experience (OR = 8.6, p = .007). Similar findings were also observed on the peer-relationship problems subscale, with comparison children (7%) and ME children who remained with their biological mothers (7%) again being at similar risk for adjustment problems in this area (OR = 0.8, p = .81). By comparison, ME children exposed to out-of-home care by age 4.5-years tended to be at elevated risk (OR = 3.4) although this finding approached significance only (p = .08).

Behavioural Adjustment Problems. Table 14 shows that relative to the comparison group (4%), both ME groups showed similar rates of conduct adjustment problem (37% and 30%, p < .001). The similarity observed in the odds ratios suggests that risk of conduct adjustment problem might be more closely associated with maternal methadone maintenance therapy rather than out-of-home care. Similar results were found on the hyperactivity/attention subscale of the SDQ (p = .06). ME children who remained in maternal care to age 4.5-years had higher rates of hyperactivity/attention problems than the comparison children (OR = 2.8), but this difference was not significant (p = .10). Furthermore, ME children exposed to out-of home care were not shown to be at further additional risk for hyperactivity/attention problems (OR = 1.8, p = .38).

Overall Levels of Adjustment Problems. Children born to mothers maintained on methadone during pregnancy who were subsequently removed from parental care were at elevated risk for overall adjustment problems (22%) compared to non-exposed children (2%) and ME children remaining in maternal care (17%) to follow-up (p = .01). The odds ratio across the groups (OR = 5.6, p = .03) suggests that increase in risk was due to both prenatal methadone exposure and out-of-home care placing children at risk of adjustment difficulties overall.

Table 13

Rates of Adjustment Problem (SDQ) of Comparison, ME without Placement and ME Placement Groups

Subscales	Non-Exposed Comparison (n = 54)	Methadone-Exposed No Placement (n = 30)	Methadone-Exposed Placement (n = 23)	*Overall* *p*	Comp. vs. ME No Placement OR	Comp. vs. ME No Placement *p*	Comp. vs. ME Placement OR	Comp. vs. ME Placement *p*
% Emotional Problems	3.7	3.3	26.1	.003	0.69	.75	8.60	.007
% Hyperactivity/ Attention Problems	7.4	26.7	17.4	.06	2.76	.10	1.84	.38
% Conduct Problems	3.7	36.7	30.4	<.001	6.48	.004	5.50	.01
% Peer-relationships Problems	7.4	6.7	21.7	.12	0.81	.81	3.40	.08
% Overall Problems	1.9	16.7	21.7	.01	3.01	.17	5.63	.03

6.7 Risk of Clinical Disorder of ME Children Exposed to Placement.

Previous findings on the SDQ indicated that ME children exposed to out-of-home care tended to have an elevated risk of emotional (p = .003) and overall adjustment problem (p < .001). This question was further examined in relation to children's DAWBA scores.

Internalising Disorders. As shown in Table 14, ME children were approximately three-times more likely to be identified as being at risk for separation anxiety disorder and specific phobia disorder. However, these between-groups differences were not statistically significant (p = .35), and the odds ratios did not reveal an increase in risk as a function of prenatal methadone exposure (p = .76) or foster care placement (p = .19). There was also no significant group comparison for risk of depression. Despite rate of internalising disorder detected being in the hypothesised direction, the lack of statistical significance might be attributable the low rate of disorder detected for the sample overall. Nonetheless, the findings do suggest that exposure to out-of-home care contributes to increased levels of subclinical emotional adjustment problems by age 4.5-years, with preliminary evidence suggesting that these subclinical problems may well eventuate to clinical problems into later childhood.

Externalising Disorders. As shown in Table 14, there was a significant effect of group across all externalising disorder scales measured by the DAWBA (ps < .05). Conduct disorder was the only behavioural disorder that ME children exposed to placement were more likely have a moderate to high risk rating (p = .03). Furthermore, the odds ratio (OR = 4.4) approached significance (p = .07), suggesting that placement might be having some possible effect on risk of CD within the ME group. Conversely, risk of externalising disorders spanning ADHD (p = .04), hyperkinesis (p = .03), and ODD (p < .001) seemed to be more associated with ME children who remained in biological maternal care from birth to 4.5-years. However, the odds ratio for ODD showed that ME children exposed to out of home care had 14-times the risk of ODD relative to the comparison sample (p = .002). However, ME children remaining in biological maternal care to follow-up also showed significant risk (p = .006), suggesting that risk did not increase in response to exposure to out-of-home care for ME children.

More generally, there was a significant effect by group on the Any Disorder subscale of the DAWBA (p <.001). Here, ME children exposed to out-of-home care showed a slight proportional increase in risk for an emotional or behavioural disorder (44%) in comparison to ME children who remained in maternal care to age 4.5-years (40%). This trend is most likely attributable to the slight increase in rates of specific phobia, separation anxiety, depression

and conduct disorder observed among ME children exposed to out-of-home care. However, inspection of the odds ratios for the any disorder subscale suggested that both groups of ME children were at increased risk for a clinical disorder relative to the comparison group, indicating that placement is not yet having a definitive effect on clinical levels of emotional and behavioural problems within the ME group by age 4.5-years.

Table 14

Rates of Clinical Disorder (DAWBA) of Comparison, ME without Placement and ME Placement Groups

Subscales	Non-Exposed Comparison (n = 54)	Methadone-Exposed No Placement (n = 30)	Methadone-Exposed Placement (n = 23)	*Overall* *p*	Comp. vs. ME No Placement OR	Comp. vs. ME No Placement *p*	Comp. vs. ME Placement OR	Comp. vs. ME Placement *p*
% Separation Anxiety	1.8	3.3	8.7	.35	1.50	.76	4.48	.19
% Specific Phobia	1.8	3.3	8.7	.35	1.50	.76	4.48	.19
% Depression	0	0	4.3	.16			-	
% ADHD	1.9	16.7	13	.04	3.31	.14	3.16	.18
% Hyperkinesis	0	13.3	8.7	.03	4.39	.14	3.60	.23
% Oppositional Defiant Disorder	0	30	4.3	<.001	9.59	.006	14.13	.002
% Conduct Disorder	1.9	16.7	17.4	.03	3.15	.15	4.35	.07
% Any disorder	7.4	40	43.5	<.001	4.65	.007	6.17	.002

6.8 The Effect of Child Protection and Placement Experiences at Age 4.5-Years.

The earlier reported findings revealed that ME children were characterised by elevated levels of conduct problems (p = .003) and total difficulties (p = .006) on the SDQ that remained after adjustment for the covariate factors associated with maternal methadone treatment. In addition to this, ME children are also approximately 23-times more likely to enter the foster care system than non-exposed children (p < .001). Increased risk of internalising disorder tended to be associated with the ME placement group, whereas risk of externalising disorder was slightly more associated with the ME maternal care group. However, tendencies did not reach statistical significance. Despite this, the ME placement group were overall at an increased risk of any disorder than the ME maternal care and comparison groups (p < .001), suggesting that there was a possible effect of placement on the wellbeing of ME children at age 4.5-years. Of further interest was the extent to which individual child protection and placement factors might be associated with increased levels of emotional and behavioural adjustment problems. This last research aim was undertaken in a two step process. Firstly, correlations between child protection, placement factors and DAWBA outcomes are presented for all study children. Secondly, a linear regression model was developed to examine how levels of environmental instability, in comparison to other factors related to maternal methadone treatment, accounted for ME children's risk of disorder measured by the DAWBA.

6.8.1 Child Protection Factors, Placement and the DAWBA

Bivariate analysis indicated that a range of child protection and placement factors were significantly associated with increased risk of a range of internalising clinical disorders, as displayed below in Table 15. First, the total number of social agencies seen within the last 12-months showed slight correlations with DAWBA risk of disorder scores for depression (p = .02), hyperkinesis (p = .05), ADHD (p =.04) and CD (p =.01). It also moderately correlated with ODD (p <.001) and likelihood of any disorder (p =.001). These relationships show that children living in families characterised by higher levels of socio-environmental adversity were likely to have higher risk of disorder scores. Secondly, contact with CYF by 18-months was also a factor that had a significant relationship with DAWBA risk scores across both internalising and externalising disorders. In terms of internalising disorders, CYF contact was moderately correlated with risk scores for separation anxiety (p = .04) and specific phobia

disorder (p =.01). CYF contact by 18-months was also moderately associated with risk scores for CD (p = .02), ADHD (p = .01), hyperkinesis (p = .003), and ODD (p < .001). Children whose families had CYF contact prior to 18-months therefore likely to have higher risk of disorder scores at 4.5-years.

In terms of placement factors, the total number of placement changes to age 4.5-years and timing between first and second placement were found to be significantly associated with the DAWBA outcomes. As shown in Table 15, there was a small correlation between number of placement changes and the risk of disorder ratings for with specific phobia disorder (p < .001), ADHD (p = .05), and hyperkinesis, (p = .03), revealing that children with higher rates of environmental instability were likely to have increased risk of disorder by age 4.5-years. In addition, timing between first and second placement was also associated with DAWBA outcomes. Specifically, this variable was strongly and positively correlated with risk of ODD (p = .005) and risk of any DSM-IV/ICD-10 disorder (p = .007), suggesting that children who had longer periods between first and second placement were more likely to have increased risks for disorder during their preschool years. In summary, these results indicate that increased familial contact with social welfare and child protection services were significantly associated with later child risk of clinical disorder. Furthermore, the correlations also generally indicate that the degree of caregiver instability, as well as the timing between first and second placement, might play an important role in the development of child internalising and externalising problems during the preschool years.

Table 15

Pearson's Product Moment Correlations between Child Protection Factors, Placement Factors and DAWBA Risk of Disorder (n = 107)

	Separation Anxiety	Specific Phobia	Depression	ADHD	Hyperkinesis	ODD	CD	ANY
Number of social agencies seen in last 12 months	.08	.11	.21*	.17*	.16*	.33**	.22*	31**
CYF contact by 18-months	.17*	.25**	.14	.23**	.27**	.35**	.20*	.30**
Number of placements by age 4.5-years	.11	.40**	.06	.16*	.19*	.13	.05	.11
Age at first placement	-.13	-.15	.11	-.26	-.25	-.34	.15	-.26
Length of first placement[5]	.43	.02	-.26	.09	.31	.55**	.37	.52*

* $p < .05$

** $p < .01$

[5] For children with ≥ 2 placement changes

6.8.2 Placement as a Predictor of Disorder for ME Children at 4.5-Years

As ME children were significantly more likely to be placed in protective care during their preschool years than non-exposed children ($p < .001$) and there was some evidence to suggest that the placement experience contributed to increase in risk of possible disorder for these children, a second linear regression model was developed to examine how the placement experience contributed to child outcome within the ME group ($n = 53$).

Three factors were entered into the model to evaluate the extent to which maternal methadone maintenance, maternal social risk and child placement independently contributed to ME children's risk of disorder at follow-up. The any DSM-IV/ICD-10 disorder subscale of the DAWBA was used as the key dependent measure of child mental health at 4.5-years. For simplicity and functionality, maternal methadone dose was coded as: ≤ 40mg = 1, 40.1 – 60mgs = 2, ≥ 60.1mg = 3, to represent low, medium and high dose groups. Level of maternal social risk was a composite measure created on a scale of 0 – 6 based on education, SES, age at pregnancy, single parent, depression, any other drug use in pregnancy[6]. Child exposure to placement was coded as; No placement = 1, Low instability = 2[7], High instability = 3[8]. This analysis was performed for the ME sample only ($n = 53$) to determine whether their mental health outcomes were best predicted by maternal methadone maintenance, maternal socio-familial risk factors or exposure to out-of-home care.

Forward stepwise linear regression models were developed to identify the best fitting and most parsimonious model. Variables that did not significantly contribute to the model ($p \geq .17$) were removed in a forced fashion to improve the precision of the model. The final model accounted for 8% of the variance (adjusted $R^2 = .07$). The only significant independent predictor of disorder for ME children was maternal social risk ($p = .04$). Although the removal of the non-significant factors from block one saw a 2% decrease in the variance of DAWBA risk scores accounted for, this was a non-significant change, $R^2 = -.04$, *F change* $(2,49) = 1.05$, $p = .36$. Furthermore, upon the removal of exposure to placement and clinical level of methadone dose, block two became statistically significant ($p = .04$). The results of the regression analysis are summarised in Table 16 below.

[6] A score of six, for example, indicates that the mother was characterised by no formal education, low SES background, early motherhood, single parent, clinical level of depression and licit and/or illicit drug use during pregnancy.
[7] A single placement experience
[8] Two or more placement experiences

Table 16

Summary of Linear Regression: Predictors of children's DAWBA disorder ratings (n = 53)

	B (SE)	β	*p*
Block One			
Maternal social risk	.54 (.21)	.37	.014
Child environmental instability	-.30 (.22)	-.19	.18
Maternal methadone dose	.10 (.20)	-.37	.62
R^2 = .12, Model *F* (3,49) = 2.27, *p* = .09			
Block Two			
Maternal social risk	.42 (.20)	.29	.035
R^2 = .08, Model *F* (1,51) = 4.69, *p* = .035			

The above linear regression model reveals that level of maternal methadone dose during pregnancy and child exposure to placement did not significantly account for ME children's risk of disorder scores at age 4.5-years above and beyond maternal social risk. However, the model accounted for just 8% of the variance in disorder risk, suggesting that future research is needed to better explain how other environmental factors not considered by the current study are also contributing to the mental health risks observed among ME children.

Chapter 7

Discussion

7.1 Review of the Current Study

Children born to women engaged in MMT during pregnancy represent a high-risk group. However, little is known about the mental health outcomes of these children. To date, existing studies tended to focus on heroin and other drugs of abuse such as cocaine. Furthermore, few studies have considered how postnatal factors, such as foster care placement, that might also influence these high-risk children's outcomes. The current study addressed these issues by assessing the socio-emotional and behavioural adjustment of a cohort of preschool-aged children born to women enrolled in MMT during pregnancy. Also examined were the child protection and placement experiences of these children following from birth to age 4.5-years.

Methodological strengths of the study included the detailed measurement of prescribed maternal methadone dose throughout pregnancy, high sample recruitment and retention rates, and the examination of a wide range of infant and maternal clinical and social factors. In addition, the prospective longitudinal design allowed for detailed information to be collected regarding children's family circumstances from birth to 4.5-years. Another novel feature of this study was the use of a two tiered approach to assess key mental health outcomes across both groups. This approach consisted of an initial parent-reported SDQ screening measure to collect information regarding child emotional, peer-relationship, hyperactivity/attention and conduct adjustment problems. This was followed by the Developmental and Wellbeing Assessment (DAWBA) which is a standardised psychiatric interview to assess child clinical disorder. The DAWBA was used to assess a wide range of clinical disorders spanning separation anxiety disorder, specific phobia disorder, generalised anxiety disorder, depression, ADHD, hyperkinesis, conduct disorder and oppositional defiant disorder. Additionally, this study also examined the child protection and placement experiences of children born to methadone-dependent mothers in greater detail than other placement-focused studies (e.g. Bada *et al.*, 2008; Crea *et al*., 2008; Ornoy *et al*., 1996; Soeptami, 1994). Findings relating to each of the study aims are discussed below.

7.2 Socio-emotional Adjustment of Methadone-Exposed Children at age 4.5-years

By age 4.5-years, caregivers of ME children reported significantly higher levels of child emotional adjustment problems than did caregivers of non-exposed children. ME children were approximately seven-times more likely to have emotional adjustment problems in the clinical range than comparison children, indicating that they are more likely to experience problems with negative affect, worrying and psychosomatic symptoms. These findings support past research that has shown that prenatal exposure to other teratogenic substances such as alcohol, cocaine, marijuana and tobacco is highly associated with later emotional adjustment problems throughout childhood (Fergusson *et al.,* 1998; Gray *et al.,* 2005; O'Conner and Kasari, 2000; Morrow *et al.,* 2009; Simon *et al.,* 2009).

In addition to emotional adjustment problems, the SDQ also revealed that children born to mothers maintained on methadone were at risk of peer-relationship problems. ME children were nearly twice as likely than non-exposed children to have peer-relationship problem scores in the abnormal range, indicating that ME children may be at risk for developing social difficulties. This finding is highly consistent with the findings of both Roding *et al.* (1989) and Hayford *et al.* (1989) where heroin/methadone-exposed children under six-years of age were shown to have extensive difficulty maintaining positive interactions with their peers than the non-exposed group. Although Roding *et al.* (1989) and Hayford *et al.* (1989) both suggested that such social deficits become evident by age six for children born to opiate dependent mothers, the current study has also shown that these problems may in fact emerge prior to school entry.

Although the above findings suggested that ME children were at increased risk for emotional adjustment problems, subsequent analysis of the DAWBA revealed that ME children were at similar risk of separation anxiety disorder and specific phobia disorder relative to rates of disorder detected in the comparison group. The current study also did not find a strong association between prenatal methadone exposure and increased risk for generalised anxiety disorder or depression among the ME group. These findings seem to conflict with other substance exposure research (*see* Fergusson *et al.,* 1998; O'Conner and Kasari, 2000). For example, Gray *et al.* (2005) reported that prenatal exposure to cocaine during the first and third trimesters of gestation was significantly associated with increased risk of depression at a 10-year follow-up for exposed children even after control for pre- and postnatal covariates. The findings of the current study therefore suggest that ME children are at increased risk for

internalising problems; however these tendencies were observed at the subclinical level only by age 4.5-years.

