The Antecedents of Out-of-Home Care among Methadone-Exposed Children

A thesis submitted in partial fulfilment of the requirements for the degree

of Master of Arts in Psychology

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ABSTRACT

Opioid dependence during pregnancy is an increasing global health concern due to the effects of opioids on the health of both mother and child. Methadone maintenance treatment (MMT) is the gold-standard treatment for opioid-dependent pregnant women, although currently there is little evidence of the effects of prenatal methadone exposure beyond infancy. Children prenatally exposed to MMT are typically described as a dual-hazard population due to the risks of prenatal methadone exposure, and the postnatal psychosocial risks of having an opioid dependent parent. One such risk is an increased likelihood of placement of the prenatally exposed child in out-of-home care (OOHC). Whilst placement into OOHC is necessary for care and protection of the child, there is an increased likelihood of poor emotional and behavioural outcomes.

This thesis had three aims: 1) to describe the living arrangements of a cohort of New Zealand children exposed to methadone *in-utero* as toddlers and again in middle-childhood; 2) to determine the differences in neonatal, maternal and psychosocial characteristics between those who remained in the care of their mother and those who entered OOHC arrangements; and 3) to examine the way in which the effects of a) maternal characteristics, b) child characteristics, and c) familial psychosocial risk factors combine to influence child OOHC from birth to 18-months, and from 18-months to 9.5 years of age.

Data were drawn from an existing prospective longitudinal study of 105 pregnant women who were enrolled in the Canterbury Methadone Program and gave birth between 2002 and 2009. Children's living arrangements were recorded at the 18 month and 9.5 year follow-up assessments. Neonatal, maternal and psychosocial characteristics of the mother-child dyads were drawn from comprehensive maternal interviews at the birth of the child, and primary caregiver interviews at the 18 month follow-up assessment.

Results showed that children exposed to methadone experienced a high rate of OOHC and caregiver changes. At 18 months of age 19.4% of children were in OOHC, and this increased to 42.7% by 9.5 years of age. There were a considerable number of neonatal, maternal and psychosocial differences between the OOHC group and the maternal care (MC) group at both ages. The predictors of OOHC by 18-months of age were lower maternal scores on the personality dimension of Cooperativeness, maternal perinatal depression, a greater number of different drugs used during pregnancy, and being a single parent. Maternal depression predicted children entering OOHC between 18 months and 9.5 years, alongside low SES and the amount of methadone prescribed, measures which were derived from the 18 month caregiver interview.

Study findings suggest that the risk of entry into OOHC is predicted by a combination of maternal characteristics, drug use, social and economic support. Determining which families and their children are at risk of OOHC and is fundamental for designing and targeting interventions to assist mothers in retaining the care of their child in the home for optimal long-term behavioural, social and emotional well-being.

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LIST OF ABBREVIATIONS

ADHD: Attention Deficit Hyperactive Disorder

CDRG: (The Canterbury) Child Development Research Group

CPS: Child Protective Services

CYFS: Child Youth and Family Service

EPDS: Edinburgh Post-Natal Depression Scale

ME: Methadone Exposed

MIP: Methadone in Pregnancy

MMT: Methadone Maintenance Treatment

NAS: Neonatal Abstinence Syndrome

NME: Non-Methadone Exposed

OECD: Organisation for Economic Cooperation and Development

OOHC: Out-of-Home Care

OST: Opioid Substitution Treatment

OT: Oranga Tamariki

SES: Socio-Economic Status

TCI: Temperament and Character Inventory

UNICEF: United Nations' International Children's Emergency Fund

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Chapter 1: Methadone Maintenance for Opioid Dependent Pregnant Women

1.1 Opioid Use and Dependency

The 2018 United Nations World Drug Report concluded that opioids are causing the most harm of any drug, accounting for a staggering 76% of deaths where substance abuse was the stated cause (UNODC, 2018). The population of opioid dependent adults in Aotearoa, New Zealand (NZ) is significant, estimated at around 9,000 daily, or almost daily, users in 2008, or 0.325% of the population (Adamson et al., 2012). National statistics regarding those dependent on opioids have not been updated in almost a decade, but a survey of drug users indicated the prevalence of illicit opioid use has remained stable over the period from 2008 to 2014 (Wilkins, Prasad, Wong, & Rychert, 2015). The New Zealand Alcohol and Drug Use Survey 2007-2008 found the 12 month prevalence rate of opioid use was not significantly different between males (1.5%) and females (1.0%), and, although they did not determine how many of these women were physically dependent on opioids, it was found that the large majority were of childbearing age (Mason, Hewitt, & Stefanogiannis, 2010).

While rates of illicit opioid use in NZ are stable, there is concern for a potential increase in opioid dependence as a result of prescription opioid use. Between 2007 and 2011, prescriptions made for opioids rose by 249% (BPAC NZ, 2014), and it appears that these rates have continued to increase ever since (Health Quality and Safety Commission New Zealand, 2017). Evidence from the United States (US) shows that the number of deaths from opioid overdose have increased in concert with the number of prescriptions made (Han et al., 2017). Further, increases in the prescription of opioids are associated with increases in other mental health disorders and

worsening socio-economic conditions (Dart et al., 2015; Saha et al., 2016). In response to these statistics, the U.S. Department of Health and Human Services declared opioid addiction a public health emergency in 2017 (U.S. Department of Health and Human Services, 2018).

The collective term 'opioids' refers to any substance that binds to the opioid receptors in the brain to produce an analgesic effect, including synthetically designed prescription medications and 'opiates', which are naturally occurring substances derived from the opium poppy (Hemmings & Egan, 2012). Due to the biological processes involved in maintaining homeostasis, chronic use of opioids results in neural adaptation (Gruber, Silveri, & Yurgelun-Todd, 2007). This in turn, creates tolerance to the substance, whereby higher doses are required to get the same desired effect. As the neural systems adapt to the presence of opioids, they no longer function normally in their absence, creating the 'withdrawal syndrome'. This syndrome is characterised by unpleasant symptoms such as sweating, shaking and vomiting, and serves to maintain drug-seeking behaviour to avoid such aversive effects. It is thought that persistent neural adaptation is responsible for the chronic, relapsing course of opioid addiction as once the immediate withdrawal syndrome has subsided, the neural system remains hypersensitive to the incentive value of drug-reward (De Vries & Shippenberg, 2002). As evidence of the chronicity and harms of opioid dependence, one well-known 33 year follow-up study of heroin addicts found that heroin use patterns were stable over time and became a life-long condition associated with a high rate of comorbid health and mental health concerns, as well as mortality rates 6-20 times higher than those seen in the general population (Hser, Evans, Grella, Ling, & Anglin, 2015; Hser, Hoffman, Grella, & Anglin, 2001).

1.2 Opioid Substitution Treatments

From the early 1960's methadone was tested as a possible treatment for opioid addiction as it has a long half-life in the body, and has been shown to not only be effective at removing

withdrawal symptoms, but also able to produce a 'blockade' effect, whereby molecules of methadone persistently occupy the neural opioid receptors and prevent the pleasant intoxication effect if other opioids are subsequently ingested (Kreek, 1992, 2000). Since this time, methadone maintenance (MMT) has been established as a safe and effective treatment for heroin addiction, although there are some patients who do not respond optimally, which has resulted in the formulation of other long-acting synthetic opioids such as levo-α-acetylmethadol (LAAM) and buprenorphine (Bell, 2014). Collectively, the administration of long-acting opioids to treat addiction is known as Opioid Substitution Treatment (OST). In brief, MMT was introduced to NZ in the early 1970's following the success of overseas trials, although the first national protocol was not formally established until 1992 (Deering, Sellman, & Adamson, 2014). The latest guide introduced the use of buprenorphine formulated with naloxone (Suboxone) as an alternative OST, but does not recommend Suboxone for use by pregnant women, citing a lack of evidence for its safety (Ministry of Health, 2014).

Reviews of opioid substitution and maintenance treatments by the Cochrane Collaboration have confirmed that MMT in the higher dose range is the most effective treatment for suppressing heroin use and retaining patients in care (Amato et al., 2005). Further research has shown that those who have family, social support and employment are much more likely to maintain abstinence, whereas having a comorbid mental health disorder decreases the chance of recovery (Hser et al., 2015). Other positive outcomes from MMT cited include reduction in criminal offending, cost effectiveness, social well-being and improved physical health (Bell & Zador, 2000). For example, an analysis from NZ conservatively estimated a cost benefit ratio of 1:5, such that for every dollar spent on MMT programs, there was a saving of five dollars, mostly in the criminal justice and health sectors. The authors stated that the likely savings in real terms were

between $385 and $700 per MMT patient *per week* in 1996, worth approximately $587-$1067 in 2018 after adjusting for inflation (Reserve Bank of New Zealand, 2018; Sellman, 1996). A smaller part of the savings from MMT are due to the higher rates of employment, which increases between 7% and 20% after entry into a MMT program (Adamson & Sellman, 1998; Corsi, Lehman, & Booth, 2009; Sun et al., 2015). Despite the demonstrated positive outcomes of MMT, the stigma associated with being dependent on MMT is a barrier to treatment. Other barriers include long wait times to join the program and the overly restrictive approach taken by treatment providers, whereby daily visits to the pharmacy and limited takeaway doses place a limit on MMT patients' freedom of movement (Deering et al., 2014).

1.2.1 The use of MMT for pregnant women dependent on opioids.

As opioids can cross the placental barrier, women who become pregnant whilst dependent on opioids are exposing their foetus to the direct effects of intoxication and withdrawal, as well as the associated physical and psychosocial risks of illicit drug use and drug-seeking behaviours (Minozzi, Amato, Bellisario, Ferri, & Davoli, 2013). These additional risks may include exposure to blood borne diseases from the sharing of needles, poverty and its consequent stressors, poor nutrition, and poly-drug use (Davie-Gray, Moor, Spencer, & Woodward, 2013; Powis, Gossop, Bury, Payne, & Griffiths, 2000). In light of the potential harms to the unborn child, it is considered best practice to give those who become pregnant whilst dependent on illicit opioids priority admission into MMT (Ministry of Health, 2014).

MMT is the standard treatment as pregnant opioid-dependent women benefit from fewer cycles of intoxication and withdrawal, thereby reducing the amount of stress placed on the foetus (Minozzi et al., 2013; Minozzi, Amato, Vecchi, & Davoli, 2008). MMT in pregnancy is also associated with decreased use of other substances and drug seeking behaviours; although the direct

benefit from decreased physiological risk due to reduction in illicit drug use is difficult to disentangle from the other benefits of being engaged in regular health care (Minozzi et al., 2013). The benefits of MMT during pregnancy were highlighted in a study comparing those who were maintained on methadone continuously throughout their pregnancy, to those who entered MMT later. Those who presented later in their pregnancy smoked cigarettes more heavily, had fewer contacts for antenatal care, and had a higher risk of preterm birth and infant admission to special care units, placing their children at higher risk for poor health and developmental outcomes (Burns, Mattick, Lim, & Wallace, 2007).

1.2.2 The consequences of foetal exposure to methadone.

Whilst MMT during pregnancy has been established as a safe alternative for mother and child when compared to continuing dependence on illicit opioids, there is a higher incidence of adverse physiological effects for children exposed to methadone than seen in non-opioid-exposed populations. *In-utero*, foetal heart rate is slower and less variable, and motor activity is lower than non-exposed controls, suggesting an early impact on neurobehavioural functioning (Jansson et al., 2012; Jansson, Dipietro, & Elko, 2005). Adverse effects evident at birth include a higher risk for prematurity, restriction of foetal growth, Neonatal Abstinence Syndrome (NAS), and sudden infant death (Behnke & Smith, 2013; Hulse, Milne, English, & Holman, 1998; Nørgaard, Nielsson, & Heide-Jørgensen, 2015). While the immediate symptoms of NAS and associated harms in infancy have been well-studied, less is known with regards to the long-term consequences of opioid exposure on child development. There has been significant variance in outcomes from studies of infants exposed to MMT over 40 years of research, which is partly explained by associated physiological risk factors such as poly-drug use and blood borne disease from intravenous drug-use, as well as the effects of psychosocial risk factors in the caregiving environment such as low

socio-economic status, parental depression and greater experience of adverse life events (Bandstra,

Morrow, Mansoor, & Accornero, 2010; Burns et al., 2007; Holbrook et al., 2012).