7.3 Behavioural Adjustment Methadone-Exposed Children at age 4.5-years

The second set of mental health outcomes of interest were externalising behaviour problems including hyperactivity/attention and conduct adjustment problems on the SDQ; ADHD, hyperkinesis, OD and ODD on the DAWBA. From the SDQ and DAWBA, the results consistently suggested that ME children were at increased risk for behavioural adjustment problems and behavioural disorder. In terms of the SDQ, ME children were three-times more likely to have hyperactivity scores in the abnormal range and nine-times more likely to have conduct problem scores in the abnormal range than non-exposed children. These results are similar to previous studies reporting an increased prevalence of behavioural difficulties in samples of children prenatally exposed to heroin and/or methadone (Hayford *et al.,* 1988; Pulsifer *et al.,* 2004; Seuss *et al.,* 1997; Soepatmi, 1994). While the association between prenatal methadone exposure and hyperactivity/inattention problems has previously been well established (Pulsifer *et al.,* 2004; Seuss *et al.,* 1997), the current study showed that ME children may be at particular risk of developing an antisocial behavioural disorder in later childhood.

In support of the SDQ behavioural adjustment findings, the analysis of the behavioural disorder scales of the DAWBA also revealed that preschool children born to MM women are significantly at risk for a range of behavioural disorders such as ODD, CD, ADHD and hyperkinesis. Oppositional defiant disorder was the most commonly reported child behavioural problem by caregivers of ME children, with children in this group being 32-times more likely than non-exposed children to have a moderate to high risk rating for ODD by 4.5-years old. This was followed by, in order of prevalence, CD (17%), ADHD (15%) and hyperkinesis (11%); all of which were significantly higher than the non-exposed comparison sample. These results replicate previous findings by Suess et al. (1997), Soeptami (1997) and Walhovd *et al.* (2007); showing that children born to heroin and/or methadone dependent women are significantly more likely to experience an externalising disorder than non-exposed children. In addition to this, Ornoy *et al.* (2001) reported that between 24 - 54% of their heroin-exposed sample aged 5–12 –years met the diagnostic criteria for ADHD, suggesting that prevalence rate of ADHD (15%) from the present ME sample may be somewhat

conservative, potentially reflecting the considerable clinical care and service support being given to these New Zealand families compared to other international cohorts.

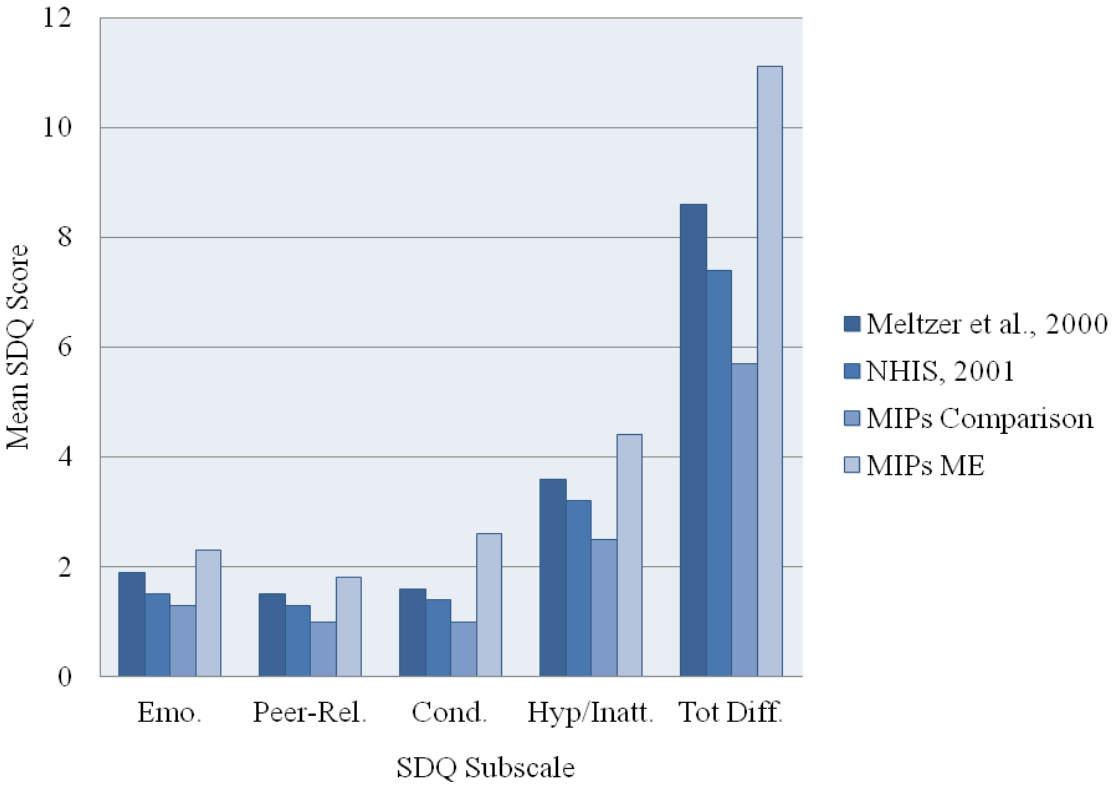
When taken together, the findings suggest that preschool children born to MM women show an increased risk for emotional and behavioural adjustment problems than non-exposed children. Upon a more detailed examination of these adjustment problems, the results also indicate that ME children are more likely to experience externalising problems at a clinical level rather than internalising problems relative to non-exposed children. Given that the likelihood ratings of clinical disorder are dependent on the DAWBA's impact supplement, the findings also indicate that these externalising difficulties are likely to negatively affect ME children's family, social and early educational domains. This is a concerning issue given the nature of these reported difficulties across multiple areas of psychosocial development with respect to the age of this group of children (McCall, 2011).

7.4 Cross Sample Comparison of Adjustment Problems

Cross sample comparisons with several British and North American studies that also used the SDQ further illustrate how this sample of ME children's socio-emotional and behavioural adjustment problems fared in comparison to other general populations. As shown in Figure 4 below, ME children consistently had higher mean socio-emotional and behaviour problem scores across all domains than similarly aged British (Meltzer *et al.*, 2000) and American (NHIS, 2001) samples of children. What is also of particular interest is that although the current study's comparison sample tended to be characterised by lower levels of socio-emotional adjustment problems than the British (Meltzer *et al.*, 2000) and American (NHIS, 2001) community samples, ME children's tendency to be rated as having higher levels of adjustment problems was observed against the larger and presumably more diverse samples of overseas children. This further highlights that ME children potentially represent a high-risk group in need of further mental health support during their pre-school years.

Figure 4

Cross-Sample Comparisons of British, American and MIPs SDQ Scores



While the above between-groups comparisons appear to suggest that children exposed to methadone during gestation are at an increased risk for mental health problems in early childhood, it is possible that socio-economic and family factors correlated with MMT might account for the associations detected thus far (Brooks-Gunn *et al.*, 1994; Gray *et al.*, 2005). In an effort to disentangle the pre- and postnatal effects of MMT, the relationship between prenatal methadone exposure and children's later emotional and behavioural adjustment outcomes were examined after adjustment for a wide range of confounding factors. These factors included maternal background characteristics spanning age at delivery, educational achievement, SES, and solo motherhood (Accornero *et al.*, 2002; Brown, Bakeman, and Coles, 2004); and maternal licit and illicit drug use while pregnant (Crea *et al.*, 2008; Ornoy *et al.*, 2001).

7.5 Direct Methadone Effects: Emotional and Behavioural Child Wellbeing after Covariate Adjustment

After covariate adjustment for maternal social risk and poly-drug use during pregnancy, between groups-differences in children's conduct problems (p = .003) remained. This finding is largely consistent with other prior research also reporting the presence of direct opiate effects that remained after controlling for confounding variables (Crea *et al.*, 2008; Ornoy *et al.*, 1996). This finding adds support to the speculation that prenatal exposure to heroin and/or methadone may affect monoamine systems and the CNS of the unborn baby, which in turn, may impair later regulation of behavioural inhibitory control during childhood (Linares, Singer, Kirchner, *et al.*, 2006; Moe, 2002; Soeptami, 1994; Walhovd *et al.*, 2007). This behavioural deficit may be further compounded by a dysfunctional home environment characterised by substance abuse disorders and poor parenting, thereby explaining the high prevalence of behavioural disorders commonly observed in drug-exposed samples of children (Gray *et al.*, 2005; Morrow *et al.*, 2009; Linares *et al.*, 2006).

In addition to the above, elevated peer-relationship (p = .06) and emotional problems (p = .08) tended to remain associated with the ME group, although this approached significance only. Nonetheless, there is existing evidence to suggest that prenatal exposure to a teratogen may have an effect on foetal development of the neurological systems associated with later emotion regulation. From Gray *et al.*'s (2005) review of studies linking prenatal marijuana exposure to rat and human neurological development, it was suggested that the amygdala and other systems responsible for regulation of emotion were impaired by the teratogenic effect of marijuana. Therefore, it is speculative to suggest that methadone might possibly have a similar effect on ME children's brain structures. This was shown by the tendency towards elevated levels of emotion adjustment problems not fully explained by maternal risk and poly-substance exposure, although this result approached significance only. Nonetheless, this possible neurological impairment, when coupled with a high-risk child rearing environment, may increase a child's susceptibility to emotional adjustment problems and internalising disorders (Gray *et al.*, 2005; Greenfield, Back, Lawson and Brady, 2010; Morrow *et al.*, 2009).

7.6. Child Protection and Placement Experiences of ME Children at 4.5-Years

A second major focus of the current study was to describe the nature of the child protection and placement experiences of ME children and examine how these factors might also be

associated with increased risk of emotional and behavioural problems for this group. Given the socioeconomic profile of the families in the ME group, it was clear that children born to MM women were being raised in homes characterised by high levels of adversity and who were significantly more likely to be investigated by child protection services. In terms of child protection service contact, 76% of mothers reported that they had been investigated by CYF services at least once between the term and 4.5-year interviews, compared to only 9% of comparison mothers. This finding was similar to Bada *et al.* (2008), who reported that 61% of their sample of cocaine/opiate-dependent mothers had been involved with child protective services from birth to 3-years. This is further supported by Conners, Bradley, and Mansell (2004) and Grella, Scott, and Foss (2003), who reported that at least half of all women who enter substance disorder treatment programmes have been investigated by child protection services at some time. Therefore, the reported rate of contact between MM mothers in the current study and child protection services is certainly consistent with, if not higher, than the rates of contact reported by the international studies of Bada *et al.* (2008), Conners *et al.* (2004) and Grella *et al.* (2003) despite the fact that there are no mandatory requirements for health professionals in New Zealand to report parental substance use unless it is believed that this use significantly impairs the quality of childcare provided.

In terms of child placement as a result of CYF investigation, 43% of ME children were subsequently removed from the family home and placed in alternative care by age 4.5-years. This rate of placement is fairly consistent with other studies. For example, Bada *et al.* (2008) reported that 35% of their cocaine/opiate exposed sample had a foster care placement by 3-years old and Ornoy *et al.* (1996) reported that 53% of their heroin-exposed sample was placed in adoptive care by 5 – 6-years old. Similar to the current study, Ornoy *et al.* (1996) also reported that these placements were likely to occur at, or soon after, the birth of the child. This generally indicates that the rates of placement experienced by ME children are relatively consistent with those of children born to mothers dependent on cocaine or heroin from international studies.

In terms of the nature of children's protective care arrangements, a similar proportion of ME children were placed with relative and non-relative caregivers. This differs somewhat from Maharey (2000) who reported that up to a third of all fostered children in New Zealand are placed with extended-relatives. In the current study, children who were placed with a non-relative caregiver upon their first placement were more likely to move on to a second placement than children who were first placed with relatives. Further research is needed to

determine why children first placed in non-relative care were less likely to have a successful placement. In terms of the rate of children who had unsuccessful first placements, just over half of ME children exposed to out-of-home care experienced more than one change in primary caregiver from birth to 4.5-years old. These changes typically occurred in response to CYF preference to move siblings to the same caregiver, changes in caregiver circumstances, caregivers being unable to cope with difficult children or custody being re-awarded to the biological mother. High levels of environmental instability is not thought to be uncommon for children from high-risk backgrounds, as placement breakdowns often occur due to inadequate relative care, caregiver perceptions of 'difficult to manage' children and poor caregiver-child fit from other studies examining the placement experiences young children (Fisher *et al.,* 2005; Hunt *et al.,* 2008; Redding *et al*., 2000).

7.6.1 Predictors of Foster Care Placement

Study findings so far reveal that ME children are at an increased risk of emotional and behavioural problems during their preschool years and that they are significantly more likely to experience out-of-home care than their non-exposed peers. Identifying the factors that place drug dependent women at increased risk of child protection concerns is an important clinical issue, as discussed below.

Index of Women's Drug Addiction. The strongest predictor of the loss of maternal custody was the maternal methadone dose prescribed during pregnancy. Higher doses were positively associated with increased risk of child placement in foster care. Average daily prescribed dose for the sample across pregnancy was 58.28mg (range: 6.16 – 195mg), with 42% of MM women being classified as high-dose (≥ 60mg) by clinical definition (*see* Jansson *et al.,* 2005; Quick *et al.,* 2008; Wouldes *et al.,* 2003; Wouldes and Woodward, 2010). Higher doses are typically prescribed to patients who have complex and unstable opiate abuse disorders to facilitate therapy retention and success (Greenwald, 2006). Moreover, the current sample was drawn from the existing Canterbury Methadone in Pregnancy study by Wouldes and Woodward (2010), who found that higher prescribed maternal methadone dose was associated with a range of less favourable life-outcomes that included lower levels of education, higher rates of social welfare beneficiary, lower rates of home ownership, increased tobacco and psychoactive drug use, and higher rates of clinical depression (*p*s = .001). It is likely that women in the current study who were prescribed methadone doses greater than 60mg were also characterised by the same social background factors as shown in

Wouldes and Woodward (2010). Therefore, maternal methadone dose was a significant predictor of child placement as higher-risk mothers requiring increased quantities of methadone to stabilise their complex substance abuse disorders during pregnancy were more likely to be compromised in terms of the their ability to provide adequate childcare, resulting in higher rates of child placement.

Mental Health. Maternal depression measured using the Edinburgh Postnatal Depression (EPD) scale was the second strongest predictor of child placement. At term, methadone dependent mothers were approximately seven times more likely than non-dependent mothers to meet the clinical criteria for depression. While this was not a clinical diagnosis for depressive disorder, it indicates that MM mothers are likely to be experiencing increased levels of internalising symptoms throughout the pregnancy than comparison mothers, a factor strongly shown to predict child removal from maternal care. This finding is consistent with Goldstein's (2009) review which identified major depressive disorder as the most common disorder reported by women diagnosed with substance abuse disorders. Moreover, substance-dependent mothers characterised by depression are more likely to be investigated for instances of child maltreatment than non-depressed dependent mothers (Luthar, D'Avanzo, and Hites, 2003).This may reflect previous findings linking maternal depression and lower levels of maternal sensitivity and attachment (Donovan, Leavitt, and Walsh, 1998; Mikhail, Youchah, DeVore, *et al.*, 1995). Lower levels of maternal sensitivity characterising depressed methadone-dependent mothers may result in poorer parenting practices and explain the elevated rates of child protection investigation and placement among the ME sample.

Timing of Motherhood. Maternal age at delivery was the third factor that significantly predicted child placement in foster care. MM mothers were significantly younger than comparison mothers at the term interview, being seven years younger on average. Earlier transition into motherhood may not be an uncommon occurrence in samples of methadone-dependent women as these women are less likely to use reliable contraception methods than non-dependent women (Harding and Ritchie, 2003).

Relationships between earlier and/or unplanned pregnancy, poorer life-outcomes and punitive parenting have been well established, and are problems that may be further compounded by long term methadone dependency. For example, Hobcraft and Kiernan's (2001) longitudinal study (n = 5632) found that non-dependent women who had their first pregnancy younger than 23-years old were also likely to be uneducated, be in poor physical health and have a

long-term dependency on social welfare by age 33-years. This relationship remained after controlling for background SES. Fergusson and Woodward (1999) have also reported links between early or off-time motherhood and poorer parenting practices, suggesting that the developmental timing of pregnancy for young women has a significant impact on their parenting ability. Specifically, their study found that women who gave birth younger than 20-years old typically reported unresponsive (p <.0001) and punitive parenting styles (p < .0001), and tended to report lower levels of parental attachment (p >.10) than older mothers. Together, the findings from Hobcraft and Kiernan (2001) and Fergusson and Woodward (1999) suggest that the quality of the child rearing environment might be compromised by the lifestyle and parenting risk factors associated with young motherhood. This, when in conjunction with other risks associated with methadone dependency, may explain why younger maternal age at delivery was shown to predict loss of maternal custody.

Poly-Substance Use. Both licit (tobacco) and illicit (cannabinoids, benzodiazepines, other opiates and stimulants) drug use during pregnancy was significantly associated with the MM sample at term, and with a loss of maternal custody by follow-up. Mothers maintained on methadone were five-times more likely to continue using tobacco during pregnancy than the comparison mothers in the current study. Increased rates of tobacco use among methadone-dependent samples have been well documented, with chronic cigarette use shown to be a stronger predictor of severe poly-drug misuse than prescribed methadone dose alone (Frosch *et al.*, 2000). In line with this, MM mothers in the current study were 33-times more likely than non-dependent mothers to use an illicit substance while pregnant. This supports the long standing suggestion that patients enrolled in MMT are unlikely to use prescribed methadone in isolation, with up to 80% of methadone-maintained samples reported to be using other psychoactive substances during treatment (Beswick *et al.*, 2001; Brands, Blake, Sproule, *et al.*, 2004; Brown *et al.*, 1998). This suggests MM mothers characterised by complicated and severe substance abuse disorders during their pregnancies are less likely to be able to provide adequate child care as a result of their unstable or escalating drug use (Bada *et al.*, 2008; Brooks-Gunn *et al.*, 1994; MOH, 2002; CDHB, 2007; Usher *et al.*, 1999).

Socio-Economic Status. The final factor that was a significant predictor of child placement associated with both methadone-maintenance and loss of maternal custody was SES at term. Methadone maintained mothers who were classified as low SES were more likely to have their child removed from their care than MM mothers from higher SES brackets. A possible explanation for this finding is that strained economic conditions often characterise low SES

households affected by substance-abuse disorders (Brooks-Gunn *et al.,* 1994; Hayford *et al.,* 1988; McGlone *et al.,* 2009; Vuvinovic *et al.,* 2008). Mothers of low SES households more often experience increased stress, financial hardship, and have fewer resources available to meet the needs of the family, subsequently resulting in a poorer standard of living (Lang, Kirkwood, Bowker, *et al.,* 1999). From the perspective of child protective services, low SES MM women might have been more likely to lose custody of their children in situations where they were unable to provide for the immediate needs of the child (Cash and Wilke, 2003).

To summarise, many of the clinical and socio-familial characteristics that differentiated MM mothers from comparison mothers at term were also found to predict a loss of maternal custody and subsequent child placement by the 4.5-year follow-up. More specifically, MM mothers who were of younger maternal age at delivery, prescribed higher methadone doses, clinically depressed, used other psychoactive substances during pregnancy and who were from low SES households were significantly more likely to have their children removed from their care. While the identification of the maternal social risk factors predicting child placement is not necessarily a new finding in wider substance-exposure research (*see* Cash and Wilke, 2003; Hunt *et al.,* 2008; McGalde *et al.,* 2009), the current study has shown how these risk factors relate specifically to mothers engaged in MMT during pregnancy.

7.7 The Mental Health Outcomes of ME Children: The Role of Out-of-Home Care by Age 4.5-Years

As preschool-aged children born to MM mothers were significantly more likely to be placed in a foster care home by age 4.5-years, a further research aim was to examine how the placement experience might have impacted their mental health outcomes. Methadone-exposed children who experienced out-of-home care during their preschool years were rated by their caregivers as having a greater level of difficulty with emotional and peer-relationship adjustment problems than both the ME children that remained in maternal care and non-exposed comparison children. Clinical rates of internalising anxiety or mood disorder did not reach significance, possibly due to the low rate of disorder detected overall. Nonetheless, the findings suggest that a greater proportion of ME children who experienced out-of-home care showed a tendency towards having subclinical levels of socio-emotional problems than those remaining in biological maternal care to 4.5-years. These trends are very similar to those reported by Bada *et al.* (2008) who found that both prenatal opiate/cocaine-exposure and foster care placement contributed to increased risk of internalising adjustment problems

among young children born to mothers dependent on methadone. However, the rates of disorder found in the current study may have been under-reported. For example, Strijker *et al.* (2008) reported that 14% of their non-exposed sample in foster care met the diagnostic criteria for an attachment disorder, nearly twice the rate found for separation anxiety disorder in the current ME placement sample (9%). Therefore, true rates of internalising disorder among the ME sample regarding to out-of-home care may be higher than currently found.

The current study found evidence to suggest that children remaining in the home environments of mothers who are dependent on methadone tend to show similar or higher risk of behavioural outcome than those placed in care. The findings of the SDQ suggested that ME children remaining in biological maternal care had a higher rate of conduct and hyperactivity/attention behavioural adjustment problem than ME children in placement. However, from the DAWBA, risk of ADHD (p = .04), hyperkinesis (p = .03), and oppositional defiant disorder (p < .001) was more associated with ME children remaining in maternal care, suggesting that risk of clinical disorder did not increase as a function of exposure to out of-home care. Although the association found between placement and risk of ADHD was contrary to the research hypothesis, this finding is in line with research by Ornoy *et al.* (2001) where twice as many heroin-exposed children residing in maternal care were at risk of ADHD (54%), compared to exposed children placed in foster care (24%). In terms of rates of DSM-IV conduct disorder detected, there appeared to be similar risk between ME children with and without placement experiences. However, as the odds ratio that approached significance (p = .07), this finding suggests that ME children may show a small increase in risk in relation to the placement experience, consistent with findings of other studies (Bada *et al.*, 2008; Soepatmi, 1994).

The increased rates of behavioural disorder more closely associated with ME children remaining in maternal care to 4.5-years might reflect how continued exposure to socio-familial environments characterised by risk contributes to poorer behavioural development relative to the impact of out-of-home care. Given that substance dependent mothers are a population likely to be involved with child protective services due to concerns surrounding the quality of childcare provided (Bada *et al.*, 2008; Conners *et al.*, 2004; Grella *et al.*, 2003), children remaining in the suboptimal care of MM mothers (i.e. poorer quality care that has not yet resulted in child maltreatment) seem likely to be at increased risk for ADHD, hyperkinesis and ODD, emphasising the dual hazard concern. While there were no distinct differences in clinical disorder across the ME groups at age 4.5-years, the results nonetheless

indicated that ME children clearly have difficulties with behavioural adjustment and that a placement experience might place them on a trajectory for further possible emotional problems throughout childhood. As child placement is widely recognised as a contributing mechanism to poor behavioural development among heroin/opiate exposed children (Bada *et al.,* 2008*;* Redding *et al.*, 2000; Proctor *et al.*, 2010), it is possible that risks associated with exposure to out of home care may increase over time. This is particularly relevant with respect to the age of the sample at follow-up, given that the accurate measurement of clinical disorder among high-risk samples of young children may be difficult with age-dependent effects in outcome potentially not emerging until later childhood or adolescence (McCall, 2011).

7.7.1 Relationships between Individual Placement Factors and Risk of Disorder

The above findings indicated that ME children experiencing a foster care placement may be at increased risk of developing an emotional disorder, whereas there was a tendency for increased risk of behavioural disorder among ME children who remained in maternal care to age 4.5-years. However, in terms of general risk (i.e. developing an emotional and/or behavioural disorder), ME children with a placement experience were inclined to show higher rates of possible clinical disorder, in line with the research hypothesis. From this, the current study went on to examine how individual placement factors might be related to the increased risk of disorder for ME children with a placement experience by age 4.5-years.

Age at First Placement. Age at first placement was associated with poorer behavioural conduct by 4.5-years. Placements occurring for younger children were significantly correlated with increased DAWBA risk ratings for ODD. This association highlights the extent to which the timing of early environmental disruption may relate to defiant behavioural episodes among preschool ME children. The relationship seen between earlier placement and increased behavioural problems is, however, in direct contrast to the findings published by Rutter (1998), Soepatmi, (1994) and Zill (1990). All three of these studies found that earlier foster care placements predicted better behavioural adjustment at follow-up two- to 12-years post-placement. The authors collectively proposed that earlier placements allowed for new attachment bonds to develop between child and caregiver at a crucial developmental stage, thereby decreasing the likelihood of adverse behavioural outcomes. Later placements, by contrast, were thought to disrupt the bond during a critical phase of re-attachment, thereby resulting in an increased likelihood of child behavioural problems.

The conflicting results between the current study and other published studies might be explained in two ways. First, the difference between the current findings and those by Rutter (1998), Soepatmi, (1994) and Zill (1990) may be accounted for by the difference in longitudinal scope of the studies. For example, Rutter (1998), Soepatmi, (1994) and Zill (1990) tracked children's placement changes into late childhood and thus had the ability to compare placements over an extended duration. In contrast, the current study describes very early placement changes for preschool aged children only. Second, the discrepancy in the found results may also be explained by the fact that in the current study, children placed at a very young age may have a greater likelihood of encountering subsequent replacements, particularly if they are first placed with non-relative caregivers. It is possible that such children experienced more frequent changes in primary caregiver from an earlier age, and were thus unable to develop stable attachment relationships with their caregivers than were the children first placed at an older age (van IJzendoorn, Palacios, Sonuga-Barke, *et al.*, 2011). Therefore, the correlation observed between earlier placement and poorer behavioural outcome might be accounted for by increased opportunity for replacement; a suggestion that is more consistent with Rutter (1998), Soepatmi, (1994) and Zill (1990).

Furthermore, the association between age at first placement and child behavioural wellbeing may be interpreted other ways. While it may be that earlier first placement contributes to increased conduct problems for preschool children, it may also be that infants with more pronounced externalising problems are more likely to be placed in foster care at an earlier age. The latter may be particularly relevant for children born into families characterised by methadone dependency, given that early behavioural difficulties stemming from neuro-behavioural disturbances may be more prevalent in these children (*see* Linares *et al.*, 2006; Moe, 2002; Soeptami, 1994; Walhovd *et al.*, 2007). As a result, the negative mutual influences observed between parent and child may be exacerbated in these families, increasing the likelihood of earlier placement (Hammen, Burge and Stansbury, 1990). While this might partially explain the observed relationship between ODD and early entry into foster care, the correlation between earlier first placement and poorer behavioural outcome might be also explained by the fact that children placed at an earlier age are more likely to be born into highly dysfunctional families. These families may be more likely to be targeted by child protection agencies, resulting in an earlier child placement (Fisher *et al.*, 2005).

Length of First Placement. Among ME children who experienced multiple placements, longer lasting first placements that were subsequently disrupted was associated with poorer

behavioural functioning by age 4.5-years. Specifically, the timing between first and second placement was shown to be positively correlated with ODD risk ratings on the DAWBA. This finding replicates Redding *et al.* (2000), who also found that stable first placements tended to predict normal attachment and non-aggressive behaviour among children recently placed in foster care. ME children who have had more time to develop a stable familial relationship with a caregiver to then have this relationship disrupted, may be at an elevated risk of poorer emotional and behavioural development (Rutter, 1998; Soepatmi, 1994; Zill, 1990). Similar to age at first placement, the timing of first placement to subsequent second placement is an important factor to consider when describing the effects of the timing of placement, given that the timing of the disruption may contribute to behavioural functioning among preschool-aged ME children.

Rate of Environmental Instability. The number of placement changes experienced by ME children from birth to 4.5-years old was positively related to DAWBA risk ratings for separation anxiety, specific phobia disorder and hyperkinesis. These observed relationships are highly consistent with past research by Bada *et al.* (2008), Redding *et al.* (2000), and Proctor *et al.* (2010), all of whom suggested that increased placement instability contributed to adverse child development. Repeated separation from familiar caregivers, routines and environments, may well explain why environmental instability is a consistent predictor of adverse child emotional and behavioural outcomes for children remaining within the foster care system (van IJzendoorn *et al.*, 2011). However as Bada *et al. (*2008) suggested, the main limitation of such correlational analysis concerns causality. It could be that increased environmental instability contributes to the worsening of child emotional and behavioural outcomes, or that the children with more severe emotional and behavioural difficulties are likely to experience subsequent replacements as caregivers become unable to effectively manage these difficulties. To address the issue of causality, the current study also evaluated the extent to which exposure to out-of-home care predicted the mental health outcomes of ME children by 4.5-years.

7.7.2 Placement as a Predictor of Child Wellbeing

Previous between-groups and correlational analysis indicated that ME children with a placement history tended to show some increased risk for clinical disorder compared to ME children remaining in biological maternal care or non-exposed comparison children. However, past research so far has been unable to effectively demonstrate whether exposure to

out-of-home care significantly predicts risk of disorder above and beyond the risks posed from maternal methadone dependency and exposure to adverse socio-familial factors (Bada *et al*., 2008; Ornoy *et al*., 1996; Soeptami, 1994). To better understand how this population fits the double jeopardy model, the current study examined the impact of placement as a predictor of preschool children's mental health outcomes relative to the effects of maternal methadone maintenance and maternal social risk.

The regression model included three factors which were maternal methadone dose, maternal social risk (defined by education, SES, age at pregnancy, single parent, depression, and any other drug use in pregnancy) and level of environmental instability experienced by the child. The DAWBA Any Disorder subscale was used as the key outcome variable for the ME children. The results of this model revealed that by age 4.5-years, exposure to out-of-home care did not significantly predict ME children's risk of developing an emotional or behavioural disorder, as the factor approached significance only. In addition to this, maternal methadone dose also did not significantly predict ME children's risk of disorder. Instead, adverse maternal social risk at term was shown to be the only key predictor of child disorder risk. This suggests that children born into families where the condition of the home and quality of caregiving is adversely affected by the mother's complex socio-familial profile are at increased risk of developing an internalising or externalising disorder, and that the influence of maternal risk is apparent on child development as early as 4.5-years of age. This raises important concerns for children remaining in maternal care beyond the preschool years.

Although children who were from the most adverse backgrounds were removed from suboptimal maternal care, it appears that exposure to out-of-home care is not yet moderating the risks associated with being born to a mother maintained on methadone for these children. Placement was not shown to either markedly reduce or increase the risk of disorder faced among the ME sample in terms of significant group differences. Moreover, placement did not significantly account for the variation seen in DAWBA risk scores in the final predictive analysis. This is largely at odds with previous longitudinal research which has demonstrated an adverse effect of placement on emotional and behavioural outcomes among samples of heroin/methadone exposed children and adolescents aged 3 to 17-years (Bada *et al.,* 2008; Crea *et al.*, 2008; Soeptami, 1994; Ornoy *et al.*, 1996). Due to the consistency of findings from the aforementioned studies, the lack of a placement effect for the current ME sample should be interpreted with caution.

To further illustrate this point, there was a diverse range of foster care experiences reported by the caregivers of ME children. As a result, the heterogeneity of the sample may account for why there was little observable effect of placement on mental health outcomes for ME children as a group, at least in terms of statistical significance. Some ME children may have had stable and beneficial change from a successful foster care placement whereas others have experienced unstable and less desirable placements. As a result, the lack of difference seen between the ME children with and without placement experiences might be accounted for by the diverse range of child protection and foster care experiences of the ME group. In addition, the high degree of overlap in the maternal social risk predictors of child placement and risk of disorder largely suggests that at age 4.5-years, exposure to inadequate caregiving may be having a more pronounced effect on the severity of child problem observed, relative to the impact of out-of-home care. Further follow-up research will be needed to determine whether an effect of placement will become apparent over time for ME children in care.

7.8 Socio-Familial Risk Associated with Methadone-Dependent Mothers: The Double Jeopardy Concern

The current study has shown how maternal engagement with methadone therapy during pregnancy, early exposure to social risk and foster care placement might be shaping both adjustment problems and risk of disorder for ME children. Through highlighting the effects of pre- and postnatal factors, the current study has added support to the double jeopardy hypothesis, which postulates that children born to methadone-maintained mothers are compromised by both the prenatal teratogenic effects of methadone and by being born into adverse socio-familial environments associated with maternal methadone maintenance treatment. Specifically, the current study has supported this perspective by showing that:

1) variation in SDQ scores was not wholly explained by infant clinical characteristics, poly-drug exposure or maternal social background, alluding to a possible biological effect of maternal methadone maintenance on child subclinical problems,
2) maternal social risk was the key mechanism predicting DAWBA DSM-IV/ICD-10 ratings. These maternal risk factors included younger maternal age at delivery, single motherhood, depression, higher methadone dose, poly-substance use, less educational achievement and lower SES.

Together, these results suggest that methadone may be having some effect on lower level adjustment problems, whereas maternal socio-familial risk significantly contributes to the longer-term clinical outcomes of preschool children born to mothers maintained on methadone during pregnancy. The role of maternal clinical and social risk factors as contributors to child mental health has been well documented in previous studies. For example, in terms of continued methadone dependency, Cash and Wilke (2003) found that current dependency and the severity of use increased the likelihood of child maltreatment occurring in the home environment. The role of postnatal maternal risk has also been highlighted by Ehrensaft, Wasserman, Verdelli, *et al.* (2003), where child antisocial behaviours were largely influenced by inadequate maternal involvement and monitoring, characteristics that are also shared by mothers maintained on methadone (Donovan *et al.*, 1998; Mikhail *et al.,* 1995). In addition, a study by Luthar *et al.* (2003) reported that highly depressed drug-dependent mothers were likely to have children experiencing both internalising and externalising problems, as maternal caregiving was compromised by both the substance abuse disorder and mental illness. Therefore, determining the contributing factors to the mental health outcomes of children born to mothers characterised by substance dependency and socio-environmental adversity may be highly complex, given that confounding factors such as mental illness have also been shown to explain the association between prenatal methadone exposure and child internalising and externalising problems.