Chapter 2: Drug-Exposed Children in Out-of-Home Care

Research has consistently shown that children with substance dependent parents are at risk of transient, abusive or neglectful parenting, which may lay the foundation for the long-term emotional and behavioural difficulties seen in this population (Ammerman, Kolko, Kirisci, Blackson, & Dawes, 1999). For example, a retrospective study found that parental alcohol abuse was associated with up to 13 times the risk for exposure to other adverse childhood experiences including verbal, emotional and physical abuse, witnessing family violence, and parental separation (Dube et al., 2001). When the caregiving context is over- or under-stimulating (abusive or neglectful), this poses a greater risk to the neurobehavioural development of the child (Anda et al., 2006; Teicher et al., 2003; Watts-English, Fortson, Gibler, Hooper, & De Bellis, 2006). Due to the higher risk for poor parenting and maltreatment, children with substance dependent parents are also more likely to be placed into out-of-home care (OOHC). This is due to a myriad of reasons which will be the focus of this thesis and are described in the following chapter. This thesis refers to OOHC as an inclusive term to cover both formal foster or kinship care placements through Child Protective Services (CPS), and informal caregiving arrangements outside of the biological mothers' home. This section aims to first address statistics regarding substance use of parents and their child's placement into OOHC, the process of OOHC placement in NZ, and then outline a model to aid understanding of what factors might contribute to OOHC placement among children of substance dependent parents.

2.1 Child Protective Services Involvement of Substance Dependent

Parents and their Families

The nationwide US Child Maltreatment Report found 28.5% of reports to CPS had caregiver drug use listed as the primary reason for concern in 2016 (U.S. Department of Health and Human Services Administration for Children and Families, 2018). With regards to these statistics, it is important to note that the US has a federal law requiring mandatory reporting of all cases of substance-exposure *in-utero* upon the child's birth. Some states in the US have policies whereby maternal substance use during pregnancy is grounds for termination of parental rights by the child welfare agency (Guttmacher Institute, 2018). Thus, these high figures may not represent those who are maltreating or neglecting parents, but rather indicate the number of children with substance dependent parents.

Countries with different child welfare policies have also reported on the prevalence of parental substance misuse in their child welfare system. Forrester (2000) took a sample from inner London and determined that parental substance use was marked 'of concern' in 52% of their child welfare cases. Heroin was the second most prevalent drug used, at 16% of all families on the register, second only to alcohol in 24% of families. In South Australia, 40% of CPS cases resulting in OOHC were due to parental substance misuse, although a wider review of cases showed that whilst not documented as a reason for entry into OOHC, parental substance use was implicated in 70% of all cases (Jeffreys, Hirte, Rogers, & Wilson, 2009). No similar statics regarding substance use in families of children in OOHC in NZ are available. However, there is a clear link between substance use, child welfare involvement, and placement into OOHC across similar jurisdictions in the western world.

2.1.1 Pathways into out-of-home care in New Zealand.

While there is no specific research examining the relationship between substance abuse and child protection services involvement in NZ, it is known that the child protection agency, Oranga Tamariki (formerly known as Child Youth and Family Services - CYFS), reported a seven percent increase in the number of children removed from their biological family home, and a seven percent increase in the total number of children in OOHC, from 2017-2018 (Oranga Tamariki, 2017a). A broad review of CYFS began in 2013, in response to increasing public concern regarding the high rate of child maltreatment in NZ compared to similarly wealthy nations. For example, in a 2009 report from the Organisation for Economic Cooperation and Development (OECD) NZ ranked 29th out of 30 countries on the dimension of child health and safety (OECD, 2009). Further, a United Nations International Children's' Emergency Fund (UNICEF) report from OECD data found that child mortality rates due to maltreatment were 6 times higher in NZ than other industrialised countries such as Spain, Greece, Italy, Ireland, and Norway in 2003, but there was insufficient data for NZ to be included in the updated report in 2013 (UNICEF, 2003). While these reports do not directly indicate those who are subject to OOHC, it does show that NZ has a poor record for child well-being, in part due to the increasing rate of child poverty, which has been shown to covary with child maltreatment (Craig et al., 2012). The review of CPS in NZ culminated in a new piece of legislation known as The Vulnerable Children Act, 2014, and the change in name from CYFS to Oranga Tamariki (A. Grant, 2016).

Despite having new governing legislation and a name change, the process of entry into OOHC remains largely the same for all transitions governed by Oranga Tamariki. As summarized by Fernandez and Atwool (2013), and the Oranga Tamariki practice guidelines (2016), the process toward OOHC occurs in three main phases. First, a report made by a concerned party is reviewed by Oranga Tamariki to determine if an investigation is necessary. Second, an investigation is

conducted, which includes contact with the family and the child individually to ensure their views are taken into consideration. The third phase is intervention, and one of three choices is made depending on the findings of the investigation: partnered response, in which a non-governmental organisation provides support or training to the family; an agreement in which the family is subject to a three month intervention including monitoring and receipt of social services; or, they are referred for a Family Group Conference in which a decision is made about the child's need for care and protection with the collaboration of the whānau (extended family group) and social workers or case managers from social services (Frost, Abram, & Burgess, 2014). If it is determined that the child is in need of OOHC, guardianship arrangements are made (Fernandez & Atwool, 2013). The Family Court are charged with reviewing the need for OOHC every 6 months if the child is under 7 years of age, or 12 months if the child is older (Ministry of Justice, 2018).

The Family Group Conference was developed in New Zealand and it was instituted to respond to concerns that the whānau had no voice or input into care planning (Frost et al., 2014). There has also been a great emphasis on whānau placements in NZ. In 2017, of the 5708 children in OOHC with Oranga Tamariki, 44% were with whānau caregivers (Oranga Tamariki, 2017b). A systematic review of 102 studies found that placement with whānau (known as kinship care) might be preferable to placement with non-whānau caregivers (non-kin care) as there are better outcomes in terms of mental health, behavioural functioning and placement stability (Winokur, Holtan, & Batchelder, 2014).

2.1.2 Consequences of out-of-home care placement

While often necessary for care and protection, placement into OOHC itself can be a risk to the child's neurodevelopment, mostly due to the disruption of the primary attachment relationship and the child's response to the stress of changing contexts (Committee on Early Childhood

Adoption and Dependent Care, 2000). A meta-analysis of the cognitive, adaptive and behavioural functioning of foster children, found that whilst children in foster care had lower levels of functioning across all domains than those from the general population, their results were similar to children considered to be at high risk who remained at home (Goemans, van Geel, van Beem, & Vedder, 2016). Despite this overall finding, results appear to be mixed across studies and there remains concern about the additional impact of OOHC on at-risk children, particularly regarding mental health outcomes (Tarren-Sweeney, 2008). Results from multiple studies indicate that between 39-68% of children in foster care have clinically significant externalising or internalising behaviour problems. Of particular note, is the emotional and behavioural dysregulation of the children observed in these studies, which was thought to be a result of attachment difficulties and trauma (Tarren-Sweeney, 2018).

When the child's previous attachment relationships have been inadequate, as is most often the case for those needing OOHC, they are less likely to have developed an organised strategy to gain the attention and affection from a caregiver in order to meet their basic needs and aid co-regulation of emotion (Goldberg, Muir, & Kerr, 2013). Early attachment predicts a wide range of adolescent and adult outcomes including social functioning, physical health and emotional well-being (Ranson & Urichuk, 2008). The impact of caregiver change on the child is thought to be mediated by severity or chronicity of abuse prior to placement, age at placement into OOHC, length of placement, and the number of changes in caregiver, which can be explained, in part, to the impact on attachment security and organisation (Oosterman, Schuengel, Wim Slot, Bullens, & Doreleijers, 2007). Further, it has been shown that improving the child's attachment security with caregivers improves the child's cortisol production in their HPA axis, a biological marker of stress responsivity (Bernard, Hostinar, & Dozier, 2015; Dawe, Harnett, Staiger, & Dadds, 2000; Dozier,

Peloso, Lewis, Laurenceau, & Levine, 2008). Overall, children in care are a large and heterogeneous group affected by a constellation of psychosocial issues that may constitute risk factors for their health and well-being, some of which might be exacerbated by the separation from the primary caregiver when placed into OOHC, and the challenges of developing new attachment relationships.

2.2 Out-of-Home Care Placement among Children of Substance-Dependent Mothers

Maternal substance abuse is one of five key risk factors for a child entering out-of-home care in the United States (Dubowitz et al., 2011). Other risk factors include low maternal education, maternal depression, having more children in the family, and the child's low performance on a developmental assessment battery. Central to this thesis is the examination of psychosocial characteristics that may explain, or have some predictive utility to aid understanding, of why some mothers in MMT retain their children in their care whilst others do not. To date, there are few published studies describing the psychosocial characteristics of opioid addicted pregnant women in MMT. This is a small, high-risk group of women who face a unique constellation of adversities that may impact their parenting and the lives of their children. While inferences may be drawn from studies of similar populations of 'other' substance using mothers, it is important to differentiate this group as they are actively participating in a treatment that presents unique challenges for both the individual and their family. To this end, this section will cover how and why specific post-natal environmental factors are related to OOHC.

Children born to mothers in MMT during their pregnancy are a dual hazard population; they are subject to the teratonergic effects of methadone and other substances and are more likely to be raised in a home characterised by psychosocial adversity. That is, they are more likely to be

born to a single mother, who is young, has poor economic and social support, and greater mental health difficulties (Davie-Gray et al., 2013; Hans, 1999). Early research identified that, as a group, mothers in MMT required more assistance in parenting, were more socially isolated and less likely to pursue work and educational opportunities than a control group matched for age and SES (Fiks, Johnson, & Rosen, 1985). Barry Lester and Ed Tronick are leading experts in the field of substance exposure *in-utero* and child neurodevelopmental outcomes, and they developed a transactional model to illustrate the influence multiple risk factors associated with maternal cocaine use during pregnancy have on child outcomes (Lester & Tronick, 1994). The model, as reproduced in Figure 2.1, will be used in this thesis to provide a framework for examining factors, both prenatal and postnatal, that may determine whether the methadone-exposed child is at risk for out-of-home care placement. The primary assumption is that drug exposure influences the neurobiology of the child and makes them "more vulnerable to the effects of a poor caretaking environment" (Lester & Tronick, 1994, p. 119). A second important assumption is that OOHC is a result of maladaptive parenting that is a consequence of these interrelated factors, as suggested by Peisch and colleagues (2018) in their review of studies of opioid-exposed children in OOHC.

Exposure to drug(s)

Prenatal environment

Infant

Mutual Regulation

Mother & Others

Substance abuse

Personality

Life Style

Environmental Regulators
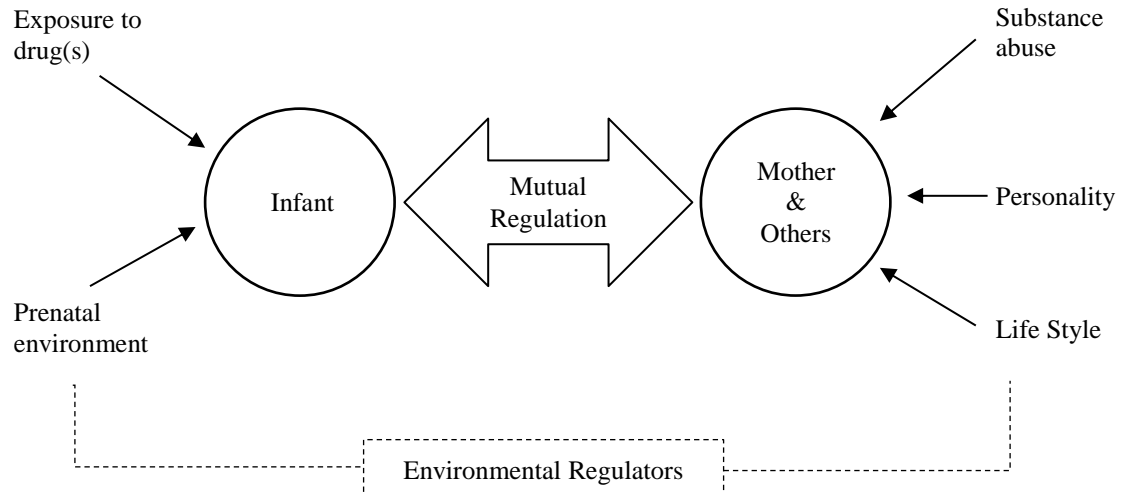
Figure 2.1: The systems approach to the study of cocaine exposure in-utero
     (Lester & Tronick, 1994)

Prima facie, this appears to be a simple model, but it also proves to be the most parsimonious for our purposes. More recent waves of research have touted the benefits of using an ecological model to explain the multitude of influences on placement into OOHC, in which environmental factors are considered to lie within a multi-level system best drawn as a series of concentric circles, with the child and/or mother at the middle (Bronfenbrenner, 1979; Cash & Wilke, 2003; English, Thompson, & White, 2015; Peisch et al., 2018). Lester and Tronick's model is not incompatible with ecological systems theory, but ecological models tend to lack explanatory power as they usually fail to highlight the mechanisms through which each of the factors become a risk or protective factor for child outcome. Nonetheless, employing an ecological framework is useful for two reasons. First, it considers a broad range of factors at varying degrees of proximity to the child, and second, the ecological model takes into consideration complex interactions between these factors. For these reasons, an ecological framework will be employed to augment

Lester and Tronick's model and provide a structure for describing the factors that might contribute to parenting and out-of-home care placement.