7.9 Mechanisms to Risk: Accumulative Factors Affecting Child Development

The current study has shown that socio-environmental factors such as maternal clinical and social background have important implications for children born to methadone maintained mothers. Another environmental mechanism examined was child exposure to out-of-home care, although the effect was not as significant as that of maternal risk. However, given the very young age of the sample, it might be possible that a placement-response effect is not yet observable within the ME group (McCall, 2011), a suggestion that is well in line with the previously described subtle effects argument.

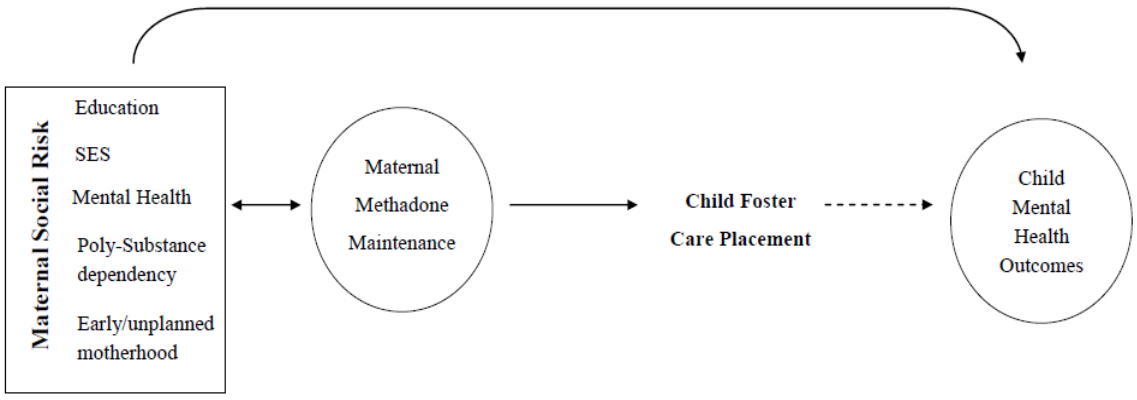
The subtle effects argument, discussed by Crea *et al.* (2008) and Savage *et al.* (2005), proposes that the effects of exposure to adverse biological and environmental mechanisms compound over time, and that poorer outcomes are more likely to be observed in children's later development as opposed to early development. This is largely due to disadvantaged children's difficulties becoming more pronounced in the face of increasing cognitive and

behavioural demands set by increasingly structured environments (McCall, 2011). One factor thought to contribute to this process is child placement in out-of-home care. While the current study saw little observable effect of the foster care experience on preschool children's mental health, possible effects may yet emerge over time as these children encounter differing socio-familial experiences within each foster care home, per placement change. As a result, the emerging between-groups differences currently detected between ME children with and without placement experiences may continue to widen in response to the multiple and diverse placement changes.

Figure 5 below highlights the two possible pathways to risk identified by the findings of the current study. Maternal risk factors relating to methadone treatment primarily predict both the wellbeing of children remaining in maternal care, and the wellbeing of those placed in foster care by 4.5-years. Following this, children may arrive at poor outcomes either via the continued exposure to possible risk by remaining in MM care or via child maltreatment leading to placement and high levels of environmental instability (Hunt *et al.,* 2008; McGalde *et al.*, 2009). These two pathways further show how ME children remaining in maternal care appeared to be at elevated risk for externalising disorders, whereas those exposed to out-of-home care tended to be characterised by increased risk for internalising disorders. This model also suggests that a relationship between exposure to out-of-home care and poor outcome might continue to emerge over time as the risks associated with multiple placements compounds those resulting from earlier exposure to maternal risk, as per the subtle effects argument.

Figure 5:

Pathways to Risk: Maternal factors, MMT and Placement on Child Wellbeing.



7.10 Clinical and Research Implications

A number of clinical and research implications can be identified from the findings of the study. These implications include 1) the indication of increased conduct, and to some extent peer-relationship and emotional adjustment problems remaining after covariate adjustment, 2) the child protection and placement concerns surrounding ME children, and 3) a high degree of overlap shown between child placement and wellbeing in terms of maternal clinical and social risk factors.

Direct Effect of Prenatal Methadone Exposure. The findings of the current study raise concerns about the current clinical practice of prescribing increased doses of methadone to stabilise pregnant opiate-dependent women. This study found that children born to methadone-dependent mothers had elevated levels of conduct adjustment problems on the SDQ by 4.5-years old that remained after covariate control. That is, maternal social risk at term and poly-drug use during pregnancy did not explain the between-groups differences in the behavioural adjustment problems of ME and non-exposed children. As a result, these findings raise concerns about the neurobehavioural development of children born to mothers maintained on methadone during pregnancy. Therefore, future research could be extended to compare children born to mothers maintained on higher and lower doses of prescribed methadone as another possible mechanism contributing to child emotional and behavioural problems.

For those ME children that have significant conduct problems resulting from the possible direct-effect of prenatal methadone exposure, it will be important to consider how these methadone-related difficulties might further impact other imminent developmental milestones for children after school entry. For example, the acquisition of basic numeracy and literacy skills might be compromised by ME children's attention and hyperactivity problems (Barkley, 2002). In addition, their tendency to show difficulties with emotional regulation and early interpersonal skills might also compromise the development of friendships with peers in classroom and playground settings (Barkley, 2002; Kendall, Panichelli-Mindel, Sugarman, and Callahan, 1997). Given the potential for cascading effects, ME children maybe in need of additional support as they transition into primary education, particularly for those children with complex placement histories.

The detection of a possible harmful methadone effect contributing to early emotional and behavioural adjustment problems of ME children also raises questions about the longer-term

outcomes for these children. Several studies have found that emotional and behavioural problems evident in the preschool years are likely to persist through to later childhood, even after controlling for child exposure to social risk factors (Mesman and Koot, 2001). While approximately half of all children who have behavioural difficulties in middle-late childhood will not continue to show similar levels of difficulty during their adolescent years (Hill, 2003), those that continue to have problems are likely to experience early school leaving, juvenile delinquency and adolescent substance abuse disorders (Reinherz, Giaconia, Hauf, *et al*., 2000). This concern brings to light the possible longer-term effects of prenatal methadone exposure on a range of developmental outcomes, thus emphasising the importance of early identification of adjustment problems and risk of clinical disorder (Dadds, Spence, Holland, *et al*., 1997).

Placement Experiences of ME Children. A second applied implication of the study concerns the child protection concerns and placement experiences of ME children. There are very few existing studies that have successfully followed ME children throughout their foster care placements with a high rate of sample retention (e.g. Bada *et al.*, 2008; Crea *et al.*, 2008) and have typically been unable to examine the nature of these placement experiences in great detail (e.g. Crea *et al.*, 2008). With its high retention rate and detailed accounts of the placement experiences, the study adds valuable insight into the likely patterns of placement movement from birth to 4.5-years for ME children.

As a result of the meticulous documentation of ME children's pathways, the current study found that ME children may experience very complex placements, with no clear pattern of movement and considerable variation shown in the timing of placements. With the placement experiences of ME children being heterogeneous by nature, it may be difficult to predict how ME children might compare in terms of their longer-term mental health outcomes (Mash and Wolfe, 2007). It would seem that clinicians and educational providers should be aware of these complex patterns of early placement movement even during the preschool years, as these children may require additional psychosocial support (Fernandez, 2008). The current study therefore advocates for the implementation of tailored intervention programmes to meet the mental health needs of ME children with complex placement histories, given that current foster care services are not thought to be sensitive to the developmental needs of high-risk children in care (McCall, 2011), such as those born to methadone-dependent mothers.

Role of Maternal Psychosocial Risk. Finally, this study has highlighted how postnatal or environmental factors associated with MMT at term influence the outcomes of ME children at 4.5-years old. Maternal risk factors measured at term were shown to predict both child placement and risk of disorder by follow-up, indicating a high degree of overlap in factors contributing to the emotional and behavioural development of these children. Furthermore, maternal factors were also shown to contribute to child risk of clinical disorder over and above maternal MMT in pregnancy and child placement. This suggests that ME children are highly vulnerable to the socio-environmental influences associated with mothers dependent on methadone, further advocating for specialist support for this population.

Currently, there are few existing social policies that enable MM women to access professional child wellbeing services as part of their current treatment programme. The two existing methods for accessing clinical help for child difficulty involve referral by GP or by investigation from CYF only after a community complaint against the mother has been laid. These two options are problematic as firstly, MM women are hesitant to approach GPs for advice in fear that it may lead to further investigation and prosecution; and secondly, CYF investigation is only likely reinforce this fear rather than facilitating accessible and ongoing intervention and support (Ornoy *et al.,* 1996; Lester *et al.,* 2009; Seuss *et al.,* 1997). Given that the current study has shown that maternal risk continues to impact child adjustment for those children remaining in biological maternal care, developing protocols for other more supportive and readably available services need to be developed. If MM mothers were able to access funded support services earlier without fear of CYF involvement, MM mothers of children with subclinical emotional and behavioural problems might be more inclined to seek out professional sources of support. This may, as a result, effectively ameliorate any adverse emotional and behavioural risk of disorders observed among the current ME sample.

7.11 Strengths of the Current Study

As previously outlined, past studies are limited by methodological problems including the inadequate reporting of maternal methadone dose (Hunt *et al.,* 2007; Ornoy *et al.,* 2001; Rodning *et al.,* 1989; Seuss *et al*., 1997; Soeptami 1994), recruitment of small and selective samples (Cash and Wilke, 2003; Fernandez, 2008; Moe, 2002; Seuss *et al.,* 1997; Walhovd *et al.,* 2007), high sample attrition (Crea *et al.,* 2008; Hunt *et al.,* 2007), poly-substance exposed samples (Bada *et al.,* 2008; Crea *et al.,* 2008) and poor consideration of confounding

variables (Soeptami, 1994). As a result, the current study has employed a range of methodological strategies to avoid similar limitations.

First, this study is one of the few methadone-based studies that has utilised independent toxicology reports of maternal methadone dose from hospital service records and to include this in descriptive and multivariate analysis. By using accurate and detailed information concerning maternal dose levels, the study was able to show ME-response relationships on child conduct problems unlike previous studies (Hunt *et al.*, 2007; Ornoy *et al.*,2001; Rodning *et al.*, 1989; Seuss *et al*., 1997; Soeptami 1994).

Second, the current sample of ME children retained to age 4.5-years (n = 53) was much larger than sample size retained in other studies. For instance, in Seuss *et al.* (1997) and Walhovd *et al.* (2007) both recruited samples of fewer than 16 heroin/methadone-exposed children. In addition to large sample recruitment, the third methodological strength of the study was its high rate of sample retention. The study saw 95% of the comparison sample retained to follow-up, and 93% of the methadone sample retained to follow-up. This is an excellent retention rate in comparison to other studies. For example, by their 4-year follow-up, Crea *et al.* (2008) had a sample retention rate of 83%, and recognised that the level of sample dropout resulted in a loss of valuable data concerning very high-risk and difficult to track children who are most in need of psychosocial support. In contrast, the current study has been able to report the outcomes of high-risk ME children due to the multiple tracking strategies employed by the research team, consequentially resulting in low rates of premature sample attrition.

Fourth, this study is one of the only methadone-focused studies to include a psychiatric measure of child wellbeing. Other heroin/methadone-exposure studies have historically used the CBCL as the primary measure of general internalising and externalising difficulty similar to that of the SDQ (Soeptami, 1994; Walhovd *et al.*, 2007). To remedy this, the current study implemented a two tiered method to assess child emotional and behavioural wellbeing in greater depth. In addition to the initial screening SDQ, the DAWBA was also administered to further the specific mental health problems of ME children. By incorporating this objective clinical measure, the current study has also reduced the likelihood of parent-report bias, given that mood-disordered and/or substance-dependent women either over or under-report the significance of their child's difficulty (Chi and Hinshaw, 2002; Hennigan *et al.*, 2006, Mash and Johnston, 1983), leading to some bias in the interpretation of the results. In contrast, the

DAWBA is a structured and detailed clinical interview based on DSM-IV/ICD-10 diagnostic criteria. As both the administration and scoring of the DAWBA was objective, the results were not prone to maternal bias.

Fifth and last, where other studies have failed to consider the effects of confounding variables such as maternal social background or poly-drug use across pregnancy (e.g. Soeptami, 1994), the current study employed two methods to examine the role of such extraneous variables. The current study considered how both maternal psychosocial characteristics and poly-substance use while pregnant might alternatively explain ME children's SDQ scores at follow-up. The current study also employed multivariate analysis to evaluate how maternal methadone dose, maternal social risk factors and subsequent child placement might explain ME children's DAWBA risk of disorder scores, thereby examining a wide range of mechanisms shaping the wellbeing of preschool aged children.

7.12 Limitations of the Current Study

Although efforts were made to remedy many of the methodological difficulties characteristic of heroin/methadone studies, the current study is not without its own limitations and these should be considered alongside the interpretation of the findings. First, the prevalence of possible disorder and placement experiences reported in the current study are representative of ME children born to mothers characterised by high levels of social risk. Given that the majority of the MM mothers were clinically depressed, uneducated, in low-paying or no employment and characterised by a high rate of poly-drug use, it is unclear whether the levels of adjustment problems and risk of clinical disorder among children born to these women would generalise to ME children born to MM mothers of lower social risk. However, with the high co-occurrence of risk characteristics inherent to substance abuse disorders (Brooks-Gunn *et al.,* 1994; Hayford *et al.,* 1988; McGlone *et al.,* 2009; Vuvinovic *et al.,* 2008), future studies may struggle to recruit a more diverse sample of MM women.

A second methodological issue that should also be noted is that the DAWBA is recommended for diagnosing disorder in children aged 5-years and older. Consequently, there may be some issue relating to the sensitivity and specificity of the DAWBA in detecting disorder for children aged under 5-years old who are not yet in full-time primary education. DAWBA items require caregivers to report any teacher complaints of child problems in the school environment in order to confirm the presence of a pervasive emotional and behavioural difficulty. However, as children in the sample were not yet in primary education,

the current study was unable include teacher-based information. Due to the lack of detailed information concerning child behaviour across multiple settings, the DAWBA may have under- or over-estimated rates of possible disorder. However, despite this, the DAWBA was still able to detect a significantly greater risk of probable disorder among the ME children than non-exposed children.

Third, the DAWBA also typically involves clinical review of the DAWBA's case notes by a child psychiatrist to confirm or reject the diagnosis made by the computer scoring system. As these reviews were not included, it may be possible that rates of possible disorder are overstated. However, the detected rates of disorder were shown to be very similar to those reported by Bada *et al.* (2008), which suggests that the lack of psychiatric review may not have affected the validity of the results. Nonetheless, both teacher report and clinical ratings will be an important in future studies examining the mental health outcomes of ME children.

7.13 Suggestions and directions for future research

Although this research has contributed to the field in terms of reporting the risks associated with children born to methadone maintained mothers who have subsequently been placed in protective care due to child maltreatment, concerns still exist for this high-risk group that future research should address. Most notably, there is a need to continue the longer-term tracking of ME children placed in foster care, to consider how co-morbid disorders might further compound children's outcomes, to consider how the qualitative differences between types of foster caregivers might affect child wellbeing, and most importantly, to identify factors that promote resiliency among children born to MM women.

First, this study has produced preliminary evidence that exposure to out-of-home care may continue to contribute to the longer-term mental health outcomes of ME children. A slightly larger proportion of children born from MM mothers who were placed in foster care had a tendency to show elevated risks of internalising disorder by age 4.5-years on the DAWBA, and there was a significant positive correlation between total number of placement changes and increased DAWBA risk scores. In line with the subtle effects argument, the longer-term tracking of ME children will be important to identify which children will continue to experience pervasive emotional and behavioural difficulties beyond their preschool years, particularly for those placed in foster care homes.

Second, this study did not examine possible rates of comorbid disorder present among the ME sample. Barkley (2002) suggests that ODD and CD are highly co-morbid, and that children with ADHD rarely present without symptoms of other externalising behavioural problems. Therefore, it is also likely that some ME children in the current sample may have received multiple risk ratings from the DAWBA, rates of which the current study did not examine. Future research should assess possible rates of comorbid disorder, and consider how these children might be at further risk for poorer psychosocial and educational outcomes than ME children meeting the criteria for a single disorder.

Third, the examination of the qualitative differences between foster care homes might also be an important factor to consider in future research. A better understanding of the differences between caregivers in terms of parenting styles and practices, might have enabled the current study to evaluate how the quality of the foster care home might also be shaping ME children's experiences once placed in care. Such information would be particularly relevant for child protection professionals trying to achieve permanent placements characterised by good caregiver-child fit. While Redding *et al.* (2000) identified several foster caregiver factors that influenced the success of a placement, these factors have not yet been linked to the outcomes of high-risk ME children. Doing so may help to ensure that the best suited caregivers are selected for these vulnerable children.