The outer arrows of Lester and Tronick's model demonstrate the environmental regulators that impact upon the mother and her infant. Environmental regulators may be best conceptualised as risk or protective factors for the mother-child dyad, that is, they can be "regulators or deregulators, stabilisers or destabilisers" on child outcome (Lester & Tronick, 1994, p. 112). On the left-hand side, the model illustrates how direct exposure to substances *in-utero* is confounded with other aspects of the prenatal environment that can affect the growth and development of the foetus *in-utero*. While these early environmental exposures will be considered in this thesis, greater focus will be placed on the right-hand side of the model, which illustrates the environmental factors associated with substance use that are purported to impact upon the mothers and play an ongoing role in the lives of their families. Results from studies testing this model in cocaine using pregnant women generalise to the population of women maintained on methadone during pregnancy. Research has established that opioid use in adults is often comorbid with mental health problems, poverty, limited social and familial support, which contribute to increased risk of child OOHC placement and poor emotional and behavioural outcomes (Peisch et al., 2018; Smith, Johnson, Pears, Fisher, & DeGarmo, 2007). There is a pattern of poor developmental outcomes for methadone-exposed children across domains of functioning, such as cognition, physical health and behaviour, when compared to control groups not exposed to substances (Peisch et al., 2018). However, these deficits are subtle and can be largely explained by maternal health and lifestyle factors rather than the direct effect of methadone exposure (Conradt, Crowell, & Lester, 2018; Shearer, Davis, Erwin, Anderson, & Lindley, 2018). A recent review comparing the children of opioid using women to other high-risk groups found similar poor developmental outcome among

children of those with alcohol use or depressive disorders, who may experience similar environmental adversities (Peisch et al., 2018).

2.2.1 Mutual regulation.

Central to Lester and Tronick's (1994) model is the process of mutual regulation between the mother and child. Mutual regulation is the interaction and emotional reciprocity between parent and child that fosters secure, or insecure, attachment, which is important for the development of self-regulatory capacities and personality (Mirick & Steenrod, 2016). Mutual regulation suggests that the child's behaviour will influence their caregiver's thoughts, behaviours and emotional reactions in a bidirectional relationship. It is by mutual regulation that risk and protective factors impacting the mother are transmitted to the child, as they affect parenting attitudes and behaviours. Other researchers have tested the impact of maternal factors on child outcomes in high-risk groups and similarly highlight that risk factors which have a direct impact on the mother have an indirect effect on the child due to individual differences in parenting capacity, attitudes and behaviours (Belsky, 1993; Cash & Wilke, 2003; Peisch et al., 2018; Sidebotham & Heron, 2006). At the extreme end, poor parenting can result in child abuse, neglect and placement into out-of-home care. Out-of-home care has been conceptualised in previous research as a proxy measure for whether the child is exposed to child abuse or neglect, although due to disruption in attachment and caregiving relationships, it also represents an additional risk for the children's well-being (Peisch et al., 2018; Tarren-Sweeney, 2008).

The parenting of opioid abusers and how it affects their attachment relationships has been the subject of a recent review, which found that opioid abusers were more likely to be less empathetic, less sensitive, more hostile, more intrusive and poorer responders to attachment cues than those who do not use substances (Mirick & Steenrod, 2016). The authors also found that

female opioid abusers were more likely to have a history of attachment insecurity to their own primary caregiver(s), which would impact upon their ability to foster secure relationships with their child due to the intergenerational transmission of parenting behaviours, and possibly a poor capacity for self-regulation of behaviours and emotions. It must be noted that substance-dependent parents employ strategies to protect their children from the consequences of substance use, and that often these parents provide adequate care for their children (Hans, 2002; Richter & Bammer, 2000). While not all those dependent on substances are at risk of having their child placed in OOHC, there is evidence to suggest that as a group, they provide poorer quality parental care than non-substance-abusers.

2.2.2 Maternal personality.

Lester and Tronick conceptualised 'maternal personality' as including both personality disorders and 'other psychopathology' which together describe the psychological resources the mother has in to draw on when performing tasks of mutual regulation. Belsky's (1984) ecological model "The Determinants of Parenting", described maternal personality as a psychological resource which moderates the impact of environmental factors on parenting and risk to the child, a relationship which has been evidenced in subsequent empirical research (Kochanska, Aksan, Penney, & Boldt, 2007). According to one recent review, 25-33% of opioid dependent pregnant women have a psychiatric comorbidity, most commonly depression, anxiety, and post-traumatic stress disorder (Arnaudo, Andraka-Christou, & Allgood, 2017). Further, there is evidence to suggest that opioid dependent women have higher rates of psychiatric comorbidity than 'other drug' abusers, especially for depression, anxiety, gambling and personality disorders (Wu, Woody, Yang, & Blazer, 2011).

There is a wide body of research which illustrates the mechanism through which maternal mental health might impinge upon parenting capacity and behaviours. For example, a large review found that maternal depression was related to negative parenting behaviours such as negative expression, intrusion, coercion, criticism and disengagement from the child. This review also found that these effects of depression on parenting behaviour were magnified for socio-economically disadvantaged groups, and further, that having a history of depression is associated with later negative behaviours, even if an individual is not currently in an active depressive episode (Lovejoy, Graczyk, O'Hare, & Neuman, 2000).

No studies to date have directly assessed the personality of mothers in treatment for drug dependence and determined how this might impact upon their parenting or whether their child is likely to be placed in OOHC. Personality and parenting have been assessed typically using the NEO Personality Inventory (NEO-PI) from the "Big-5" model of personality (Costa & McCrae, 1992), whereas in the field of substance abuse, the Temperament and Character Inventory (TCI) from the "Psychobiological Model of Temperament and Character" has been widely used, and is also used in the current study (Cloninger, Svrakic, & Przybeck, 1993). The discrepancy creates some issues in comparing the research from these fields, however a large review by Widiger and Simonsen (2005) compared the models to determine how they overlap, which aids interpretation. The authors determined there were similarities in many dimensions, for example Agreeableness from the NEO-PI, with traits such as altruism, compliance and tendermindedness, mapping on to Cooperativeness from the TCI, with traits of social tolerance, helpfulness and compassion. A summary of their findings is replicated in table 2.1, using descriptions of domains from the corresponding personality inventory manuals to aid comparison (Cloninger, Przybeck, & Svrakic, 1994; Costa & McCrae, 1992; Widiger & Simonsen, 2005).

Table 2.1: Comparison of personality dimensions from the NEO-PI and the TCI.

	Cooperativeness	Reward Dependence	Persistence (*P*) & Novelty Seeking	Self-Directedness	Harm Avoidance	Self-Transcendence
TCI	Habits (in)congruent with long-term goals Social tolerance Empathy Helpfulness Compassion Ethical and principled	Sentimental vs practical Warm vs cold to others Dedication and attachment Dependent vs independent from others	Diligence (*P*) Work ethic (*P*) Ambitiousness (*P*) Exploration and curiousness Impulsiveness Disorderliness Extravagance and enthusiasm	Maturity Strength of character Responsibility Reliability Purposefulness Resourcefulness Self-acceptance	Pessimism Fearfulness Self-doubting Shyness Fatigability	Wise Patience Creativeness Self-forgetfulness

	Agreeableness	Extraversion	Conscientiousness		Neuroticism	Openness
NEO-PI	Trust Straightforwardness Altruism Compliance Modesty Tendermindedness	Warmth Gregariousness Assertiveness Activity Excitement seeking Positive Emotion	Competence Order Dutifulness Achievement- striving Self-discipline Deliberation		Anxiety Hostility Depression Self-conscious Vulnerability to stress Impulsiveness	Fantasy Aesthetics Feelings Ideas Values Actions

A meta-analysis of 5835 parent-child dyads using the Big-5 model found that all five dimensions were associated with observational ratings of parental warmth and behavioural control, whereas just Agreeableness and Neuroticism related to autonomy support (Prinzie, Stams, Deković, Reijntjes, & Belsky, 2009). Autonomy support is important when considering child maltreatment and OOHC, it is best defined as tolerance of the child's striving for autonomy, when the parent is intolerant it can lead to conflict. These authors concluded that more agreeable and less neurotic parents (more Cooperative and less Harm Avoidant under the TCI) are possibly less prone to frustration and anger that can lead to harsh discipline and a greater likelihood of escalating conflict. A series of studies were conducted by Kochanska and colleagues over the decade 1997-2007 which explored the relationships between personality and parenting with two key findings important for the current study; first, maternal personality, as measured when their children were 8-10, months old, was the sole predictor of parenting behaviours as the children turned 13-15

months of age. Mothers high in Neuroticism (Harm Avoidance) or Extraversion (Novelty Seeking and Reward Dependence) were more likely to have harsh disciplinary styles, mothers low in Agreeableness (Cooperativeness) showed more negative affect and less nurturing parenting, and mothers high in Conscientiousness were more responsive to their children (Clark, Kochanska, & Ready, 2000). Second, parental personality mediated the impact of social adversity on parenting style, such that those at high social risk who reported traits of optimism, social trust and higher conventionality were more likely to display positive parenting traits (Kochanska et al., 2007).

When looking at drug-dependent mothers specifically, it has been shown that both maternal personality and mental health (depression and anxiety) can predict insensitive parenting and potential to commit child abuse independently of ongoing substance use (Ammerman et al., 1999; Chaffin, Kelleher, & Hollenberg, 1996; Eiden, Stevens, Schuetze, & Dombkowski, 2006). Exploring these relationships further, Hans, Bernstein, and Henson (1999) determined that while maternal opioid use was related to negative parenting behaviour, in a parent-child interaction paradigm, the association was largely accounted for by the effects of comorbid psychopathology, particularly personality disorders. In addition, Hien, Cohen, Caldeira, Flom, and Wasserman (2010) determined that both depression and anger arousal largely moderated the link between mothers' substance dependence and their child abuse potential, but did not assess personality.

The idea that psychological resources mediate the link between substance use and child abuse potential has also been evidenced in the population of mothers in MMT, with findings suggesting that a parent-reported stress mediates the relationship between social risk factors and aggression from mothers (Suchman & Luthar, 2001). Perhaps the most convincing evidence for the importance of personality and psychopathology in the parenting of women in MMT comes from a series of intervention studies by Sharon Dawe and colleagues. The authors specifically

targeted psychological functioning of individuals in the family alongside parent behaviour management training, to show an improvement in child abuse potential scores with large effect sizes (Dawe & Harnett, 2007). The original randomised control trial was conducted in Australia, and there is currently a large multi-site follow up being conducted in the United Kingdom, among substance users in any treatment program (Barlow et al., 2013). The intervention is delivered with a focus on development of emotion regulation through mindfulness, which is thought to mediate the impact of personality dysfunction on the child by affecting choice of discipline, parental monitoring and family routine. In turn, it is believed that this influences the development of attachment and therefore, behavioural outcomes (Harnett & Dawe, 2012). The use of mindfulness as a strategy for developing emotion regulation is a relatively new area of research with promising evidence; however, it is not yet considered a well-established practise. Nonetheless, from these findings it seems that improving emotional regulation might help to improve an individual's psychological state, which not only helps to mediate the cumulative impact of life stressors and addiction on parenting behaviours, but also serves to reduce the potential of child abuse.

2.2.3 Substance use during pregnancy.

Lester and Tronick (1994) described substance exposure *in-utero* as having a direct, acute, effect on the child's neurobehavioural development. Relevant to this thesis are concerns regarding the impact of methadone exposure on infant clinical outcomes such as NAS, infant growth, and how these might affect behaviour and self-regulatory capacities in early childhood, as these might affect the process of mutual regulation.

Neonatal Abstinence Syndrome.