Fourth and finally, little is known about the socio-familial characteristics that might attenuate the development of poor emotional and behavioural outcomes for children born into families characterised by opiate dependency. A resiliency-focused study may compliment the traditional focus on factors that promote pathways to risk for ME children as per the current study. To illustrate this point, while 42% of the ME sample were at risk for a DSM-IV/ICD-10 disorder, the remainder of this sample was not identified as having a problem warranting further clinical attention. As a result, determining possible protective factors that promote resiliency for ME children may ultimately help clinicians to design intervention programmes that foster these specific factors, thereby reducing the prevalence of possible disorder as currently observed among the study group.

7.14 Concluding remarks

The current study examined the emotional and behavioural adjustment problems and rates of possible DSM-IV/ICD-10 disorder among ME children at age 4.5-years. The role that exposure to out of home care played in child outcome was also considered. As hypothesised,

ME children were rated by their caregivers as having elevated levels of conduct adjustment problems (p = .003), general adjustment problems (p =.006), and to some extent peer-relationship (p = .06) and emotional adjustment problems (p = .08) than comparison children after adjusting for a range of maternal confounds. ME children were also significantly more likely than non-exposed children to be placed in protective foster care homes (p < .001). Methadone-exposed children with placement experiences tended to show increased risk for separation anxiety, specific phobia, depression and CD, whereas ME children remaining in biological maternal care showed increased risk for ADHD, hyperkinesis, and ODD; however these between group comparisons largely did not reach statistical significance. Within the ME group, level of environmental instability was not shown to predict child mental health problems (p = .18) above and beyond maternal social risk (p = .035). The high degree of overlap between the maternal predictors of child placement and child mental health outcome highlights the role of socio-familial risk relative to that of environmental instability. Together, these results nonetheless suggest that ME children have clear difficulties with behavioural adjustment and that a placement experience might place them on a trajectory for further possible emotional problems throughout childhood. How unique foster care experiences continue to shape the longer-term outcomes of ME children remains to be seen and further follow-up will be important to fully understand the emerging associations between out-of-home care and mental health problems for young children.

To conclude, the findings of this study have important clinical and public health implications. First, it is hoped that the observation of a possible methadone-effect on ME children's conduct adjustment problems after covariate adjustment will help to guide clinicians in terms of the safe and appropriate prescription of maternal methadone dose levels. Current treatment protocols of MMT primarily focus on stabilising maternal functioning, with marginal consideration given to the longer-term neuropsychological development of children born to these mothers (Berghella *et al.*, 2003; Greenwald, 2006; Jones *et al.*, 2008). Consequently, the current study urges for careful review of methadone doses prescribed to pregnant women in treatment settings.

Second, the increased risk of socio-emotional and behavioural adjustment problem and disorder observed among the ME group suggests that appropriate clinical follow-up is needed to address the psychosocial difficulties experienced by ME children. Currently, there are few systematic social policies in place that are designed to promote adaptive functioning of children born from women enrolled in MMT during pregnancy. By showing that ME children

are likely to experience significant socio-emotional and behavioural problems, the study recommends that MM mothers need additional support to effectively manage child problems. Such support could potentially be incorporated into methadone treatment protocols so that these high-risk children are not overlooked by more general welfare services. This is important, as very early child emotional and behavioural difficulties have been shown to predict early school-leaving and onset of adolescent substance abuse disorders (Hawkins, Catalano, and Miller., 1992). This is also particularly relevant for ME children exposed to out-of-home care, where protocols should also be introduced to target the specific developmental needs of young ME children as they transition through the placement process. As the study has shown that the possible effects of prenatal methadone exposure and exposure to out-of-home care on child wellbeing are apparent even prior to these children entering primary education, the preschool years might be a timely opportunity to offer early intervention and continue the support of the psychosocial development of ME children beyond the preschool years.

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Appendices

Appendix A: Ethical Approval for Methadone in Pregnancy Study

Health and Disability Ethics Committees

Upper South B Regional Ethics Committee
Ministry of Health
4th Floor, 353 Oxford Terrace
PO Box 3877
Christchurch
Phone (03) 372 3018
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19 November 2007

Associate Professor Lianne Woodward
Dept of Psychology
University of Canterbury
Private Bag 4800
Christchurch

Dear Associate Professor Woodward

Ethics Ref: URB/07/10/042
Neurodevelopmental outcomes of children exposed to Methadone during pregnancy at ages 4.5 and 6 years: Role of neuroanatomical and socio-environmental factors
Investigators: Ass/Professor Lianne Woodward, Ms Verena Pritchard, Dr Stephanie Moor, Carole Spencer, Ms Karella Levine, Ms Melissa Warne, Dr Richard Watts, Ass. Professor Simon Warfield
Locality: University of Canterbury

The above study has been given ethical approval by the Upper South B Regional Ethics Committee. A list of members of this committee is attached.

Approved Documents
Parent's Information Sheet 4.5 year follow-up, dated November 2007
Consent Form 4.5 year follow-up, dated November 2007
Parent's Information Sheet 6 year follow-up, dated November 2007
Consent Form 6 year follow-up, dated November 2007
Information Sheet: 6 Year follow-up Magnetic Resonance Imaging study, dated September 2007
Consent Form: 6 Year follow-up Magnetic Resonance Imaging study, dated September 2007
Teacher's Information Sheet: 6 year follow-up, dated November 2007

Certification
The Committee is satisfied that this study is not being conducted principally for the benefit of the manufacturer or distributor of the medicine or item in respect of which the trial is being carried out.

Accreditation
The Committee involved in the approval of this study is accredited by the Health Research Council and is constituted and operates in accordance with the Operational Standard for Ethics Committees, April 2006.

Progress Reports
The study is approved until December 2010. The Committee will review the approved application annually and notify the Principal Investigator if it withdraws approval. It is the Principal Investigator's responsibility to forward a progress report covering all sites prior to ethical review of the project in **November 2008**. The report form is available on http://www.newhealth.govt.nz/ethicscommittees. Please note that failure to provide a progress report may result in the withdrawal of ethical approval. A final report is also required at the conclusion of the study.

Requirements for SAE Reporting
The Principal Investigator will inform the Committee as soon as possible of the following:
- Any related study in another country that has stopped due to serious or unexpected adverse events
- withdrawal from the market for any reason
- all serious adverse events occurring during the study in New Zealand which result in the investigator breaking the blinding code at the time of the SAE or which result in hospitalisation or death.

Health and Disability Ethics Committees

Upper South B Regional Ethics Committee
Ministry of Health
4th Floor, 250 Oxford Terrace
PO Box 3877
Christchurch
Phone (03) 372 3018
Fax (03) 372 1015

- all serious adverse events occurring during the study worldwide which are considered related to the study medicine. Where there is a data safety monitoring board in place, serious adverse events occurring outside New Zealand may be reported quarterly.

All SAE reports must be signed by the Principal Investigator and include a comment on whether he/she considers there are any ethical issues relating to this study continuing due to this adverse event. It is assumed by signing the report, the Principal Investigator has undertaken to ensure that all New Zealand investigators are made aware of the event.

Amendments
All amendments to the study must be advised to the Committee prior to their implementation, except in the case where immediate implementation is required for reasons of safety. In such cases the Committee must be notified as soon as possible of the change.

Please quote the above ethics committee reference number in all correspondence.

The Principal Investigator is responsible for advising any other study sites of approvals and all other correspondence with the Ethics Committee.

It should be noted that Ethics Committee approval does not imply any resource commitment or administrative facilitation by any healthcare provider within whose facility the research is to be carried out. Where applicable, authority for this must be obtained separately from the appropriate manager within the organisation.

Yours sincerely

Di Rutledge

Di Rutledge
Upper South B Regional Ethics Committee Administrator
Email: di_rutledge@moh.govt.nz

Appendix B: Consent form at 4.5-year Follow-up

Canterbury Child Development
Research Group
Department of Psychology
College of Science

November 2007

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

CODE NUMBER

4.5-YEAR FOLLOW-UP STUDY
CONSENT FORM

- I have been invited to participate with my child in a study that is comparing the development of children who were and were not born to mothers on methadone maintenance during their pregnancy. I have read and understood the Information sheet dated November, 2007.

- I have had enough time to consider whether we will take part in the study, and to discuss my decision with the researcher or a person of my choice.

- I know who to contact if I have any questions about the study.

- I understand that our participation in this research is **confidential** and that no material which could identify me will be used in any study reports, or made available to anyone else without my approval in writing.

- I understand my child will be videotaped during the procedure and that this information will only be used for further observation by the named investigators and the material will be secured and kept strictly confidential.

- I also understand that my child and I can withdraw from the study at any time.

- I understand the compensation provisions for the study.

- I agree to members of the research team having access to medical information about my child for cross checking the number and dates of any major or minor illnesses that I have recorded on the study forms. **YES/NO**

- I wish to receive a summary of the results of this study. **YES/NO**

I consent to take part in this study.

Parent/s Name: _____

Signature of Parent/s: _____ **Date**: _____

I consent to my child taking part in this study.

Child's name_____ Parent/s Name: _____

Signature of Parent/s: _____ **Date**: _____

In my opinion, consent was given freely and the participant understands what is involved in this study.

Researcher's Name:_____

Signature of Researcher: _____ **Date**: _____

Child's GP (Family Doctor) Contact Details:

Child's GP

Name:……..

Medical Centre/Practice:……

Address and phone (If known)
……
……

……

Previous GP's and Name of Medical Centres (if changed over past 4 years)

Name:……..

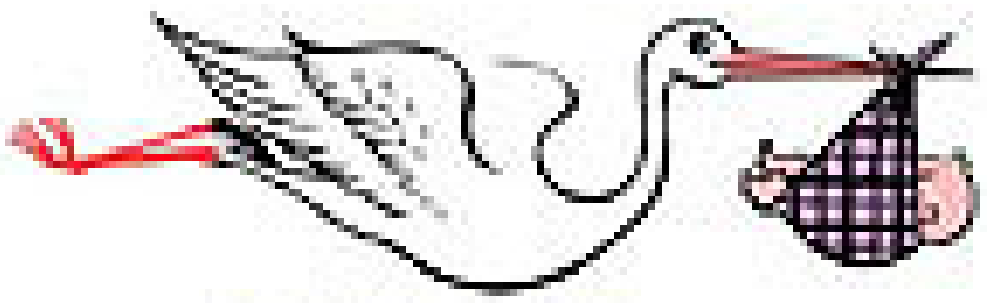
Name……

Appendix C: Term Maternal Interview

METHADONE IN PREGNANCY STUDY

BACKGROUND INTERVIEW

1.



CODE NUMBER	
STATUS CODE	
INTERVIEWER	

	Day	Month	Year
DATE			

SECTION A. RESPONDENT'S BACKGROUND

A.1 What is your expected date of delivery?

D	D	M	M	Y	Y	Col 18

Mother

A.2 How old were you on your last birthday?

Years

A.3 Which of the following ethnic groups do you belong to or identify with?

	Yes	No	
NZ Maori	1	2	
NZ European	1	2	
Other European (English, Dutch, Scottish, Australian, etc)	1	2	
Samoan	1	2	
Tongan	1	2	
Niuean	1	2	
Asian	1	2	
Other Specify: _____	1	2	Col 28

A.4 Which of the following best describes your educational qualifications? (circle one)

Left school between 13-16 years, no qualifications	1
School Certificate (>2 subjects)	2
Further secondary education, eg UE, HSC or Bursary	3
Secretarial or trade qualifications	4

Professional qualifications without a degree	5	
University degree	6	
Other qualifications, specify: _____	7	Col 29

Partner Relations

A.5 Are you currently living with a partner?

Yes, legally married	1
Yes, cohabiting	2
Has partner, not cohabiting	3
No partner	4

A.6 If yes, is he the father of your new baby?

Yes	1	
No	2	
No partner	9	Col 31

IF NO PARTNER ENTER 9s IN A.7 – A.10 AND ASK B.1

A.7 How old is your partner? Years

A.8 Which of the following ethnic groups does your partner belong to or identify?

	Yes	No	NA
NZ Māori	1	2	9
NZ European	1	2	9
Other European (English, Dutch, Australian, etc)	1	2	9
Samoan	1	2	9
Tongan	1	2	9
Niuean	1	2	9

Asian	1	2	9	
Other, specify: _____	1	2	9	Col 41

A.9 Which of the following best describes your partner's school/educational qualifications?

Left school between 13-16 years, no qualifications	1
School Certificate (>2 subjects)	2
Further secondary education, eg UE, HSC or Bursary	3
Secretarial or trade qualifications	4
Professional qualifications without a degree	5
University degree	6
Other qualifications, describe: _____	7
Don't know	8
NA (no partner)	9

A.10 How long have you been in this relationship?

Months [ ][ ] Col 44

SECTION B. PARENTHOOD

B.1 a) Is this your first pregnancy?

Yes	1
No	2

b) If no, how many times have you been pregnant before?

Number [ ] Col 46

IF RESPONDENT HAS HAD OTHER PREGNANCIES, GIVE DETAILS BELOW. IF NO PREVIOUS PREGNANCY ENTER 9's IN RELEVANT ITEMS

PREGNANCY 1: Age became pregnant | Years | | |

Outcome of pregnancy	Child kept by respondent	1	
	Child adopted	2	
	Pregnancy terminated	3	
	Miscarriage	4	
	Still birth	5	
If other, specify: _____	Currently pregnant	6	
_____	Other	7	
	NA	9	Col 49

PREGNANCY 2: Age became pregnant | Years | | |

Outcome of pregnancy	Child kept by respondent	1	
	Child adopted	2	
	Pregnancy terminated	3	
	Miscarriage	4	
	Still birth	5	
If other, specify: _____	Currently pregnant	6	
_____	Other	7	
	NA	9	Col 52

PREGNANCY 3: Age became pregnant | Years | | |

Outcome of pregnancy	Child kept by respondent	1
	Child adopted	2
	Pregnancy terminated	3
	Miscarriage	4
	Still birth	5

If other, specify: _____	Currently pregnant	6	
_____	Other	7	
	NA	9	Col 55

PREGNANCY 4: Age became pregnant Years

Outcome of pregnancy	Child kept by respondent	1	
	Child adopted	2	
	Pregnancy terminated	3	
	Miscarriage	4	
	Still birth	5	
If other, specify: _____	Currently pregnant	6	
_____	Other	7	
	NA	9	Col 58 REC01

IF MORE THAN 4 PREGNANCIES, ENTER DETAILS HERE

Biological Children

B.2 a) Total number of biological children

Number ☐

2.

b) INTERVIEWER: Complete the coding frame for all biological children of the respondent.

Name of Child	DOB			Age (Years)		Gender	Legal Custody	Physical Custody
1 (Eldest)								
2								
3								
4								
5 (Youngest)								

Col 60

Coding: Date of birth: Code day, month, year. NA = 99.

Child's age coded in whole years. NA = 99.

Gender: Female = 1; Male = 2; NA = 9.

Legal custody: Sole = 1; Shared = 2; None (ie, other parent has sole legal custody) = 3; NA = 9.

Physical custody: Sole = 1; Shared = 2; None (ie, no physical contact) = 3; NA = 9.

Record any additional information here: _____

_____

B.3 Do all of these children have the same mother/father?

Yes	1	
No	2	Col 61
		REC02

If no, please describe: _____

_____

Step or Non-biological Children

B.4 Are you parenting or caring for any children who are not your own?
(Include here all non-biological children)

3. Number

B.5 Can you tell me the names and ages of each of these children? Complete coding frame for non-biological children)

Name of Child	DOB			Age (Years)		Gender	Relationship to child	Custody
1 (Eldest)								
2								
3								
4								
5 (Youngest)								

Col 60

Coding: Date of birth: Code day, month, year. NA = 99.

Child's age coded in years, NA = 99.

Gender: Female = 1; Male =2; NA = 9.

Relationship to child: Adoptive parent = 1; Step/de facto step parent = 2; Family relation (eg, aunt/uncle) = 3; Foster parent = 4; Other = 5; NA = 9.

Legal custody: Yes = 1; No = 2; NA = 9.

Record any additional information here: _____

_____

_____

B.6 Are any other people living with you at the moment?

4. Number

Total number of people in the household?

Total number

Col 64

SECTION C. FAMILY FINANCES AND LIVING CONDITIONS

Housing

C.1 What kind of house are you living in at the moment?

Own house	1
Own flat	2
Rented house (private landlord)	3
Rented flat (private landlord)	4
State/council owned house	5
State/council owned flat	6
Single room or bedsit	7
Staying with other family members	8
Other, eg car, caravan, boat. Specify: _____	9

C.2 How long have you lived here? Months

C.3 How many places have you lived in the past 3 years? Number Col 69

Family Finances

C.4 Are you working (in paid employment) at the moment?

Yes	1
No	2

C.5 If yes, specify:

a) Occupation: _____

b) Industry: _____

c) How many hours per week do you work?
If no work enter 00.