NAS is a collection of symptoms in the neonate that primarily result from withdrawal from intrauterine exposure to opioids, but may also be associated with the consumption of a variety of

other substances including alcohol, benzodiazepines, nicotine and serotonin specific reuptake inhibitors (SSRI's) (Hudak & Tan, 2012). For methadone-exposed infants, symptoms of NAS start within 48-72 hours of birth and may include problems with: neurological excitability, such as high-pitched crying, tremors and seizures; gastro-intestinal distress, including poor feeding, suck reflex and vomiting; and autonomic reactivity, such as increased sweating, mottled skin and temperature instability (Shearer et al., 2018). Estimates of the incidence of NAS due to methadone exposure vary, between 13 and 94%, and there is a large variability in the presentation and duration of NAS symptoms (Cleary et al., 2010). A meta-analysis of 29 studies has shown that severity of symptoms is unrelated to the size of methadone dose, but results have varied across studies and some researchers suspect that duration or timing of methadone exposure during pregnancy might be more important to the risk of the infant experiencing NAS (Cleary et al., 2010; Desai et al., 2015; Shearer et al., 2018). Infants with NAS are retained in hospital care for an average of 10 days post-birth, however treatment needs vary with NAS severity (Dryden, Young, Hepburn, & Mactier, 2009; Uebel et al., 2015).

The long-term developmental consequences of NAS have been reviewed elsewhere (e.g. Shearer et al., 2018); however, important to this thesis is the effect on the parent. Due to high physiologic arousal, infants with NAS are difficult to soothe and feed which may impair early attachment and bonding (Mirick & Steenrod, 2016). For example, one study of feeding behaviour during NAS found that both mother and child behaviours contributed to higher arousal and poor engagement, and therefore heightened difficulty with feeding (LaGasse et al., 2003).

Infant growth restriction.

A large review of infant outcomes confirmed there was sufficient evidence to link any type of opioid exposure *in-utero* to growth restriction, leading to low birthweight and smaller size as

measured by length and head circumference (Behnke & Smith, 2013). However, there is some evidence to suggest that methadone exposure has better infant growth outcomes than heroin exposure (Bandstra et al., 2010; Buckley, Razaghi, & Haber, 2013; Hulse, Milne, English, & Holman, 1997). Nonetheless, when compared to non-exposed children, those prenatally exposed to MMT have higher rates of prematurity, lower birth weight, and smaller head circumference, with between 3.6 and 42.7% of methadone-exposed infants being classified as small for their gestational age (Nørgaard et al., 2015; Ross, Graham, Money, & Stanwood, 2015).When considering confounding variables, methadone has been shown to have a significant effect on growth outcome independent of the effects of premature birth, nicotine exposure or socio-economic status of the mother (Mactier, Shipton, Dryden, & Tappin, 2014; Wouldes & Woodward, 2010). In addition, there is some evidence for a linear relationship between methadone dose and smaller infant size as measured by weight, length and head circumference, although this finding has not yet been replicated (Wouldes & Woodward, 2010).

There is concern that small size, particularly head circumference, might result in cognitive and behavioural developmental difficulties later in life. However, these children often catch up to their peers in size and, when looking at group differences only, there has been no consistent evidence of developmental delay due to opioid restricted growth as differences in samples are typically explained by factors in the post-natal environment such as socio-economic status (Kaltenbach et al., 2018; Lifschitz, Wilson, Smith, & Desmond, 1985; Tong, Baghurst, & McMichael, 2006). Regardless of whether the effects are due to methadone exposure or the post-natal environment, children with developmental delays are more likely to demand more physical and attentional resources from their parents who typically report higher parenting stress, which

then contributes to worsening behaviour problems in a transactional manner and may lead to greater need for OOHC (Baker et al., 2003; Neece, Green, & Baker, 2012).

2.2.4 Post-natal substance use by parents.

Lester and Tronick (1994) have also illustrated that ongoing postnatal substance use has a direct effect on the mother's parenting and therefore, an indirect effect on the child. Findings from studies of parents in MMT indicate that a small proportion of women and their partners report using any illicit substances between one and four-years after the birth of their child, although the effects of MMT itself might be of concern (Lund, Brendryen, & Ravndal, 2014; Lund et al., 2012). MMT during pregnancy has been presented as a good opportunity to engage the substance dependent mother in further services to address their wider psychosocial needs to help improve their lives and that of their families (Arlettaz et al., 2005; Jones et al., 2008). Post-birth, parents have described MMT being both a facilitator and a hindrance to parenting. A qualitative study of UK families engaged in MMT indicated that the treatment is perceived as a necessary route to normal family functioning, although many are hindered by the practical constraints of adhering to the treatment, the physiological effects of methadone and the social stigma associated with being in drug treatment (Chandler et al., 2013).

How drug-taking and drug-related behaviours are associated with guardianship status remains unclear. It is difficult to determine from cross-sectional research whether mothers who have lost custody of their children have more frequent and riskier drug using practices prior to losing care, which may contribute to the decision to remove their children, or if the mothers increase their drug use after losing custody. Prior research has found that women typically decrease their use of substances when they become pregnant, citing caregiving responsibilities as the main motivation for behaviour change (Copeland, 1998; Jessup et al., 2014; Powis et al., 2000). Along

with cessation of drug use, women employ other strategies to reduce the harm of their drug-taking on their children such as shielding them from drug-related activities, keeping the home environment secure and stable, and trying to maintain a small stable habit (Kearney, Murphy, & Rosenbaum, 1994; Richter & Bammer, 2000). Further, it has been suggested that women may increase their drug consumption once their children have been removed from the home, due to being relieved of the ongoing responsibility for caregiving (Kearney et al., 1994).

2.2.5 Lifestyle.

Lester and Tronick included 'lifestyle' in their model to account for the "lack of social support and the larger environmental stressors associated with a poverty lifestyle" (Lester & Tronick, 1994, p. 112). This is a broad definition but may be sensibly divided into two related categories, social support and socio-economic status, for the discussion on how lifestyle may contribute to child out-of-home care placement.

Social support.

Social support, or lack thereof, has been included as a variable in several ecological models attempting to explain child abuse, neglect and OOHC placement. In review of the models, there appears to be two pathways through which social support may influence whether a parent is more at-risk of maltreating their child. First, practical and emotional support received by the family may mediate the impact of stressors on parenting behaviour. For example, Cash and Wilke (2003) found that having difficulty in finding child care was related to neglect. In addition, Belsky (1993) determined that having an adequate support network was linked to subjective well-being, appearing to operate as a "stress-bufferer" which was purported to reduce the likelihood of negative parenting behaviours (p, 422). Further, one large study used a scale that recorded perceived support with items such as "I get love and affection", as well as practical support such

as "I get help when I need transportation" and confirmed that these factors are useful for predicting OOHC placement in a community sample (English et al., 2015).

In the second pathway, social support factors are thought to influence the parent more directly, whereby having a social network with other high-risk alcohol and drug abusers is associated with a higher risk for child maltreatment (Cash & Wilke, 2003). Cash and Wilke (2003) did not venture to describe how substance-using others might influence the parent's risk for committing maltreatment, however it is possible that others' pro-substance using attitudes may influence their own attitudes, thereby increasing frequency or intensity of drug use for the parent which can lead to poor parenting or maltreatment in several direct and indirect pathways.

Socio-economic status.

Indicators of socio-economic status used in empirical research include education, income and employment status. Low socio-economic status has been linked to child maltreatment and OOHC across decades of research, and multiple mechanisms may explain this association (Hoff, Laursen, & Tardif, 2002). Belsky (1995) attempted to explain the link between socio-economic status and maltreatment through evolutionary theory, stating that resource instability or inadequacy forces a parent to make difficult decisions regarding the optimal allocation of material and psychological resources, possibly leading to neglect of some or all children in favour of their own needs. Alternatively, Belsky (1995) also considered the position that harsh parenting is intended to prepare the child for the realities of living in a harsh environment. Cash and Wilke (2003) suggested that poorer communities lack resources to provide social support services and drug treatment. The impact of socio-economic status on OOHC placement is examined in greater depth in the following literature review.

Chapter 3: Literature Review

3.1 Research Questions and Method for Conducting Review

A comprehensive database search was conducted to identify existing research that addressed the research question of who among substance dependent women in treatment retain guardianship of their children, and who have children entering OOHC. The databases PsycINFO, Google Scholar and Pubmed were queried with multiple keywords including: parent*ing, maternal, prenatal, substance, drug, use, abuse, addiction, caregiving, foster care, infant, placement, child welfare, child abuse, neglect, psychological distress, mental health, opioid substitution. Abstracts of articles were scanned for relevance and included in the review if the study sample was of drug-dependent females in treatment with at least one biological child, and multivariate statistical techniques were used to assess OOHC placement. Both longitudinal and cross-sectional studies were included in the review, and all were from peer-reviewed journals. Ten studies meeting inclusion criteria were identified and are summarised in table 3.2.

It was decided that three studies which tested contact with local child welfare services as their outcome measure, instead of placement out-of-home, should be included as CPS contact precedes out-of-home placement and is likely to have similar antecedents, although these findings will be interpreted with caution. Lean, Pritchard, and Woodward (2013) reviewed a subset (n = 73 from a possible N = 94) of a sample of Methadone Exposed (ME) children, and a subset of controls (n = 54, from a possible N = 105) from the Canterbury Child Development Research Group's Methadone in Pregnancy study to identify which perinatal variables predict *contact with CPS* up to 4.5 years of age. While 43.5% of the ME children were in OOHC by the age of 4.5 years and all children in the community control sample had remained with their mothers, a small proportion

(7.4%) of control group mothers had contact with CPS not resulting in OOHC placement (Lean et al., 2013). Two cross-sectional studies also used the outcome measure of "contact with CPS" but did not include a non-drug using comparison sample (Grella, Hser, & Huang, 2006; Taplin & Mattick, 2013).

Four cross-sectional studies were included, either conducted by interviewing substance-dependent women in treatment (Gilchrist & Taylor, 2009; Grella et al., 2006; Taplin & Mattick, 2013), or through review of databases from addiction treatment services (Meier, Donmall, & McElduff, 2004). Six studies of longitudinal design were included, which recruited pregnant women from medical facilities that were dependent on drugs, following them and their offspring for a range of one month to eight years (Eiden, Foote, & Schuetze, 2007; T. Grant et al., 2011; Lean et al., 2013; Minnes, Singer, Humphrey-Wall, & Satayathum, 2008; Nair et al., 1997; Tyler, Howard, Espinosa, & Doakes, 1997). Study design, measures and limitations are summarised and compared in table 3.2. Results are discussed according to Lester and Tronick's (1994) model, assessing the contribution of maternal characteristics, child characteristics and 'environmental regulators' to child placement outcome in turn.

3.2 The Proportion of Substance Dependent Women with a Child in Out-of-Home Care

In studies with cross-sectional design, the rates of OOHC were reported and varied between 24 – 49% of each sample (Gilchrist & Taylor, 2009). Two samples were of women in OST (maintained on methadone or burprenorphine), and the rate of OOHC was 24 – 32.7% (Gilchrist & Taylor, 2009; Taplin & Mattick, 2013). Gilchrist and Taylor (2009) investigated women accessing drug addiction services and found that the rate of OOHC was significantly lower in the subset of women in OST ($n = 59$). Unfortunately, the authors chose to combine the groups for their

multivariate analyses, obscuring possible differences in risk factors for those in OST specifically. Taplin and Mattick (2013) looked at women from OST only and found a rate of OOHC comparable to that from other kinds of drug treatment services in the current review. Finally, the largest study did not report what drug addiction services their sample were engaged in, but found that one-third of their sample had a child in OOHC (Meier et al., 2004).

Within the longitudinal studies, the rate of children entering OOHC appears to increase with time elapsed to follow-up, although not in a linear fashion. Two studies had a short follow up of one month and found that between 19.1% – 30.7% had been placed in OOHC (Eiden et al., 2007; Minnes et al., 2008). One study followed their sample of children for six months and found that 34.3% were in OOHC (Tyler et al., 1997). Another study followed up after eighteen months and found that the proportion of children in OOHC was 43.3% (Nair et al., 1997). Only two studies followed the children beyond eighteen months. Grant and colleagues (2011) found that 40.8% of children at 3 years of age were placed in OOHC, and in the Canterbury Methadone in Pregnancy study, 43.5% of methadone-exposed children were placed in OOHC at 4.5 years of age (Lean et al., 2013).