Hours | | | Col 72

d) How much do you receive each week after tax? (If not working enter 0's)

Amount | | | | | Col 76

REC03

C.6 Are you in receipt of any of the following Social Welfare benefits?

	Yes	No
Domestic Purposes Benefit	1	2
Unemployment Benefit / Community Wage	1	2
Sickness/Invalid's Benefit	1	2
Other Social Welfare Benefit. Specify:	1	2

C.7 How much do you receive in benefit payments per week?

Amount | | | |

C.8 Do you receive any Family Assistance payments (that are not already included above)?

Amount/week | | | |

C.9 Do you receive income from any other source, eg donations from parents, investment income, etc

Amount/week | | | | Col 17

IF NO COHABITING PARTNER ENTER 9's IN C.10 – C.15

C.10 Is your partner working (in paid employment) at the moment?

Yes	1
No	2
NA	9

Col 18

C.11 If yes, specify:

a) Occupation: _____

b) Industry: _____

c) How many hours per week does s/he work? Hours

d) How much does s/he receive each week after tax? (If not working enter 0's)

Amount Col 24

C.12 Is your partner in receipt of any of the following Social Welfare benefits?

	Yes	No	NA	
Domestic Purposes Benefit	1	2	9	
Unemployment Benefit / Community Wage	1	2	9	
Sickness/Invalid's Benefit	1	2	9	
Other Social Welfare Benefit. Specify:	1	2	9	Col 28

C.13 How much does your partner receive in benefit payments per week?

Amount

C.14 Does your partner receive any Family Assistance payments (that are not already included above)?

Amount/week

C.15 Does s/he receive income from any other source, eg donations from parents, investment income, etc

Amount/week Col 37

SECTION D. PREGNANCY

D.1 How many weeks pregnant are you at the moment?

GA

D.2 Were you trying to get pregnant?

Yes	1	
Unsure	2	
No	3	Col 40

D.3 What was your reaction when you first heard you were pregnant?

Delighted/very happy	1
Happy	2
Indifferent	3
Upset	4
Very upset	5

D.4 What was your partner's reaction when you told him you were pregnant?

Delighted/very happy	1	
Happy	2	
Indifferent	3	
Upset	4	
Very upset	5	
No partner	9	Col 42

D.5 When did you first consult a doctor concerning your pregnancy?

Record weeks of pregnancy		

D.6 So far during your pregnancy, have you experienced any of the following problems or illnesses?

a) Vaginal bleeding	0-3 months	Yes	1
		No	2

	4-6 months	Yes	1	
		No	2	
	7-9 months	Yes	1	
		No	2	
		NA	9	Col 47
b) High blood pressure	0-3 months	Yes	1	
		No	2	
		NA	9	
	4-6 months	Yes	1	
		No	2	
		NA	9	
	7-9 months	Yes	1	
		No	2	
		NA	9	Col 50
c) Psychiatric or emotional problems treated by a doctor eg depression	0-3 months	Yes	1	
Specify: _____		No	2	
	4-6 months	Yes	1	
		No	2	

7-9 months	Yes	1	
	No	2	
	NA	9	Col 53

D.7 Who have you been seeing for antenatal care?

a) Family doctor or GP	Yes	1	
	No	2	
b) Private specialist/Obstetrician	Yes	1	
	No	2	
c) Hospital clinic	Yes	1	
	No	2	
d) Midwife	Yes	1	
	No	2	Col 57

Pregnancy Nutrition

D.8 On average how many servings of the following would you have eaten **per week** during your pregnancy

	Number	
a) Fruit including fresh, frozen, canned, stewed (1 serving = 1 apple or 2 small apricots)		

Number

b) Vegetables including fresh, frozen, canned
(1 serving = 1 potato, ½ cup cooked vegetables, 1 cup salad greens)

Number

c) Meat including beef, lamb, chicken, fish, shellfish

Number

d) Bread or toast slices (number of slices)

Number

e) Pasta, rice, muesli, cereal
(1 serving = 1 cup cooked rice/pasta/porridge/cornflakes or ½ cup

muesli or 2 weetbix)

Number

f) Milk (1 serving = 1 glass)

Number

g) Eggs (1 serving = 1 egg)

Col 71

REC 04

SECTION E. DRUG USE DURING PREGNANCY

E.1 Did you smoke cigarettes before or during your pregnancy?

	No. of cigs per day	
Before pregnancy		
1st 3 months		
2nd 3 months		
3rd 3 months		Col 12

E.2 Did you smoke dope/cannabis before or during your pregnancy?

	No. of joints per week		
Before pregnancy			
1st 3 months			
2nd 3 months			
3rd 3 months			Col 20

E.3 Did you drink alcohol before or during your pregnancy?

	No. of drinks per week		
Before pregnancy			
1st 3 months			
2nd 3 months			
3rd 3 months			Col 28

E.4 Did you use benzodiazepines before or during your pregnancy?

	No. of times per week		
Before pregnancy			
1st 3 months			
2nd 3 months			
3rd 3 months			Col 36

E.5 Did you use heroin or other opioids (excluding methadone) before or during your pregnancy?

	No. of times per week

Before pregnancy			
1st 3 months			
2nd 3 months			
3rd 3 months			Col 44

E.6 Did you use stimulants (eg amphetamines, speed, cocaine) before or during your pregnancy?

Before pregnancy			
1st 3 months			
2nd 3 months			
3rd 3 months			Col 52

SECTION F. MATERNAL WELLBEING

(Edinburgh Postnatal Depression Scale, Cox et al., 1987)

F.1 Right NOW

	Not at all	Somewhat	Moderately	Very much	
I feel calm	1	2	3	4	
I am tense	1	2	3	4	
I feel upset	1	2	3	4	
I am relaxed	1	2	3	4	
I feel confident	1	2	3	4	
I am worried	1	2	3	4	Col 58

5.

F.2 During my PREGNANCY:

	Often	Sometimes	Hardly Ever	Never
I was able to laugh and see the funny side of things	1	2	3	4
I looked forward with enjoyment to things	1	2	3	4
I blamed myself unnecessarily when things went wrong	1	2	3	4

	I felt anxious or worried for no good reason	1	2	3	4
	I felt scared or panicky for no very good reason	1	2	3	4
	Things got on top of me	1	2	3	4
	I was so unhappy that I had difficulty sleeping	1	2	3	4
	I felt sad or miserable	1	2	3	4
	I got so unhappy that I cried	1	2	3	4
	I thought about harming myself	1	2	3	4 Col 68

F.3 In the PAST TWO WEEKS:

	Often	Sometimes	Hardly Ever	Never	
I have been able to laugh and see the funny side of things	1	2	3	4	
I have looked forward with enjoyment to things	1	2	3	4	
I have blamed myself unnecessarily when things went wrong	1	2	3	4	
I have been anxious or worried for no good reason	1	2	3	4	
I have felt scared or panicky for no very good reason	1	2	3	4	
Things have been getting on top of me	1	2	3	4	
I have been so unhappy that I have had difficulty sleeping	1	2	3	4	
I have felt sad or miserable	1	2	3	4	
I have been so unhappy that I have been crying	1	2	3	4	
The thought of harming myself has occurred to me.	1	2	3	4	Col 78

REC 05

SECTION G. DRUG DEPENDENCE

(DSM-IV questions from the Composite International Diagnostic Interview)

Cigarettes

G.1 Over the last 6 months have you smoked a cigarette or cigarettes? If yes, how many cigarettes would you smoke per day?

Non-smoker	1	
<1 per day	2	
1-4 per day	3	
5-9 per day	4	
10-20 per day	5	
21+ per day	6	Col 5

IF RESPONDENT REPORTS SMOKING ASK G.2 OTHERWISE ENDORSE THIS ITEM WITH 9's

G.2	Doesn't Apply	Applies Somewhat	Def. Applies	NA	
If you can't get or have a cigarette do you feel tense, irritable, need a cigarette	1	2	3	9	
Do you want a cigarette first thing in the morning	1	2	3	9	
Do you have headaches or other physical symptoms when you can't get cigarettes	1	2	3	9	
Have you more than once wanted to quit or cut down on smoking	1	2	3	9	
Have you tried to quit or cut down on your smoking and found you couldn't	1	2	3	9	
Can you go a day without having a cigarette	1	2	3	9	
Do you think you are dependent on or addicted to cigarettes	1	2	3	9	
Have you often had periods of days when you smoked more than you intended	1	2	3	9	Col 13
Have you had to go outside of work or other places so that you could smoke	1	2	3	9	
Have you increased the amount you smoke to get the same effect	1	2	3	9	
Has smoking cigarettes ever caused a problem with your health	1	2	3	9	
Have you ever been advised by a doctor to give up smoking because of your health	1	2	3	9	Col 17

Alcohol

G.3 Over the past month how often would you have drunk alcohol?

Never	1	
Very occasionally (once or twice)	2	
At least weekly	3	
Almost every day	4	Col 18

IF RESPONDENT HAS NEVER DRUNK ALCOHOL IN THE LAST MONTH ENTER 0's IN G.4 – G.5

G.4 On the last occasion you drank how much did you drink?

INTERVIEWER: Find out best 'unit' eg glasses, etc in which to measure drinks and record for that unit. Enter 00 in other boxes

		Number		
Beer	Glasses			
	Handles			
	Jugs			
	Standard bottles			
	Cans/stubbies			
	Flagons			Col 30
	Riggers			
Low Alcohol Beer	Glasses			
	Handles			
	Cans/stubbies			
Spirits/Liqueurs	Glasses			
	½ Bottles			
	Bottles			
Mixed Cocktails	Glasses			
Wine	Glasses			

	Bottles		
Wine Cooler	Glasses		
	Bottles		
Fortified Wine	Glasses		
	Bottles		
	Flagons		
Other, specify	Glasses		Col 62

G.5 What is the most you have drunk on any one occasion in the past month?

		Number	
Beer	Glasses		
	Handles		
	Jugs		
	Standard bottles		
	Cans/stubbies		
	Flagons		
	Riggers		Col 76

REC 06

Low Alcohol Beer	Glasses			
	Handles			
	Cans/stubbies			
Spirits/Liqueurs	Glasses			
	½ Bottles			
	Bottles			
Mixed Cocktails	Glasses			
Wine	Glasses			
	Bottles			
Wine Cooler	Glasses			
	Bottles			
Fortified Wine	Glasses			
	Bottles			
	Flagons			
Other, specify	Glasses			Col 34

Marijuana

F.1 Have you ever used or tried smoking cannabis (marijuana, grass, dope etc)?

Yes	1	
No	2	Col 35

IF YES TO F.1 ASK F.2 - F.3 OTHERWISE ENDORSE THESE ITEMS WITH 9's AND ASK F.4

F.2 At the present time how often do you use cannabis?

Nearly every day	1
At least once a week	2
At least once a month	3
Less than once a month	4

Has only used once or twice	5	
Not used cannabis	9	Col 36

F.3 Over the last year has your use of cannabis resulted in any of the following

	Yes	No	NA	
You being unable to work or meet other commitments because you were high	1	2	9	
Problems with your family	1	2	9	
Problems with your friends	1	2	9	
Problems with the Police	1	2	9	
Problems with your husband/partner/boyfriend	1	2	9	
Being in a situation where being high increased your chances of being hurt, having an accident	1	2	9	
You having a strong and irresistible desire to smoke cannabis	1	2	9	
You wishing to stop or cut down on using cannabis but finding you couldn't	1	2	9	
Often using larger amounts of cannabis than you intended to when you started	1	2	9	
Using cannabis for longer than you intended to	1	2	9	
Spending a great deal of time using cannabis or getting over its effects	1	2	9	
Having to use more to get the same effect	1	2	9	
Having withdrawal symptoms if you tried to stop or cut down on using cannabis (eg feeling sick, headaches etc)	1	2	9	Col 49
Problems with your health	1	2	9	
Psychological problems	1	2	9	
Have you ever stolen goods or money in order to buy cannabis	1	2	9	Col 52

ASK ALL RESPONDENTS F.4

F.4 Have you ever used or tried any of the following

	Yes	No
Solvents - glue, petrol, etc	1	2
Sedatives – downers	1	2
Stimulants – uppers	1	2
Heroin/homebake	1	2

Morphine/MSTs	1	2	
Cocaine	1	2	
LSD, PCP, ecstasy	1	2	
Other prescription medicine to get you high	1	2	
Any other substance. Specify:	1	2	Col 61

IF RESPONDENT HAS USED ANY SUBSTANCE IN F.4 ASK F.5 OTHERWISE ENDORSE THIS ITEM WITH 9

F.5 At the present time (ie over the last month) how often do you use this drug (these drugs)

Nearly every day	1	
At least once a week	2	
At least once a month	3	
Less than once a month	4	
Has only used once or twice	5	
Not used drugs	9	Col 62

Appendix D: The Strengths and Difficulties Questionnaire

Strengths and Difficulties Questionnaire P 4-16

For each item, please mark the box for Not True, Somewhat True or Certainly True. It would help us if you answered all items as best you can even if you are not absolutely certain or the item seems daft! Please give your answers on the basis of the child's behaviour over the last six months.

Child's Name ..... Male/Female

Date of Birth.....

	Not True	Somewhat True	Certainly True
Considerate of other people's feelings	☐	☐	☐
Restless, overactive, cannot stay still for long	☐	☐	☐
Often complains of headaches, stomach-aches or sickness	☐	☐	☐
Shares readily with other children (treats, toys, pencils etc.)	☐	☐	☐
Often has temper tantrums or hot tempers	☐	☐	☐
Rather solitary, tends to play alone	☐	☐	☐
Generally obedient, usually does what adults request	☐	☐	☐
Many worries, often seems worried	☐	☐	☐
Helpful if someone is hurt, upset or feeling ill	☐	☐	☐
Constantly fidgeting or squirming	☐	☐	☐
Has at least one good friend	☐	☐	☐
Often fights with other children or bullies them	☐	☐	☐
Often unhappy, down-hearted or tearful	☐	☐	☐
Generally liked by other children	☐	☐	☐
Easily distracted, concentration wanders	☐	☐	☐
Nervous or clingy in new situations, easily loses confidence	☐	☐	☐
Kind to younger children	☐	☐	☐
Often lies or cheats	☐	☐	☐
Picked on or bullied by other children	☐	☐	☐
Often volunteers to help others (parents, teachers, other children)	☐	☐	☐
Thinks things out before acting	☐	☐	☐
Steals from home, school or elsewhere	☐	☐	☐
Gets on better with adults than with other children	☐	☐	☐
Many fears, easily scared	☐	☐	☐
Sees tasks through to the end, good attention span	☐	☐	☐

Do you have any other comments or concerns?

Please turn over - there are a few more questions on the other side

Scoring the Informant-Rated Strengths and Difficulties Questionnaire

The 25 items in the SDQ comprise 5 scales of 5 items each. It is usually easiest to score all 5 scales first before working out the total difficulties score. Somewhat True is always scored as 1, but the scoring of Not True and Certainly True varies with the item, as shown below scale by scale. For each of the 5 scales the score can range from 0 to 10 if all 5 items were completed. Scale score can be prorated if at least 3 items were completed.

Emotional Symptoms Scale	Not True	Somewhat True	Certainly True
Often complains of headaches, stomach-aches ...	0	1	2
Many worries, often seems worried	0	1	2
Often unhappy, downhearted or tearful	0	1	2
Nervous or clingy in new situations ...	0	1	2
Many fears, easily scared	0	1	2

Conduct Problems Scale	Not True	Somewhat True	Certainly True
Often has temper tantrums or hot tempers	0	1	2
Generally obedient, usually does what ...	2	1	0
Often fights with other children or bullies them	0	1	2
Often lies or cheats	0	1	2
Steals from home, school or elsewhere	0	1	2

Hyperactivity Scale	Not True	Somewhat True	Certainly True
Restless, overactive, cannot stay still for long	0	1	2
Constantly fidgeting or squirming	0	1	2
Easily distracted, concentration wanders	0	1	2
Thinks things out before acting	2	1	0
Sees tasks through to the end, good attention span	2	1	0

Peer Problems Scale	Not True	Somewhat True	Certainly True
Rather solitary, tends to play alone	0	1	2
Has at least one good friend	2	1	0
Generally liked by other children	2	1	0
Picked on or bullied by other children	0	1	2
Gets on better with adults than with other children	0	1	2

Prosocial Scale	Not True	Somewhat True	Certainly True
Considerate of other people's feelings	0	1	2
Shares readily with other children	0	1	2
Helpful if someone is hurt, upset of feeling ill	0	1	2
Kind to younger children	0	1	2
Often volunteers to help others	0	1	2

The Total Difficulties Score:

is generated by summing the scores from all the scales except the prosocial scale. The resultant score can range from 0 to 40 (and is counted as missing if one of the component scores is missing).

Interpreting Symptom Scores and Defining "Caseness" from Symptom Scores

Although SDQ scores can often be used as continuous variables, it is sometimes convenient to classify scores as normal, borderline and abnormal. Using the bandings shown below, an abnormal score on one or both of the total difficulties scores can be used to identify likely "cases" with mental health disorders. This is clearly only a rough-and ready method for detecting disorders – combining information from SDQ symptom and impact scores from multiple informants is better, but still far from perfect. Approximately 10% of a community sample scores in the abnormal band on any given score, with a further 10% scoring in the borderline band. The exact proportions vary according to country, age and gender – normative SDQ data are available from the web site. You may want to adjust banding and caseness criteria for these characteristics, setting the threshold higher when avoiding false positives is of paramount importance, and setting the threshold lower when avoiding false negatives is more important.

	Normal	Borderline	Abnormal
Parent Completed			
Total Difficulties Score	0 - 13	14 - 16	17 - 40
Emotional Symptoms Score	0 - 3	4	5 - 10
Conduct Problems Score	0 - 2	3	4 - 10
Hyperactivity Score	0 - 5	6	7 - 10
Peer Problems Score	0 - 2	3	4 - 10
Prosocial Behaviour Score	6 - 10	5	0 - 4
Teacher Completed			
Total Difficulties Score	0 - 11	12 - 15	16 - 40
Emotional Symptoms Score	0 - 4	5	6 - 10
Conduct Problems Score	0 - 2	3	4 - 10
Hyperactivity Score	0 - 5	6	7 - 10
Peer Problems Score	0 - 3	4	5 - 10
Prosocial Behaviour Score	6 - 10	5	0 - 4

Generating and Interpreting Impact Scores

When using a version of the SDQ that includes an "Impact Supplement", the items on overall distress and social impairment can be summed to generate an impact score that ranges from 0 to 10 for the parent-completed version and from 0-6 for the teacher-completed version.

	Not at all	Only a little	Quite a lot	A great deal
Parent report				
Difficulties upset or distress child	0	0	1	2
Interfere with HOME LIFE	0	0	1	2
Interfere with FRIENDSHIPS	0	0	1	2
Interfere with CLASSROOM LEARNING	0	0	1	2
Interfere with LEISURE ACTIVITIES	0	0	1	2
Teacher report				
Difficulties upset or distress child	0	0	1	2
Interfere with PEER RELATIONSHIPS	0	0	1	2
Interfere with CLASSROOM LEARNING	0	0	1	2

Responses to the questions on chronicity and burden to others are not included in the impact score. When respondents have answered "no" to the first question on the impact supplement (i.e. when they do not perceive the child as having any emotional or behavioural difficulties), they are not asked to complete the questions on resultant distress or impairment; the impact score is automatically scored zero in these circumstances.

Although the impact scores can be used as continuous variables, it is sometimes convenient to classify them as normal, borderline or abnormal: a total impact score of 2 or more is abnormal; a score of 1 is borderline; and a score of 0 is normal.

Appendix E: The Developmental and Well-Being Assessment Interview

SECTION 1.3 – Separation Anxiety (worries and concerns that children might have)

Most children are particularly attached to a few key adults, looking to them for security and comfort, and turning to them when upset or hurt.

1.3.1	Is [Name] specially attached to the following adults?	No or Not Applicable	Yes
a)	Mother (biological or adoptive)	0	1
b)	Father (biological or adoptive)	0	1
c)	Another mother figure (stepmother, foster mother, father's partner)	0	1
d)	Another father figure (stepfather, foster father, mother's partner)	0	1
e)	One or more grandparents	0	1
f)	One or more other adult relatives (e.g. aunt, uncle, grown-up brother or sister)	0	1
g)	Childminder, nanny, au pair	0	1
h)	One or more teachers	0	1
i)	One or more other adult non-relatives (e.g. a family friend or neighbour)	0	1
j)	[ ] Not specially attached to any adult	0	1

If 1.3.1j was ticked, ask 1.3.1k , 1.3.1l and 1.3.1m; otherwise continue with 1.3.2

	Is [(Child) specially attached to the following children or young people?	No or Not Applicable	Yes
k)	One or more brothers, sisters or other young relatives	0	1
l)	One or more friends	0	1

m) [ ] Not specially attached to anyone

0	1

If 1.3.1m is ticked, then skip to section 2 (Fears of specific things or situations). Otherwise continue:

1.3.2 You've just told me who [Name] is specially attached to: *If you want, you can list all from 1.3.1 that were answered 'Yes'*: From now on I am going to refer to these people as his/her 'attachment figures'

What I'd like to know next is how much [Name] worries about being separated from his/her attachment figures. Most children have some worries of this sort, but I'd like to know how [Name] compares with other children of his/her age. I am interested in how s/he is usually- not on the occasional 'off day'.

	No	Yes
Overall, in the **last 4 weeks**, has s/he been particularly worried about being separated from his/her attachment figures?	0	1

If 1.3.2 = Yes or if SDQ emotion score is ≥3 then continue. If neither skip to sub-section 1.3.4 (Fears of specific things or situations)

1.3.3 Over the last 4 weeks, and compared with other children of the same age……

	No more than others (or Not applicable)	A little more than others	A lot more than others
a) has s/he worried either about something unpleasant happening to his/her attachment figures, or about losing them?	0	1	2
b) has s/he worried unrealistically that s/he might be taken away from his/her attachment figures e.g. by being kidnapped, taken to hospital or killed?	0	1	2
c) has s/he not wanted to go to school in case something nasty happened to his/her attachment figures while s/he was away at school? (*Do not include reluctance to go to school for other reasons e.g. fear of bullying or exams*)	0	1	2
d) has s/he worried about sleeping alone?	0	1	2
e) has s/he come out of his/her bedroom at night to check on, or to sleep near, his/her attachment figures?	0	1	2
f) has s/he worried about sleeping in a strange place?	0	1	2
g) *(Only ask if aged under 11)* has s/he been afraid of being alone in a room at home without his/her attachment figures even if they are close by?	0	1	2
h) *(Only ask if aged under 11)* has s/he been afraid of being alone at home if his/her attachment figures pop out for a moment?	0	1	2

		No more than others (or Not applicable)	A little more than others	A lot more than others
i)	has s/he repeated nightmares or bad dreams about being separated from his/her attachment figure?	0	1	2
j)	has s/he had headaches, stomach aches or felt sick when s/he had to leave his/her attachment figures or when s/he knew it was about to happen?	0	1	2
k)	has being apart from his/her attachment figures, or the thought of being apart from them led to worry, crying, tantrums, clinginess or misery?	0	1	2

If any of the items in 1.3.3 have been answered "A lot more than others" then continue with 1.3.4. If not, skip to section 2 (Fears of specific things or situations)

1.3.4 Have [Name's] worries about separation been there for at least **4 weeks?**

No	Yes
0	1

1.3.5 How old was s/he when his/her worries about separation began? (if since birth, enter 0) _____ years old

1.3.6 How much have these worries upset or distressed him/her?

Not at all	A little	A medium amount	A great deal
0	1	2	3

1.3.7 Have these worries interfered with……

		Not at all	A little	A medium amount	A great deal
a)	How well s/he gets on with you and the rest of the family?	0	1	2	3
b)	Making and keeping friends?	0	1	2	3
c)	learning or class work?	0	1	2	3
d)	playing, hobbies, sports or other leisure activities?	0	1	2	3

Not at	A little	A	A great

	all		medium amount	deal
1.3.8 Have these worries put a burden on you or the family as a whole?	0	1	2	3

SECTION 2- Fears of specific things or situations

This section of the interview is about some things or situations that children are often scared of, even though they aren't really a danger to them. I'd like to know what [Name] is afraid of. I am interested in how s/he is usually – not on the occasional 'off day'. Not all fears are covered in this section – some are covered in other sections e.g. fears of social situations, dirt, separation, crowds.

2.1 Is [Name] scared of any of the things or situations on this list?

		No	A little	A lot
a)	Animals: Dogs, spiders, bees and wasps, mice and rats, snakes, or any other animal, bird or insect	0	1	2
b)	Some aspect of the natural environment, e.g. storms, thunder, heights, water	0	1	2
c)	The dark	0	1	2
d)	Loud noises, e.g. fire alarms, fireworks	0	1	2
e)	Blood – injection – injury: Set off by the sight of blood or injury, or by an injection, or by other medical procedures	0	1	2
f)	Dentists or doctors	0	1	2
g)	Vomiting, choking or getting particular diseases, e.g. cancer or AIDS	0	1	2
h)	Using particular types of transport, e.g. cars, buses, boats, planes, ordinary trains, underground trains, bridges	0	1	2
i)	Small enclosed spaces, e.g. lifts, tunnels	0	1	2
j)	Using the toilet, e.g. at school or in someone else's house	0	1	2
k)	Specific types of people, e.g. clowns, people with beards, with crash-helmets, in fancy dress, dressed as Santa Claus	0	1	2
l)	Imaginary or supernatural beings, e.g. monsters, ghosts, aliens, witches	0	1	2
m)	Any other specific fear (Describe)……	0	1	2

No	A little	A lot

.....

……

If any of the items in 2.1 have been answered 'a lot' then continue with 2.2. Otherwise go to Section 3.

2.2 Are any of these fears a real nuisance to him/her, to you, or to anyone else?

No	Perhaps	Definitely
0	1	2

If 2.2 = "Definitely" or if SDQ emotion score is ≥3 then continue. If neither, then skip to Section 3.

2.3 How long has this fear or the most severe of these fears been present?

Less than 1 month	1-5 months	6 months or more
0	1	2

2.4 When [Name] comes up against the things s/he is afraid of, or when s/he thinks s/he is about to come up against them, does s/he become anxious or upset?

No	A little	A lot
0	1	2
	2.7	2.5

2.5 Does s/he become anxious or upset every time, or almost every time, s/he comes up against the things s/he is afraid of?

No	Yes
0	1

2.6 How often do his/her fears result in his/her becoming upset like this?

N.B. If [Name] is afraid of something that is only there for part of the year (e.g. wasps), this question is about that particular season.

Every now and then	Most weeks	Most days	Many times a day
0	1	2	3

2.7 Do [Name's] fears lead to him/her avoiding the things s/he is afraid of?

No	A little	A lot
0	1	2
	2.9	2.8

2.8 Does this avoidance interfere with his/her daily life?

No	A little	A lot

0	1	2

2.9 Do you think that his/her fears are over the top or unreasonable?

2.10 And what about him/her? Does s/he think that his/her fears are over the top or unreasonable?

	No	Perhaps	Definitely
2.9	0	1	2
2.10	0	1	2

2.11 Have [Name's] fears put a burden on you or the family as a whole?

Not at all	A little	A medium amount	A great deal
0	1	2	3

SECTION 3– Fear of social situations

I am interested in whether [Name] is particularly afraid of social situations. This is compared with other children of his/her age, and is not counting the occasional 'off day' or ordinary shyness.

3.1 Overall, does [Name's] particularly fear or avoid social situations that involve a lot of people, meeting new people, or doing things in front of people?

No	Yes
0	1

If 3.1 = "Yes" or if SDQ emotion score is ≥3, then continue. If neither, then skip to section 4.

3.2 Has [Name] been particularly afraid of any of the following social situations over the last 4 weeks?

	No	A little	A lot
a) Meeting new people?	0	1	2
b) Meeting a lot of people, such as at a party?	0	1	2
c) Eating in front of others?	0	1	2
d) Speaking in class?	0	1	2
e) Reading out loud in front of others?	0	1	2
f) Writing in front of others?	0	1	2

If none of the items in 3.2 have been answered "A lot", then skip to section 4.

3.3 Most children are attached to a few key adults, feeling more secure when they are around. Some children are only afraid of social situations if they don't have one of these key adults around.

Other children are afraid of social situations even when they are with one of these key adults.

Which is true for [Name]?

Mostly fine in social situations as long as key adults are around	Social fears are marked even when key adults are around
0	1

3.4 Is [Name] just afraid with adults, or is s/he also afraid in situations that involve a lot of children, or meeting new children?

Just with adults	Just with children	With both adults and children
0	1	2

3.5 Outside of these social situations is {name} able to get on well enough with the adults and children s/he knows best?

No	Yes
0	1

3.6 Do you think his/her dislike of social situations is because s/he is afraid s/he will act in a way that will be embarrassing or show him/her up?

No	Perhaps	Definitely
0	1	2

(Only ask if 3.2d='A lot' or 3.2e = 'A lot' or 3.2f = 'A lot')

3.7 Is his/her dislike of social situations related to specific problems with speech, reading or writing?

No	Perhaps	Definitely
0	1	2

3.8 How long has his/her fear of social situations been present?

Less than 1 month	1-5 months	6 months or more
0	1	2

3.9 How old was s/he when this fear of social situations began? (if since birth, enter 0)

years old

3.10 When [Name's] is in one of the social situations s/he fears, or when s/he thinks s/he is about come up against one of these situations, does s/he become anxious or upset

No	A little	A lot
0	1	2

3.12 3.11

3.11 How often does his/her fear of social situations result in him/her becoming upset like this?

Every now and then	Most weeks	Most days	Many times a day
0	1	2	3

3.12 Does his/her fear lead to [Name] avoiding social situations

No	A little	A lot
0	1	2

3.14 3.13

3.13 Does this avoidance interfere with his/her daily life?

No	A little	A lot
0	1	2

3.14 Does s/he think that this fear of social situations is over the top or unreasonable

No	Perhaps	Definitely
0	1	2

3.15 Is s/he upset about having this fear?

0	1	2

3.16 Has [Name's] fear of social situations put a burden on you or the family as a whole?

Not at all	A little	A medium amount	A great deal
0	1	2	3

SECTION 4- Panic Attacks and Agoraphobia

Many children have times when they get very anxious or worked up about silly little things, but some children get severe panics that come out of the blue- they just don't seem to have any trigger at all.

4.1 In the **last 4 weeks**, has [Name] had a panic attack when s/he suddenly became very panicky for no reason at all, without even a little thing to set him/her off

No	Yes
0	1

4.2	Over the **last 4 weeks**, has [Name] been very afraid of, or tried to avoid, the following situations?	No or Not Applicable	Yes
a)	Crowds	0	1
b)	Public Places	0	1
c)	Travelling alone (If s/he ever does so)	0	1
d)	Being far from home	0	1

If any of the items in 4.2 have been answered "Yes"' then continue with 4.3. Otherwise skip to section 5.

4.3	Do you think this fear or avoidance of (situation) is because s/he is afraid that if s/he had a panic attack, or something like that, s/he would find it difficult or embarrassing to get away, or wouldn't be able to get the help s/he needs?	No	Yes
		0	1

SECTION 5- Generalized Anxiety

This section is about worrying

5.1	Does [Name] ever worry?	No	Yes
		0	1
		Section 6	Continue

5.1A Some children worry about just a few things, sometimes related to specific fears, obsessions or separation anxieties. Other children worry about many different aspects of their lives. They may have specific fears, obsessions or separation anxieties, but they also have a wide range of worries about many things.

	Is [Name] a worrier in general?	No, s/he just has a few specific worries	Yes, s/he worries in general
		0	1
		Only continue if SDQ emotion score ≥3	*Continue*

5.2	Over the last **6 months**, has [Name] worried so much about so many things that it has really upset him/her or interfered with	No	Perhaps	Definitely

his/her life?	0	1	2

If 5.2 = "Perhaps" or 5.2 = "Definitely" or SDQ emotion score is ≥3, then continue. If neither, then skip to section 6.

		No more than others	A little more than others	A lot more than others
5.3	Over the **last 6 months,** and by comparison with other children of the same age, has [Name] worried about…			
a)	Past behaviour: Did I do that wrong? Have I upset someone? Have they forgiven me?	0	1	2
b)	School work, homework or examinations	0	1	2
c)	Disasters: Burglaries, muggings, fires, bombs etc.	0	1	2
d)	His/Her own health	0	1	2
e)	Bad things happening to others: family, friends, pets, the world (e.g. wars).	0	1	2
f)	The future: e.g. changing school, moving house, getting a job, getting a boy/girlfriend	0	1	2
g)	Making and keeping friends	0	1	2
h)	Death and dying	0	1	2
i)	Being bullied or teased	0	1	2
j)	His/Her appearance or weight	0	1	2
k)	Other specific worry (Describe)…… ……	0	1	2

If 2 or more of these worries are scored ' a lot more than others' then continue, else skip to Section 6.

5.4 Over the **last 6 months** has s/he worried excessively on more days than not?

No	Yes
0	1

5.5 Does s/he find it difficult to control the worry?

No	Yes
0	1

If neither 5.4= "yes" or 5.5 = "Yes" then skip to section 6

5.6 *If any of the following questions are answered "yes", ask* "Has this been true for more days than not in the **last 6 months**?" *and record answer in the second column*.

		In general			More days than not in the last 6 months	
		No	Yes		No	Yes
a)	Does worrying lead to him/her feeling restless, keyed up, on edge, or unable to relax?	0	1	→	0	1
b)	Does worrying lead to him/her feeling tired or worn out more easily?	0	1	→	0	1
c)	Does worrying lead to difficulties in concentrating or his/her mind going blank?	0	1	→	0	1
d)	Does worrying lead to irritability?	0	1	→	0	1
e)	Does worrying lead to muscle tension?	0	1	→	0	1
f)	Does worrying interfere with his/her sleep, e.g. difficulty in falling or staying asleep, or restless, unsatisfying sleep?	0	1	→	0	1

5.7 How upset or distressed is [Name] as a result of all his/her various worries?

Not at all	A little	A medium amount	A great deal
0	1	2	3

5.8 Have his/her worries interfered with….

		Not at all	A little	A medium amount	A great deal
a)	how well s/he gets on with you and the rest of the family?	0	1	2	3
b)	making and keeping friends?	0	1	2	3
c)	learning or class work?	0	1	2	3

d) playing, hobbies, sports or other leisure activities?