From this review, it is apparent that there are similar rates of OOHC between the cross-sectional and longitudinal studies, indicating that all children of drug-abusers experience instability in caregiving, regardless of whether they have confirmed drug-exposure *in-utero*. Cross-sectional studies have the advantage of being able to include large numbers of participants, greatly increasing their power and adding important insight into the possible predictors of OOHC. It is evident that there is a lack of longitudinal research following the placement of drug-exposed children into middle and late childhood, and we have little understanding of caregiver changes over time.

3.3 Maternal Characteristics Contributing to Out-of-Home Care Placement.

3.3.1 Maternal age.

Maternal age was investigated as a potential risk or protective factor for OOHC in all but one of the studies (T. Grant et al., 2011). The evidence to support that age has an effect is mixed across both longitudinal studies measuring age at childbirth, and cross-sectional studies, which typically recorded maternal age at time of interview without controlling for the age of the child. Only one longitudinal study found a significant independent effect for age. Nair and colleagues (1997) determined that age at childbirth was the characteristic associated with the greatest risk for placement out-of-home, with those who had a child placed in OOHC being younger by an average of 1.9 years. Further, regression analyses showed that being under thirty years of age carried a four-fold risk of losing care (Nair et al., 1997). A second longitudinal study found that a composite variable for 'social risk' including young maternal age, single parenthood, minority ethnicity, low education and low SES, predicted contact with CPS (Lean et al., 2013). However, they did not test the effect of age independently, and their analysis of characteristics found no difference in age between groups of those who had CPS contact and those who did not.

Studies of cross-sectional design also had mixed results. Meier and colleagues (2004) found that each additional year of age was associated with a 1% increase in risk of OOHC. While this figure appears low, it was nonetheless a significant result, and was likely due to their large sample size of over sixty thousand parents which would have yielded a great amount of statistical power. A second large cross-sectional study of 4156 women in treatment for drug addiction in California found a similar result; those involved with CPS were significantly younger than those who were not. An increase of 1 year in age was independently associated with a 3% reduction in the

likelihood of CPS involvement (Grella et al., 2006). The two other cross-sectional studies found

no relationship between maternal age and OOHC or CPS contact (Gilchrist & Taylor, 2009; Taplin

& Mattick, 2013). In sum, there were mixed results for the effect of maternal age, and the wide

variation in methodology and measurement of age made it difficult to compare results across

studies.

3.3.2 Maternal education.

Nine studies recorded the formal education of the mothers and just three of these found that

education contributed to OOHC placement or CPS contact (Eiden et al., 2007; Grella et al., 2006).

In their cross-sectional study, Grella and colleagues (2006) determined that compared to having

less than 12 years of education, having 12 years of education was associated with mothers having

a meaningfully reduced risk of contact with CPS. Having 13 years or more education reduced the

risk further, these odd ratios are reported in table 3.2. Eiden and colleagues (2007) found that

primary caregiver education was significantly different between groups of parental care versus

foster care; however, they assessed education in an interview one month post-partum, such that

they were comparing birth mothers who retained the care of their children to foster parents taking

care of the one-month old infants who were unable to remain with their mothers. Lean and

colleagues (2013) included "having no formal educational qualifications" in their social risk

composite which was significantly associated with CPS contact.

Two further studies found significant group differences between groups of those who

retained care of their child and those who did not, which are not shown in table 3.2 as these

variables were not significant in the multivariate analyses when controlling for covariates of SES,

employment, jail time, and support from parents. One explanation for these findings is that

educational attainment might be a distal factor impacting custody status, and it may be mediated

by more proximal influences in adulthood such as income, or current employment status that account for the variance in the multivariate model (T. Grant et al., 2011; Taplin & Mattick, 2013).

3.3.3 Maternal drug use during pregnancy.

All six of the longitudinal studies took a self-report measure of drug use, assessing either current, lifetime or average drug use during pregnancy. Five of these used pre- or post-partum toxicology screens to confirm self-reported drug use (Eiden et al., 2007; Lean et al., 2013; Minnes et al., 2008; Nair et al., 1997; Tyler et al., 1997), and the sixth confirmed self-report findings by interviewing participants' social work case managers (T. Grant et al., 2011). Results from the studies showed mixed support for using either self-reported drug use or toxicology screens, as predictors of OOHC. Nair and colleagues (1997) found that those who had a urine toxicology screen that was positive for heroin were almost three times as likely to lose custody of their child, and the self-report scale of drug-use had no effect. In contrast, Tyler and colleagues (1997) found that self-report of the number of years of alcohol misuse predicted OOHC; however, no other variables were related to OOHC, including the urine toxicology results.

Two studies of cocaine dependents found that heavier cocaine-use during pregnancy, as measured by self-report, was predictive of the child entering OOHC within the first month of life (Eiden et al., 2007; Minnes et al., 2008). In these two studies, the urine toxicology results were merely used to confirm that the participants were correctly classified as drug-abusers, and not included in the regression analysis to find the predictors of OOHC (Eiden et al., 2007; Minnes et al., 2008). These results indicate that drug use during pregnancy, whether measured by self-report or urine toxicology, is likely to increase the risk a woman has of losing custody of her child. However, whether this relationship is because riskier drug use during pregnancy indicates later

maltreatment resulting in OOHC placement, or because CPS services are more likely to place infants into OOHC if there is evidence of drug-use during pregnancy, is unclear.

3.3.4 Maternal post-natal drug use.

When looking at drug-use by dependent mothers after the birth of their child, researchers have typically assessed both the quantity of drug use and whether the mothers were engaging in high-risk practices to attain or consume drugs, such as prostitution or sharing needles. Meier and colleagues (2004) found both risky drug-taking practices and greater consumption of drugs distinguished those who retained care of their children from those who did not. Gilchrist and Taylor (2009) found a similar result for high-risk practices, reporting that *any* history of trading sex (as opposed to *never* trading sex) was associated with a three-fold risk of OOHC; however, the severity of drug or alcohol dependence was not significant. One longitudinal study assessed the impact of drug related behaviour and its consequences. Grant and colleagues (2011) found that those who worked as a prostitute or were jailed during the three-year study intervention were seven times more likely to lose the care of their child. Further, they reported that being abstinent from drugs for two years was protective for retaining care.

Two further studies examined the impact of frequency and amount of drug use, without including any risk behaviours in their models, and found it had no effect on guardianship status (Grella et al., 2006; Taplin & Mattick, 2013). No longitudinal research assessed the impact of lifetime or current risky drug-taking practices. Overall, it seems that those women who take risks such as trade sex or share needles to attain or use drugs are less likely to have the care of their children, but there is mixed evidence to suggest that greater amount or frequency of drug consumption post-birth is a risk factor that may predict OOHC.

3.3.5 Maternal mental health.

Six studies in this review found a significant relationship between an indicator of mental distress and OOHC or CPS contacts (Gilchrist & Taylor, 2009; T. Grant et al., 2011; Lean et al., 2013; Minnes et al., 2008; Nair et al., 1997; Taplin & Mattick, 2013), where three did not (Eiden et al., 2007; Grella et al., 2006; Tyler et al., 1997). Of the six studies which found a significant result, all used different measures to assess experiences of mental distress, which are outlined in table 3.2.

Among the cross-sectional studies, Taplin and Mattick (2013) found that if a mother was using medication for a psychiatric disorder, they were almost three times as likely to have a child in OOHC. Gilchrist and Taylor (2009) found that eighty percent of the women who no longer had the care of their child answered 'yes' to having depression. Further, depression was associated with an almost four-fold risk of OOHC placement. It is impossible to infer from these cross-sectional designs whether mental health concerns including depression precede, or were a consequence of, having a child placed out-of-home. One other cross-sectional study found no evidence of maternal mental health impacting OOHC placement, despite having a significant difference in mental health status between those who retained care and those who did not (Grella et al., 2006). It is interesting to note this study included a comprehensive measure of the mother's own experience of abuse during her childhood, which was significant in the multivariate analyses. In contrast, the studies finding a significant result for mental health status did not include such a measure. These findings seem to suggest that maternal experience of abuse or maltreatment is likely related to both their mental health in adulthood and their need for contact with CPS.

The longitudinal studies of mothers who used drugs during their pregnancy had mixed results regarding the impact of mental health concerns on placement outcomes. Three found a significant relationship between perinatal maternal mental health and later child placement

outcome (T. Grant et al., 2011; Lean et al., 2013; Nair et al., 1997), and two did not (Eiden et al., 2007; Tyler et al., 1997). Grant and colleagues (2011) used a screening measure for mental health conditions, yielding three significant results. First, those who had any experience of hallucinations in their lifetime were three times as likely to have had their child placed at birth. Second, a lifetime history of anxiety was associated with the mothers *retaining* care of their child, and third, having perinatal depressive symptoms was associated with a three-fold risk of OOHC placement (T. Grant et al., 2011). Nair and colleagues (1997) also found that depressive symptoms in the past week were significantly associated with OOHC placement, although their analysis does not tell us whether group differences translate into clinically relevant differences in symptom severity. Lean and colleagues (2013) used a cut-off score to determine whether the mothers were experiencing clinically significant depressive symptoms, and found that if they were in the clinical range then there was a slightly elevated risk of contact with CPS. Overall, it may be stated that maternal mental health is likely associated with increased risk for OOHC placement. However, results are mixed which is likely due to the sensitivity of measures that have been used and the time period for which mothers are screened.

3.4 Child Characteristics Affecting Out-of-Home Care Placement

Under the ecological model, characteristics of the child are thought to contribute to parenting behaviours through a process of mutual regulation (Lester & Tronick, 1994). Despite this understanding, child characteristics are relatively understudied in the literature on OOHC.

3.4.1 Infant birth characteristics and neonatal abstinence syndrome.

In this review, only three studies included measures of child characteristics, two found significant results, and one did not (Eiden et al., 2007; Nair et al., 1997; Tyler et al., 1997). One study reported that infants who were placed out-of-home had lower birthweight than those who

remained with their mothers; a result associated with a medium effect size (Eiden et al., 2007). Further, Nair and colleagues (1997) determined that infants placed out of home were more likely to be premature and have health complications other than NAS than those who remained with their mothers. As prematurity is influenced by drug use during pregnancy, it may be argued that these between group differences reflect heavier drug use that influenced the OOHC placement decisions, or alternatively, that CPS were more likely to view infants of poorer health due to prenatal substance exposure, as being of higher need for OOHC away from their drug dependent mother.

3.5 Environmental Regulators Affecting Out-of-Home Care Placement

3.5.1 Socio-economic status and employment.

Aspects of socio-economic status (SES) were measured in quite disparate ways among the included studies. Lean and colleagues (2013) used SES in their composite score of social risk, which proved to be a significant predictor in the final multivariate model when controlling for the other variables including group status (methadone maintained during pregnancy, or non-drug using controls), antenatal depression, and a history of losing custody of other children prior to the index child. Whilst this was a significant result, the measure is unable to determine whether SES independently influenced OOHC status. Other studies have not tested SES directly which makes comparing studies difficult. One study reported significant group differences in "occupation" but failed to describe how this variable was measured in their population (Eiden et al., 2007). Grella and colleagues (2006) also assessed employment using a broad scale and determined that 'employment severity', or less employment in the past 30 days, was associated with increased risk for OOHC. One study looked at income level. Grant and colleagues (2011) tested total monthly income to find that higher income was associated with the mother retaining care of her child,

although it should be noted that all of the women were close to Washington State's definition of being 'in poverty'.

SES was very low in all drug-dependent mothers regardless of whether their child was in OOHC. For example, in one study, 98% of the sample were determined to be of 'low' SES category, meaning between groups differences were hard to detect with the measure (Minnes et al., 2008). Three studies chose not to test SES for this reason, as their samples all had very low income and employment levels; thus, group differences according to child placement status were hypothesised to be very small (Gilchrist & Taylor, 2009; Nair et al., 1997; Tyler et al., 1997). While the evidence is mixed, in studies where the sample of participants represent a greater range of SES categories, or the SES measure is more sensitive to small differences, it has been shown that income and/or employment may play a role in the likelihood of a mother retaining her child in the home.

3.5.2 Housing instability and homelessness.

Four of the included studies tested whether homelessness or housing instability was predictive of whether the mother retained care of their child or children. Of these, three found a significant result (Gilchrist & Taylor, 2009; T. Grant et al., 2011; Meier et al., 2004). One-third of Grella and colleagues' (2006) sample were homeless or had unstable accommodation, but there was no difference between groups of mothers involved with CPS versus those not involved with CPS. In the studies that found a significant result if a mother was homeless or had "unstable" housing arrangements, there was a three to seven-fold increase in risk of not retaining care of their child. Gilchrist and Taylor (2009) found the lowest estimate of increased risk for OOHC with homelessness; however, they assessed 'lifetime' homelessness which is less likely to have a direct impact on current placement of children than current homelessness. The highest estimates of risk

came from one large cross-sectional study of sixty-thousand parents which looked at current homelessness or staying short-term accommodation (Meier et al., 2004), as well as one longitudinal study that followed a cohort of women for three years (T. Grant et al., 2011). Both studies found a more than seven-fold increase of risk for OOHC associated with maternal homelessness. Grant and colleagues (2011) failed to define how and when in their intervention study, instability of housing was measured, and is therefore unable to clarify the direction of influence instability might have on OOHC. While it is likely that housing stability is related to OOHC placement, it is unclear whether having stable living conditions increases the chance the drug dependent parent will retain care of their child, or whether drug-dependent women who lose the care of their child, no longer prioritise the maintenance of stable housing.

3.5.3 Marital status.

None of the studies included in the current review found evidence of maternal relationship status predicting placement into OOHC. However, it should be noted that marital status was part of the social-risk index employed by Lean and colleagues (2013), who found that a composite scale of demographic variables did predict CPS contacts. Relationship status of the mother is considered a social risk factor as single parenthood often indicates increased parenting demands and lower socio-economic status as a single-income household (Fergusson, Boden, & Horwood, 2007).

3.5.4 Living with another drug user.

Just two of the studies included in this review tested whether the mother living with another drug user was related to OOHC placement. Both found a significant relationship, such that living with another drug user was associated with OOHC (Gilchrist & Taylor, 2009; Meier et al., 2004). Meier and colleagues (2004) found that drug-dependent women living with another person

dependent on drugs, had a small increased risk of their child living 'elsewhere', and a slightly higher risk of their child being in formal foster care placement. In line with this finding, Gilchrist and Taylor (2009) determined that mothers were almost three times more likely to not have the care of their child if they lived with another drug user.

3.5.5 Sources of social support.

Few studies of drug-dependent parents have described the neighbourhood and family supports required or received by drug-using parents and their families. Just three studies in this review included measures of support that were not solely income/economic support indicators. Nair and colleagues (1997) found that those who had retained care of their child throughout the eighteen-month intervention study, had more social supports rated as being of high quality than those who had disrupted caregiving patterns, although the social support score did not predict OOHC. For women in MMT, seeing their parents daily was strongly associated with not having CPS involvement when controlling for covariates (Taplin & Mattick, 2013). One longitudinal study measured support from friends, family, and significant others to create a composite scale of social support, which was not related to OOHC placement (Minnes et al., 2008).

The utilisation of formal support services has been sparsely assessed as a potential factor influencing whether drug-using mothers will retain care of their child. One study determined that the number of visits to prenatal care providers was inversely associated with risk for OOHC (Minnes et al., 2008). In addition, Nair and colleagues (1997) found that those in their weekly home enrichment intervention were more likely to retain care of their children than those who were in the standard care control group, and this effect was evident when controlling for possible covariates.

3.6 Summary of main findings and methodological concerns.

As there are a wide range of methodologies and measures employed in this field, it is impossible to make direct comparisons between studies and to delineate discrete definitions of variable domains. However, these papers do reveal important information regarding placement of those born to drug-using women. Among the studies included in this review, the factors influencing OOHC with the strongest evidence base appear to be maternal mental health and social characteristics, specifically, maternal depression and indicators of low socio-economic status. However, these factors are also the most widely studied and variables from other domains have been largely underserviced. Longitudinal studies are limited in size and length of follow-up, whereas studies of cross-sectional design have larger numbers of participants but ignore the possible contribution of child characteristics, social support and are often limited to what information can be found in databases or file review. Regardless of the model, it has become clear across decades of empirical research that it is not simply maternal substance use that predicts child maltreatment and OOHC placement, and that other contributing factors cannot be ignored when attempting to understand the phenomenon and plan intervention.

Table 3.2: Summary of research on predictors of OOHC

Author/ year	Location	Participants	Measures *Outcome measure*	Results		Strengths/ Limitations
				% with a child in OOHC	**Predictors of child living arrangement**	

Cross-Sectional Design

Meier et al. (2004)	England and Wales	N = 61,425 adults accessing services for drug users; including n = 19,967 women with at least one biological child <18yrs	Parental demographic data: gender, ethnicity, age. Index of risk indicators: sharing of injecting equipment; daily heroin use; daily alcohol use; regular stimulant use; unstable accommodation; living with another drug user; living alone/ with strangers; criminal justice system referral to treatment *Child living arrangement*	**33.8%**	Child in OC: Unstable accommodation (OR = 7.61) Daily heroin use (OR = 1.18) Regular stimulant use (OR = 1.62) Sharing drug injecting equipment (OR = 1.64) Daily alcohol use (OR = 1.24) Living alone/with strangers (OR = 1.20) Living with another drug user (OR = 1.36) Age (years) (OR = 0.98)	Composite index to assess the cumulative impact of risk factors, but it missed many family and wider neighbourhood factors thought to be important under the ecological model. Used generalised estimating equations instead of logistic regression as each case had multiple presentations to drug clinics, which included adjustments for age and all other variables tested. Unclear whether caregiving parents had *all* their children at home.
Grella et al. (2006)	Multi-site study, USA	N = 4156 females admitted to participating drug treatment programs with at least one child <18yrs.	Maternal demographic data: ethnicity, age, education, marital status, number of children, housing. Maternal drug use ASI subscales: addiction severity, psychiatric severity, criminal severity, employment severity. Drug treatment history: self-report Current treatment: inpatient vs outpatient care *CPS contact, (two groups of those who had contact vs those who did not)*	**34.2%**	Mother had CPS contact: Fewer economic dependents (OR = 1.32 - 2.33) Fewer years of education (OR = 1.25 – 1.43) In outpatient treatment (OR = 1.55) More children (OR = 1.50) History of physical abuse (OR = 1.39) Employment severity scale score (OR = 1.09) Younger maternal age (OR = .97)	Large sample size means even modest group differences attained statistical significance; so effect sizes were calculated which showed most were in the small to moderate range (d = .10 - .55) Participants recruited from several different treatment facilities, although to be eligible for the project had to reach certain criteria, limiting generalisability. Involvement with CPS services was self-reported by the women in the study and nature of the service received unspecified, as well as the outcome from involvement

Author/ year	Location	Participants	Measures *Outcome measure*	Results		Strengths/ Limitations
				% with a child in OOHC	**Predictors of child living arrangement**	
					Alcohol addiction severity scale score (OR = .95)	
Gilchrist and Taylor (2009)	Glasgow, Scotland	*N* = 185 females accessing services for drug-users who had at least one biological child. Including *n* = 59 women in Methadone maintenance treatment	Demographic data: age, marital status, housing, living with substance user. Drug dependence: DIS (12mo drug dependence) Alcohol use disorder: AUDIT Mental health: Self-report symptoms, medication used Neurotic Symptoms: CIS-R History of abuse in childhood, adulthood and the last 30 days: FE-ASI Drug treatment history: self-report Current drug use: self-report *Child living arrangement*	**49.0%** overall **24.0%** of methadone subgroup	Child in OOHC: Current depression (OR = 3.90) Ever involved in prostitution (OR = 3.12) Ever homeless (OR = 2.96) Live with another drug user (OR = 2.71) Ever incarcerated (OR = 2.47)	Recruitment from drug services working with users who have complex needs: not representative of all female drug users Analysed all types of treatment users together despite significantly more women beginning methadone treatment still living with their children. Post-hoc analyses showed clustering of risk factors which reveals intra-group populations: women less 'chaotic' in their drug use more likely to have their children at home
Taplin and Mattick (2013)	NSW, Australia	*N* = 171 females maintained on methadone for opioid dependence with at least one child <16yrs.	Maternal demographic data: age, ethnicity, income, education, current relationship status. Mental health: KPDS Domestic violence: self-report History of abuse: CECA-Q Social supports: self-report Drug treatment: OTI Current substance use: BTOC-C *v1.0* *CPS contacts*	**32.7%**	Mother had CPS contact: On psychiatric medication (OR = 2.96) More children (OR = 1.43) Monthly/weekly contact with parents (OR = 1.23) Daily contact with parents (OR = 0.22)	All measures self-report. The sample of mothers in OST often have different characteristics to other female drug users – they're older and in daily treatment so results not generalisable to all drug-users but useful for this research.

Author/ year	Location	Participants	Measures *Outcome measure*	Results		Strengths/ Limitations
				% with a child in OOHC	Predictors of child living arrangement	
Longitudinal Design						
Nair et al. (1997)	Maryland, USA	*N* = 152 pregnant females enrolled in a trial substance abuse intervention, follow-up with infants at 18mo of age	Maternal demographic data: Ethnicity, age, education, marital status, number of children. Mental health: BSI Maternal drug use: ASI, self-report interview 2 weeks post-birth and urine toxicology screen at birth Maternal depression: CES-D Social support: ISSI Life events: LES Infant outcome: gestational age, length of stay in hospital, health problems *Any change in caregiving away from mother*	**43.3% at 18mo old**	Child in OOHC: Maternal age < 30yrs (OR = 4.3) 2+ other children (OR = 4.5) 1 other child (OR = 2.3) Any child in foster care (OR = 2.7) Positive heroin toxicology result (OR = 2.7) Maternal depression, per 5pt increase on CES-D (OR = 1.4) Intervention group vs control (OR = 0.6)	Definition of change in caregiving from maternal care included voluntary placement with another relative – which means the rate of out of home care is higher than those conducted through CPS Many patterns of care experienced by the group up to 18mo of age – but were all put into one category regardless of when entered care or how much contact was had with the birth mother Looked at variables from all ecological domains although did not use the model as an organising structure
Tyler et al. (1997)	California, USA	*N* = 67 pregnant females enrolled in a trial substance abuse intervention, follow up with infants at 6mo of age	Maternal demographic data: age, education, parity, ethnicity, marital status. Maternal prenatal drug use: ASI lifetime sore and urine toxicology Maternal attachment style to own parents: AAI Mental health: MCMI Infant outcome: birth weight, length, head circumference, gestational age *Child living arrangement*	**34.3% at 6mo old**	Between group differences for those who lost custody vs those who retained custody: Greater number of years of self-reported alcohol use *(p<.05)* *Nil other significant differences*	Did not consider transience or time spent with each primary caregiver. Social support domain not represented in variable selection. Included infant clinical factors acknowledging likelihood that child factors contribute to caregiving changes through parenting stress.

Author/ year	Location	Participants	Measures *Outcome measure*	Results		Strengths/ Limitations
				% with a child in OOHC	**Predictors of child living arrangement**	
Eiden et al. (2007) Eiden et al. (2007) *continued.*	New York, USA	$N = 220$ mother infant dyads recruited from hospital after delivery, followed up after 1 month. $n = 115$ cocaine exposed $n = 105$ non-exposed controls	Maternal demographic data: education, age, ethnicity. Maternal drug use: TLFB taken during and after pregnancy, also urine and hair toxicology report Maternal history of trauma: CTQ Caregiver psychopathology: BSI; IES-R; BPAQ Caregiver antisocial behaviour: ASB Infant outcome: birth weight, birth length and head circumference. *Child living arrangement*	**19.1% at 1mo old**	Child in OOHC: Maternal occupation level lower $(\eta^2 = .03)$ Maternal education lower $(\eta^2 = .05)$ Maternal cocaine-use heavier during pregnancy $(\eta^2 = .26)$ Infant birth weight lower $(\eta^2 = .18)$ Infant birth length lower $(\eta^2 = .11)$	Maternal demographic differences between groups had small effect sizes in univariate analysis. One infant in non-exposed group was placed in non-parental care and excluded from the data set. Issue in interpreting mental health indicators as interview was conducted with the current caregiver at 1mo old, not birth, thus not all were conducted with the biological mother
Minnes et al. (2008)	Ohio, USA	$N = 205$ pregnant females positive for cocaine use, followed up shortly after birth	Maternal demographic data: age, education, parity, ethnicity, education, socioeconomic status. Substance use during pregnancy: self-report and urine toxicology IQ: PPVT-R, WAIS-R Mental health: BSI global scale score Coping strategies: COPE Perceived social support: MSPSS Inter-partner violence: CTS Maternal history of trauma: CTQ *Child living arrangement*	**30.7% at birth** (or shortly after)	Child in OOHC: Cocaine-use during pregnancy, above 70th %ile $(OR = 2.76)$ Clinically significant mental distress $(OR = 2.30)$ Maternal history of emotional neglect $(OR = 1.10)$ Number of prenatal visits to healthcare facilities $(OR = .84)$	Only considered those placed by CPS services, thus infant placement reflects the policy and decision making of CPS and not generalisable to all drug-using mothers who may be unable to care for their child. Implicit bias may be an issue – not all pregnant females were screened for drug use – only those for whom drug use was suspected.
T. Grant et al. (2011)	Washington State, USA	$N = 458$ females self-reporting heavy alcohol or illicit substance use in pregnancy, enrolled in a trial substance abuse intervention, 3yr follow up period	Maternal demographic data: ethnicity, education, parity. Maternal substance use: ASI, at intake and exit; social work case-manager confirmation self-report. Maternal mental health: self-report of lifetime and past month psychiatric symptoms	**40.8% at 3 yrs. old** *12.0% never lived with mother*	Child always with mother vs never with mother: Jailed during program $(OR = 7.00)$ Worked as prostitute during intervention $(OR = 6.97)$ Currently pregnant $(OR = 4.84)$	Verified self-reported substance use with reports from their social work case manager Intake and exit data obtained from interview and subject to self-report biases Only considered the services needed and used in the last year of treatment, otherwise social service