0	1	2	3

5.9 Have these worries put a burden on you or the family as a whole?

Not at all	A little	A medium amount	A great deal
0	1	2	3

SECTION 6- Depression

This section of the interview is about [Name's] mood.

6.1 In the **last 4 weeks**, have there been times when [Name] has been very sad, miserable, unhappy or tearful?

No	Yes
0	1
↓	↓
8.7	8.2

6.2 Over the **last 4 weeks** has there been a period when s/he has been really miserable nearly <u>every</u> day

No	Yes
0	1

6.3 During the time when s/he has been miserable, has s/he been really miserable for <u>most</u> of the day? (i.e. for more hours than not)

No	Yes
0	1

6.4 When s/he has been miserable, could s/he be cheered up?

Easily	With difficulty/only briefly	Not at all
0	1	2

6.5 Over the **last 4 weeks**, the period of being really miserable has lasted:

Less than 2 weeks	2 weeks or more
0	1

6.7(Sic) In the **last 4 weeks**, have there been times when [Name] has been grumpy or irritable in a way that has been out of character for him/her?

No	Yes
0	1

6.13	6.8

6.8 Over the **last 4 weeks**, has there been a period when s/he has been really grumpy or irritable nearly <u>every</u> day?

No	Yes
0	1

6.9 During the time when s/he has been miserable, has s/he been grumpy or irritable for <u>most</u> of the day? (i.e. for more hours than not)

No	Yes
0	1

6.10 Has the irritability been improved by particular activities, by friends coming round, or by anything else?

Easily	With difficulty/only briefly	Not at all
0	1	2

6.11 Over the **last 4 weeks**, the period of being really irritable has lasted:

Less than 2 weeks	2 weeks or more
0	1

6.13 (Sic) In the **last 4 weeks**, have there been times when [Name] has lost interest in everything that s/he normally enjoys doing?

No	Yes
0	1

Skip rule at start of 6.18	6.14

6.14 Over the **last 4 weeks**, has there been a period when this lack of interest has been present nearly <u>every</u> day?

No	Yes
0	1

6.15 During these days when s/he has lost interest in things, has/he been like this for <u>most</u> of the day? (i.e. for more hours than not)

No	Yes
0	1

6.16 Over the **last 4 weeks**, this loss of interest has lasted:

Less than 2 weeks	2 weeks or more
0	1

Ask 6.17 ***if 6.1 and 6.2 and 6.3 = "Yes"***

OR if 6.7 and 6.8. and 6.9 = "Yes, ask:

6.17	Has this loss of interest been present during the same period when s/he has been really miserable or irritable for most of the time	No	Yes
		0	1

6.18 ***If 6.1 and 6.2 and 6.3 = "Yes"***

OR 6.7 and 6.8. and 6.9 = "Yes

OR 6.13 and 6.14 = "Yes" then continue. Otherwise skip to 6.22. (** However, if unsure ask 6.18**)

6. 18 During the period when [Name} was sad, irritable or lacking in interest…….

		No	Yes
a)	Did s/he lack energy and seem tired all the time?	0	1
b)	Was s/he eating much more or much less than normal?	0	1
c)	Did s/he either lose or gain a lot of weight?	0	1
d)	Did s/he find it hard to get to sleep or to stay asleep?	0	1
e)	Did s/he sleep too much?	0	1
f)	Was s/he agitated or restless for much of the time?	0	1
g)	Did s/he feel worthless or unnecessarily guilty for much of the time?	0	1
h)	Did s/he find it unusually hard to concentrate or think things out?	0	1
i)	Did s/he think about death a lot?	0	1
j)	Did s/he think about harming himself/herself or killing himself/herself?	0	1
k)	Did s/he try to harm himself/herself or kill himself/herself	0	1

		No	Yes
l)	Over the whole of his/her lifetime, has s/he ever tried to harm himself/herself or kill himself/herself	0	1

		Not at all	A little	A medium amount	A great deal
6.19	How much has [Name's] sadness, irritability or loss of interest upset or distressed him/her	0	1	2	3

		Not at all	A little	A medium amount	A great deal
6.20	Has his/her sadness, irritability or loss of interest interfered with….				
a)	how well s/he gets on with you and the rest of the family?	0	1	2	3
b)	making and keeping friends?	0	1	2	3
c)	learning or class work?	0	1	2	3
d)	playing, hobbies, sports or other leisure activities?	0	1	2	3

		Not at all	A little	A medium amount	A great deal
6.21	Has his/her sadness, irritability or loss of interest put a burden on you or the family as a whole?	0	1	2	3

Deliberate Self-Harm

		No	Yes
6.22	Over the **last 4 weeks**, has s/he talked about deliberately harming or hurting himself/herself?	0	1

		No	Yes
6.23	Over the **last 4 weeks**, has s/he tried to harm himself/herself?	0	1

		No	Yes
6.24	Over the whole of his/her lifetime, has s/he ever tried to harm or hurt himself/herself?		

0	1

SECTION 7- Attention and Activity

This section of the interview is about [Name's] level of activity and concentration over the **last 6 months**. Nearly all children are overactive or lose concentration at times, but what I would like to know is how [Name] compares with other children of his/her own age. I am interested in how s/he is usually – not on the occasional 'off day'.

7.1 Allowing for his/her age, do you think that [Name] definitely has some difficulties with overactivity or poor concentration?

No	Yes
0	1

If 7.1 = "yes" or if SDQ hyperactivity score is ≥4 then continue. If neither, then skip to section 8.

7.2 I would now like to go through some more detailed questions about how [Name] has usually been over the **last 6 months**. I will start with questions about how active s/he has been.

Over the **last 6 months,** and by comparison with other children his/her age…..	No more than others	A little more than others	A lot more than others
a) Does s/he often fidget?	0	1	2
b) Is it hard for him/her to stay sitting down for long?	0	1	2
c) Does s/he run or climb about when s/he shouldn't?	0	1	2
d) Does s/he find it hard to play or take part in other leisure activities without making a lot of noise?	0	1	2
e) If s/he is rushing about, does s/he find it hard to calm down when someone asks him/her to?	0	1	2

7.3 The next few questions are about impulsiveness

Over the **last 6 months,** and by comparison with other children his/her age…..	No more than others	A little more than others	A lot more than others
a) Does s/he often blurt out an answer before s/he heard the question properly?	0	1	2
b) Is it hard for him/her to wait his/her turn?	0	1	2

Over the **last 6 months,** and by comparison with other children his/her age…..	No more than others	A little more than others	A lot more than others
c) Does s/he often butt in on other people's conversations or games?	0	1	2
d) Does s/he often go on talking if s/he has been asked to stop, or if no one is listening?	0	1	2

7.4 The next set of questions are about attention

Over the **last 6 months,** and by comparison with other children his/her age…..	No more than others	A little more than others	A lot more than others
a) Does s/he often make careless mistakes or fail to pay attention to what s/he is supposed to be doing?	0	1	2
b) Does s/he often lose interest in what s/he is doing?	0	1	2
c) Does s/he often not listen to what people are saying to him/her?	0	1	2
d) Does s/he often not finish a job properly?	0	1	2
e) Is it often hard for him/her to get himself/herself organized to do something?	0	1	2
f) Does s/he often try to get out of things s/he would have to think about, such as homework?	0	1	2
g) Does s/he often lose things s/he needs for school or games?	0	1	2
h) Is s/he easily distracted?	0	1	2
i) Is s/he often forgetful?	0	1	2

M2J2) How often does his or her level of activity or his or her lack of attention lead to difficulties?

M2J3) How severe are the difficulties at their worst?

M2J4) How long has he or she been like this?

M2J5) Is his or her level of activity or his or her lack of attention interfering with his or her quality of life? If so, how?

M2J6) Have you tried to do anything about his or her overactivity, lack of attention or impulsiveness? If so, please describe what you've tried to do, any help that you have had, and whether this has made a difference?

		No more than others	A little more than others	A lot more than others
7.5	Have [Name's] teachers complained over the **last 6 months** of problems with…..			
a)	fidgetiness, restlessness or overactivity?	0	1	2
b)	poor concentration or being easily distracted?	0	1	2
c)	Acting without thinking about what s/he is doing, frequently butting in, or not waiting his/her turn?	0	1	2

If two or more of the items in 7.2, 7.3 or 7.4 have been answered "A lot more than others," then continue to 7.6. If not, skip to section 8.

		No	Yes
7.6	Have [Name's} difficulties with activity or concentration been there for at least **6 months**?	0	1

7.7	How old was s/he when his/her difficulties with activity or concentration began? (if since birth, enter 0)		years old

		Not at all	A little	A medium amount	A great deal
7.8	How much have [Name's] difficulties with activity or concentration upset or distressed him/her?	0	1	2	3

		Not at all	A little	A medium amount	A great deal
7.9	Have [Name's] difficulties with activity or concentration interfered with…..				
a)	how well s/he gets on with you and the rest of the family?	0	1	2	3
b)	making and keeping friends?	0	1	2	3
c)	learning or class work?	0	1	2	3

d) playing, hobbies, sports or other leisure activities?				
	0	1	2	3

7.10 Have these difficulties with activity or concentration put a burden on you or the family as a whole?	Not at all	A little	A medium amount	A great deal
	0	1	2	3

SECTION 8-Awkward and Troublesome Behaviour

This next section of the interview is about behaviour. Nearly all children are awkward and difficult at times – not doing what they are told, being irritable or annoying, having temper outbursts, and so on. What I would like to know is how [Name] compares with other children of the same age. I am interested in how s/he is usually, and not just on occasional 'off days'.

8.1 Thinking about the **last 6 months**, how does [Name's] behaviour compare with other children of his/her age?	Less awkward or troublesome than average	About average	More awkward or troublesome than average
	0	1	2

If 8.1 = "More awkward or troublesome than average", or if SDQ conduct problems score is ≥4, then continue. If neither, then skip to section 9

Some children are awkward or annoying with just one person – perhaps with yourself or just one brother or sister. Other children are troublesome with a range of adults or children. The following questions are about how [Name] is in general, and not just with one person.

8.2 Over the **last 6 months**, and as compared with other children of the same age, has s/he often….	No more than others	A little more than others	A lot more than others
a) had temper outbursts?	0	1	2
b) argued with grown-ups?	0	1	2
c) taken no notice of rules, or refused to do as s/he is told?	0	1	2
d) seemed to do things to annoy other people on purpose?	0	1	2
e) blamed others for his/her own mistakes or bad behaviour?	0	1	2

f)	been touchy or easily annoyed?	0	1	2
g)	been angry and resentful?	0	1	2
h)	been spiteful?	0	1	2
i)	tried to get his/her own back on people?	0	1	2

If any of the items in 8.2 have been answered "A lot more than others", then continue with 8.3. If not, skip to 8.8.

8.3 Have [Name's] teachers complained over the **last 6 months** of problems with this kind of awkward behaviour or disruptiveness in class?

No	A little	A lot
0	1	2

8.4 Has [Name's} awkward behaviour been there for at least **6 months**?

No	Yes
0	1

8.5 How old was s/he when this sort of awkward behaviour began?

(if since birth, enter 0) _____ years old

8.6	Has [Name's] awkward behaviour interfered with…..	Not at all	A little	A medium amount	A great deal
a)	how well s/he gets on with you and the rest of the family?	0	1	2	3
b)	making and keeping friends?	0	1	2	3
c)	learning or class work?	0	1	2	3
d)	playing, hobbies, sports or other leisure activities?	0	1	2	3

8.7 Has his/her awkward behaviour put a burden on you or the family as a whole?

Not at all	A little	A medium amount	A great deal
0	1	2	3

Continue with 8.8.

Behaviour that sometimes gets children into trouble.

8.8 I'm now going to ask about behaviour that sometimes gets children into trouble, including dangerous, aggressive or antisocial behaviour. Please answer according to how s/he has been over the last year – I'm switching to the last 12 months for this next set of questions.

If any of the following questions are answered "Definitely" *ask* "Has this been going on for the **last 6 months**?" *and record answer in the second column.*

	As far as you know, over the **last 12 months**…	Over the last 12 months			Last 6 months	
		No	Perhaps	Definitely	No	Yes
a)	has s/he often told lies in order to get things or favours from others, or to get out of having to do things s/he is supposed to do?	0	1	2	0	1
b)	has s/he often started fights? (Other than with brothers and sisters)	0	1	2	0	1
c)	has s/he often bullied or threatened people?	0	1	2	0	1
d)	has s/he often stayed out after dark much later than s/he was supposed to?	0	1	2	0	1
e)	has s/he stolen from the house, or from other people's houses, or from shops or school? (This doesn't include very minor thefts e.g. stealing his/her brother's pencil or food from the fridge)	0	1	2	0	1
f)	has s/he run away from home more than once, or ever stayed away all night without your permission?	0	1	2	0	1
g)	has s/he often played truant (bunked off) from school?	0	1	2	0	1

8.9 ***Only continue if any of the items in 8.2 have been answered "A lot more than others", or any of the items in 8.8 have been answered "Definitely" otherwise skip to section 9***

May I now ask you about a list of less common but potentially more serious behaviours? I have to ask all people all questions even when they are not likely to apply.

*If any of the following questions are answered "Yes" then ask "*Has this happened in the **last 6 months**?*" and record answer in second column*

	As far as you know, have any of the following happened even once in the **last 12 months**?	***Over the last 12 months***			***Last 6 months***	
		No	Yes		No	Yes
a)	Has s/he used a weapon or anything that could seriously hurt someone? (*e.g. a bat, brick, broken bottle, knife, gun*)	0	1	→	0	1
b)	Has s/he really hurt someone or been physically cruel to them (*e.g. has tied up, cut or burned someone*).	0	1	→	0	1
c)	Has s/he been really cruel on purpose to animals and birds	0	1	→	0	1
d)	Has s/he deliberately started a fire? (*This is only if s/he intended to cause severe damage. This question is not about lighting campfires, or burning individual matches or pieces of paper*)	0	1	→	0	1
e)	Has s/he deliberately destroyed someone else's property? (*This question is not about fire setting or very minor acts e.g. destroying sister's drawing. It does include behaviour such as smashing car windows or school vandalism*)	0	1	→	0	1
f)	Has s/he been involved in stealing on the streets, e.g. snatching a handbag or mugging?	0	1	→	0	1
g)	Has s/he broken into a house, any other building or a car?	0	1	→	0	1

8.10 Have [Name's] teachers complained of troublesome behaviour over the **last 6 months**?

No	Yes
0	1

8.10A Has his/her troublesome behaviour been present for at **least 6 months?**

No	Yes
0	1

8.10B Has [Name] ever been in trouble with the police? (*Describe*)

……..

No	Yes
0	1

If any items in 8.8 have been ticked "Definitely" or items in 8.9 answered "Yes", then continue. Otherwise skip to section 9

8.11 Has [Name's] troublesome behaviour interfered with….

		Not at all	A little	A medium amount	A great deal
a)	how well s/he gets on with you and the rest of the family?	0	1	2	3
b)	making and keeping friends?	0	1	2	3
c)	learning or class work?	0	1	2	3
d)	playing, hobbies, sports or other leisure activities?	0	1	2	3

8.12 Has his/her troublesome behaviour put a burden on you or the family as a whole?

Not at all	A little	A medium amount	A great deal
0	1	2	3

SECTION 9- Strengths

I have been asking you a lot of questions about difficulties and problems. I now want to ask you about (Child's) good points or strengths.

9.1 Do the following descriptions apply to him/her?

		No	A little	A lot
a)	Generous	0	1	2
b)	Lively	0	1	2
c)	Keen to learn	0	1	2

d)	Affectionate	0	1	2
e)	Reliable and responsible	0	1	2
f)	Easy going	0	1	2
g)	Good fun, good sense of humour	0	1	2
h)	Interested in many things	0	1	2
i)	Caring, kind hearted	0	1	2
j)	Bounces back quickly after setbacks	0	1	2
k)	Grateful, appreciative of what s/he gets	0	1	2
l)	Independent	0	1	2

9.2 What are the things s/he does that really please you?

		No	A little	A lot
a)	Helps around the home	0	1	2
b)	Gets on well with the rest of the family	0	1	2
c)	Does homework without needing to be reminded	0	1	2
d)	Creative activities: art, acting, music, making things	0	1	2
e)	Likes to be involved in family activities	0	1	2
f)	Takes care of his/her appearance	0	1	2

g)	Good at school work	0	1	2
h)	Polite	0	1	2
i)	Good at sport	0	1	2
j)	Keeps his/her bedroom tidy	0	1	2
k)	Good with friends	0	1	2
l)	Well behaved	0	1	2

9.3 Does [Name] have any other good points you particularly want to mention?