Author/ year	Location	Participants	Measures *Outcome measure*	Results		Strengths/ Limitations
				% with a child in OOHC	**Predictors of child living arrangement**	
T. Grant et al. (2011) *continued.*			Social service use: ratio of services needed to services received *Child living arrangement and placement stability*		Lifetime depression (OR = 2.37) Lifetime hallucinations (OR = 2.19) Lifetime anxiety (OR = 0.46) Abstinent from alcohol/drugs for >2yrs (OR = 0.33) Total monthly income (OR = 0.22) Permanent/stable housing (OR = 0.13)	use ratio was a comprehensive measure of social support received. Effect of child characteristics not considered and not represented in variables measured. Tested domains of mental health, alcohol/drug use and maternal stability factors in separate multivariate regressions with covariates of ethnicity and education, thus hard to determine the effect of demographic factors.
Lean et al. (2013)	Christchurch, NZ	*N* = 127, followed up for 4.5 years Including *n* = 73; women recruited from Methadone Maintenance treatment during pregnancy.	Maternal social risk composite score (young maternal age, single parenthood, minority ethnicity, no education, low SES) Inter-partner violence Licit and illicit substance use during pregnancy Maternal mental health problems (self-report and EPDS) Parity Previous loss of custody *Contact with Child Protective services*	**43.5% at 4.5 yrs. old**	CPS service contact and out-of-home care: Methadone maintenance group status (OR = 1.80) Mother experiencing antenatal depression (EPDS score >13) (OR = 1.03) Mother previously lost custody of a child (OR = 1.46) Maternal social risk composite score (OR = 1.28)	Reported regression coefficients and did not include odds ratio to aid interpretation of effect. Used a binary regression analysis despite having 3 levels in the outcome measure, no contact, CPS contact without removal and CPS contact resulting in child removal. Included comparison group in final logistic regression model despite very low rates of CPS service contact in this group.

Note: **AAI**: Adult Attachment Interview; **ASB**: Antisocial Behaviour scale; **ASI**: Addiction Severity Index; **AUDIT**: Alcohol Use Disorders Identification Test; **BPAQ**: Buss Perry Aggression Questionnaire; **BSI**: Brief Symptom Inventory; **BTOC-C** *v1.0*: Brief Treatment Outcome Measure; **CECA-Q**: Childhood Experience of Care and Abuse Questionnaire; **CES-D**: Centre for Epidemiologic Studies Depression Scale; **CIS-R**: Revised Clinical Interview Schedule; **COPE**: Coping Strategies scales; **CPS**: Child Protective Services; **CTS**: Conflict Tactics Scale **CTQ**: Childhood Trauma Questionnaire; **DIS**: Diagnostic Interview Schedule; **EPDS**: Edinburgh Post-Natal Depression scale; **FE-ASI**: Female European Addiction Severity Index; **IES-R**: Impact of Events Scale Revised; **ISSI**: Interview Schedule for Social Interaction; **KPDS**: Kessler Psychological Distress Scale; **LES**: Life Experiences Survey; **MCMI**: Million Clinical Multiaxial Inventory; **MSPSS**: Multi-Dimensional Scale of Perceived Social Support; **NAS**: Neonatal Abstinence Syndrome; **OOHC**: Out-of-Home Care; **OTI**: Opiate Treatment Index; **PPTV-R**: Peabody Picture Vocabulary Test Revised; **TLFB**: Timeline follow-back interview; **WAIS-R**: Wechsler Adult Intelligence Scale Revised.

Chapter 4: Aims of the Current Study

This thesis aims to compare the neonatal and socio-familial characteristics of children born to mothers maintained on methadone during pregnancy who remain in the care of their biological mothers to those who do not in two stages; first, from birth to 18 months of age and secondly, from birth to 9.5 years of age.

4.1 Statement of Objectives.

a) To describe the living arrangements of a cohort of New Zealand children born prenatally exposed to methadone at 18mo and 9.5 years of age.

b) To determine the differences in neonatal, maternal and psychosocial characteristics between those who remained in the care of their mother and those who entered OOHC at two phases; 1) at 18 months of age, and 2) at 9.5 years of age.

c) To examine the way in which the effects of a) maternal characteristics, b) child characteristics, and c) postnatal psychosocial risk factors combine to influence child OOHC from birth to 18-months, and from 18-months to 9.5 years of age

Chapter 5: Methods

5.1 The Canterbury Methadone in Pregnancy Study

This research draws on data from the Canterbury Methadone in Pregnancy (MIP) study, a prospective longitudinal study of the neurological and developmental outcomes of children exposed to methadone during pregnancy, conducted by the Canterbury Child Development Research Group (CDRG). Women were recruited during their pregnancy and their infants underwent an assessment of physical health and neurodevelopment at birth. Follow-up phases consisted of neurodevelopmental assessments and caregiver interviews conducted at 18 months, 2 years, 4.5 years and 9.5 years of age. This thesis particularly focused on methadone-exposed (ME) children, as none of the non-methadone-exposed comparison group (NME) had left the care of their mother by 9.5 years of age. Ethical approval to conduct the research was granted by the Upper South Regional Ethics Committee of the Health Research Council of New Zealand. The caregiver was asked for their consent to participate at each follow-up phase, and to consent on behalf of their child, with the explicit understanding that disclosed information was to remain confidential, that they were participating on a voluntary basis, and they had the right to withdraw at any time.

5.2 Research Design

A prospective longitudinal, repeated measures, between groups design was used to compare ME and NME children on multiple developmental measures across childhood. This thesis examined data from two follow-up phases, age 18 months and 9.5 years, to assess the likely antecedents to placement in out of home care. Variables for assessment were drawn primarily from the maternal interview at term, and infant clinical data for the assessment of OOHC at 18 months.

At 9.5 years the analysis of OOHC was repeated, including measures from the interview with the primary caregiver at 18 months.

5.3 Participants

At the term assessment, MIP study participants included 100 infants with prenatal methadone exposure, whose mothers were consecutively recruited from those enrolled in the Christchurch Methadone Maintenance Programme via the Methadone in Pregnancy Clinic provided by the Canterbury District Health Board. A comparison group of 110 infants with no prenatal methadone exposure were recruited using a random number generator from records in the Christchurch Women's Hospital delivery database, which included all women who were registered to give birth in Christchurch during the same time period in which the Methadone sample were recruited. This thesis will primarily use data from the ME group for the analyses, with reference to the NME group characteristics on some key variables to describe the sample.

5.3.1 ME group mothers and children included in the 18 month and 9.5 year analyses.

The 18 month analyses of this thesis includes subset of 93 ME children, 54 males and 39 females, and their biological mothers who were retained in the study until 18 months of age. Eight children from the original sample were excluded from birth; four due to prematurity, three had deceased and one withdrew consent to participate. A further four ME children had withdrawn from the study by the age of 18 months, and one child from a set of twins will be excluded from this analysis. In all, 98.9% of the sample retained until 18 months of age was included in the analyses. Children remaining with their mothers were termed the 'maternal care' (MC) group. Those who entered other care arrangements were termed 'Out-of-Home Care' (OOHC) group as some were

formally placed in OOHC by Oranga Tamariki, and some moved to live with other family members through informal arrangements.

The 9.5 year analyses was comprised of a subset of the ME group retained in the study until 9.5 years of age, and were seen for their follow-up assessment prior to the end of data collection for this thesis. Seventy-five children, 43 males, 32 females, and their primary caregivers were seen, a retention rate of 75% since birth. Between the ages of 18 months and 9.5 years 10 further children were lost to follow-up; one child had deceased, eight children's caregivers declined to participate, one family moved overseas and were unable to return for assessment. In addition, one child was re-recruited who had not been seen at the 18 month phase, but will not be used in this analysis due to missing data. At 9.5 years, analyses of antecedents of OOHC were repeated for those who were placed into OOHC between 18 months and 9.5 years. Those cases already accounted for in the analyses of antecedents for OOHC at 18 months ($n = 13$) were not included in the analyses of antecedents at 9.5 years. Therefore, in the analyses at 9.5 years, only those who entered OOHC between 18 months and 9.5 years ($n = 19$), were compared to those remaining in, or returned to, the care of their mothers (MC) at 9.5 years ($n = 43$). In all, 82.7% of the sample retained until the age of 9.5 years that were used in the analyses. Key characteristics of the sample are summarised in table 5.3. Participant eligibility, recruitment and retention through each phase are summarised in Figure 1.

Table 5.3: Term characteristics of ME group mothers and children included in the analyses

Characteristics of ME group	18 Months (*N* = 94)	9.5 Years (*N* = 75)
Maternal age at delivery; $M \pm SD$, years	28.9 ± 5.2	29.72 ± 5.37
Maternal ethnicity; % Maori ethnicity	23.4	28.6
Maternal education; % no formal qualification	81.9	82.9
Socio-economic status; % low SES[a]	94.7	80.0
Marital status; % single parenting	50.0	44.0
Study child gender; % Male	58.5	57.3

[a] "Low SES" defined as in unskilled or semi-skilled employment, or unemployed as measured at term or 18 month follow-up

Eligible: pregnant women in methadone maintenance treatment (n = 119)

Not enrolled:
Declined (n= 12)
Missed due to failure to identify (n= 2)

Enrolled infants: (n = 105)
Including 1 x twins

Excluded:
Premature birth (n= 4)
Refused (n= 1)

TERM PHASE

Retained: (*n* = 100)

Follow-Up

Lost to follow-up:
Refused (n= 3)
Deceased (n= 3)

18 MONTH PHASE

Retained: (*n* = 94)

Lost to follow-up:
Refused (n= 4)
Deceased (n= 1)

4.5 YEAR PHASE

Retained: (*n* = 89)

Lost to follow-up:
Refused (n= 4)
Not located (n= 1)
Not yet seen (n=15)

Re-recruited: (n=1)

9.5 YEAR PHASE

Retained: (*n* = 75)

Analysis

Excluded at 18mo:
Twin (n = 1)

Excluded at 9.5yr:
Placed in OC before 18 months (*n* = 13)
Re-recruited child (n=1)
Not yet seen (*n* = 9)

BINARY LOGISTIC REGRESSIONS:

18mo analysis, included cases: 98.9% *(n = 93)*
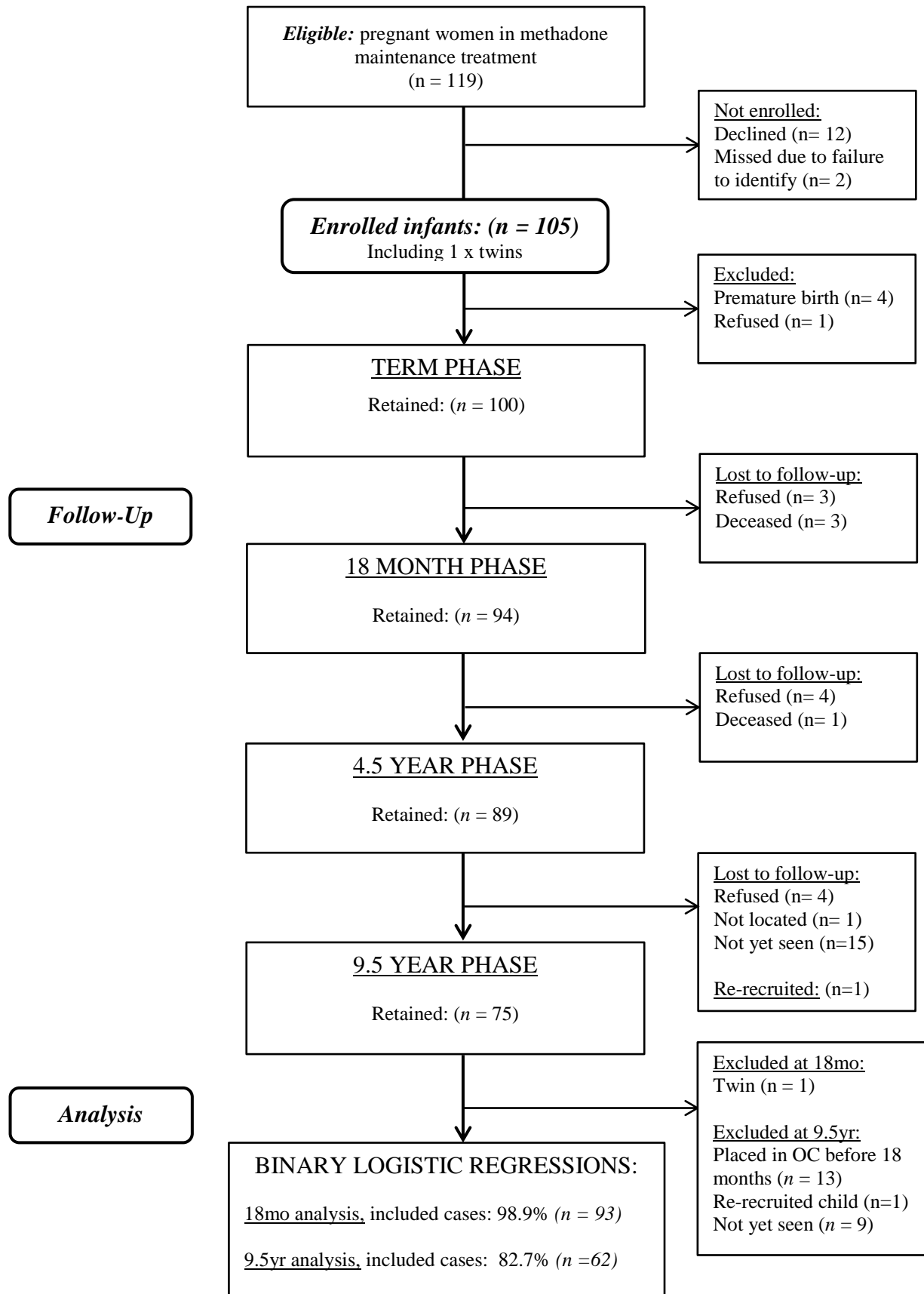
9.5yr analysis, included cases: 82.7% *(n =62)*

Figure 5.2: Summary of ME group recruitment and retention

5.4 Procedure

5.4.1 Term phase.

All women were recruited in either their second or third trimester of pregnancy from Christchurch Women's Hospital. After written consent was gained, participating mothers completed the term interview, typically given just prior to the birth of the child. For women enrolled in methadone maintenance the interview was conducted by a research nurse at the hospital during an ante-natal clinic visit, while comparison group women were seen at home and interviewed by a post-graduate student working with the CDRG. The interview was semi-structured, 45-60 minutes in length, and included the same measures regardless of group. Once the child was born infant clinical data from medical records, and any involvement with child protective services, was recorded by the research nurse. At two weeks old, measured as 42 weeks gestational age, each child underwent a neurobehavioural assessment and cry analysis.

5.4.2 Eighteen-month follow-up.

The second wave of the study is known as the 18 month follow-up as participants were contacted by researchers and re-recruited as their child was turning 18 months of age. If recruitment was successful arrangements were made for a home-visit and interview with the current caregiver of the child. If the child had entered a foster home the CPS social workers were contacted for permission to approach the foster family to request their participation. Arrangements were made to visit, and consent to participate in the follow-up was given over the phone. Appointment confirmations were sent via post, and text message reminders were sent on the day prior to the appointment. Written consent for the procedure was obtained at the time of meeting, following a thorough explanation of the content and purpose of assessment. A total of 94 ME and 109 NME participants were seen at this phase, a retention rate of 94.0% and 99.1% respectively.

The home visit consisted of an interview with the primary caregiver and a video recording of a parent-child interaction. At the end of the interview the caregiver was given a $10 gratuity to thank them for their participation. They were also asked to confirm their current contact details, and provide contact details of at least one other friend or family member in the event they could not be contacted directly for future follow up phases.

5.4.3 Nine-and-a-half-year follow-up.

Participants were contacted for recruitment as the study child approached 9.5 years of age. Contact details for the primary caregiver recorded in the prior wave were used first. If these were no longer current or the child had a new caregiver then a secondary contact was called, or a search of hospital records was conducted by the research nurse to gain current information. If contact details were not gained through any of these methods, then a visit was made to their last known address. An appointment time was arranged at this contact. Confirmation of appointment and an information sheet were sent in a letter to their homes. At the beginning of the appointment written consent to participate and consent to video the child's assessment was gained from the primary caregiver, on behalf of the child. The assessment consisted of a comprehensive interview with the primary caregiver on family circumstances, child placement changes, caregiver mental and physical health and drug use, and aspects of their child's development including their perspective on the child's behaviour and schooling. A neuropsychological battery of tests was conducted with the child including measures of general intelligence, language, self-regulation, risk-taking behaviour and academic achievement. All measures relevant to this thesis are detailed in subsequent sections. For their participation in the study families were gifted a $20 supermarket or petrol voucher, and for families that had travelled to attend the session petrol, flights or accommodation were partially reimbursed.

5.5 Measures

5.5.1 Maternal interview.

A semi-structured interview was conducted with the biological mothers shortly after the birth of their child. In subsequent follow-up stages semi-structured interviews were conducted with the primary caregiver of the study child. In the caregiver interview at each phase the main variables of interest fall into domains of: family background, drug and alcohol use of adults in the home, caregiver mental health, child placement into OOHC, and child welfare involvement. In addition, in the term interview, mothers were asked to report on drug, alcohol and tobacco use during each semester of pregnancy, frequency and type of antenatal care visits, symptoms and treatment for psychological distress or mental illness, and a personality inventory. The measures of interest for this thesis from each interview were taken from the term and 18 month interviews, and are described in the following sections.

Maternal drug use during pregnancy (Term).

Details of licit and illicit substance use during pregnancy were recorded at the term interview, interviewers reassured the mothers that their answers would remain confidential to promote disclosure of substance use in the face of concern of repercussion from social services. Mothers were asked to recall whether they had used substances during each trimester of their pregnancy, what that substance was and how much they had taken. A composite variable was created from ME group self-report of drug use during pregnancy and analysis of urine and meconium samples at birth. The composite variable was created to describe the number and quantity of drugs the child was exposed to while *in-utero* as a measure of severity of exposure, the calculation of the scale is described below.

The self-report data derived from the maternal interview included quantity of cigarettes per day; and the quantity of alcohol, cannabis, stimulants, opioids and benzodiazepines used per week which was analysed to determine the central tendency and range of reported use. A median split was used to determine high versus low use for substances that were used frequently during pregnancy, specifically cigarettes (median use = 11.67 cigarettes per day) and cannabis (median use = 0.67 times per week); these variables were then recoded into three groups "0 = not used", "1 = low use", and "2 = high use". Where few participants reported using a class of drug, these data were dichotomised into "0 = not used", versus "1 = used" during pregnancy, which included benzodiazepines, stimulants, alcohol and opioids other than methadone. Meconium and urine sample results were then used to verify the self-report information. If there was evidence of drug use that was not included in the self-report those cases were then re-classified into the "used" category for that type of drug. The transformed variables for each class of drug were then summed to provide the final composite with a possible range of scores from 0-8.

Maternal personality (Term).

The short version of the Temperament and Character Inventory (TCI-125) was employed to assess personality of the mothers at term (Cloninger, 1992; Cloninger et al., 1994). This measure is based on the seven factor psychobiological model of temperament and character (Cloninger, 1987; Cloninger et al., 1993). The TCI-125 is a short form of the TCI version 8, which uses 125 questions to the dimensions in the same seven factor structure as the original version. TCI-125 is correlated with similar measures of temperament, shows a reasonable level of internal consistency and its' validity has been confirmed in independent research across cultures (Akiskal et al., 2005; Chakroun-Vinciguerra, Faytout, Pelissolo, & Swendsen, 2005; Leventhal et al., 2007).

Temperament describes the aspects of personality involving automatic responses to stimuli. Temperament is thought to reflect individual differences in monoaminergic activity (Cloninger, 1987; De Fruyt, Van De Wiele, & Van Heeringen, 2000). The four dimensions of temperament are Novelty seeking, Persistence, Harm Avoidance and Reward Dependence. Novelty Seeking (NS) is the behavioural activation in response to novel stimuli (Cloninger et al., 1993; Kluger, Laidlaw, Kruger, & Harrison, 1999). There are four subscales in the TCI to measure the range of novelty seeking behaviours; impulsiveness versus reflection; extravagance versus reserve; exploratory excitability versus stoic rigidity; and disorderliness versus regimentation. Harm Avoidance (HA) reflects mechanisms of behavioural inhibition. The four subscales measuring HA in the TCI-125 are anticipatory worry versus uninhibited optimism; fear of uncertainty; shyness with strangers; and fatigability versus asthenia. Reward Dependence (RD) involves maintaining or continuing behaviours that have been behaviourally reinforced and a resistance to extinction of these behaviours (de la Rie, Duijsens, & Cloninger, 1998). The three subscales of RD are: sentimentality, attachment, and dependence. Persistence (P) distinguishes those who are industrious, diligent and ambitious from those who are modest and underachieving. This dimension is measured by just one subscale of five items including "I am more hard working than most people".

In the psychobiological model character dimensions are described by the authors as "individual differences in self-concepts" (Svrakic, Whitehead, Przybeck, & Cloninger, 1993). Character is thought to be influenced by environmental factors and events because they develop throughout the lifespan in several stages. The three dimensions are: Self-Directedness, Cooperativeness and Self-Transcendence. Self-Directedness (SD) is a construct which has five subscales including: taking responsibility versus blaming; purposefulness versus lack of goal-

direction; resourcefulness; self-acceptance versus self-striving; and having an enlightened second nature. Cooperativeness (C) also has five sub-scales including social acceptance versus intolerance, empathy versus social disinterest, helpfulness versus unhelpfulness, compassion versus revengefulness and pure hearted conscience versus self-serving advantage. Self-Transcendence (ST) which includes 3 subscales of self-forgetful versus self-conscious, transpersonal identification versus self-differentiation and spiritual acceptance versus rational materialism. Those high in ST are described as wise and patient, creative and self-forgetful whereas those low in ST are thought to be impatient, unimaginative and self-conscious, with a lack of humility (Svrakic et al., 1993).

The 125 items are statements that describe personal feelings or opinions that the respondent is asked to rate as true or false of themselves. For example, the item "I often try new things just for fun and thrills, even if most people think it is a waste of time" from the NS scale is answered by circling either 'true' or 'false'. TCI-125 as a short form can measure the seven dimensions adequately, but as the subscales within each dimension have just five items each in this version they are not considered reliable. Approximately half the items are reverse coded, then all items are summed to provide a score on each dimension of temperament or character. The reported internal consistency of the TCI subscales is sufficient (Cloninger et al., 1993; Svrakic et al., 1993).

Feelings regarding pregnancy (Term).

In the semi-structured interview mothers were asked if their pregnancy was planned, and how they felt about having a child. Mothers were also asked how their partner reacted to the news of their pregnancy. The mother's reaction to her pregnancy was coded on a Likert scale of 1-5 which was labelled 'very happy', 'happy', 'indifferent', 'upset', and 'very upset'. For this analysis

these answers were then recoded into a dichotomous variable with '0' representing very happy/happy with pregnancy and '1' representing indifferent/upset/very upset.

Family composition and caregiver changes, (Term and 18-months)

Family composition was obtained with questions ascertaining who lived in the household at the time of each interview and what their relationship was to the study child. Caregiver change was recorded if either maternal or paternal parent figure had permanently changed in the period between interviews, or if there had been a change in custody or absence of either parent figure from the home for a period of 1 month or more. For the purpose of this research these questions were coded into variables to reflect whether or not the child was in the care of their biological mother which was used as the outcome variable. The number of changes in *primary* caregiver, and if the child had experienced OOHC in the time prior to interview were also described.

Maternal demographic data (Term and 18 months).

The biological mother's age, ethnicity, education and marital status were recorded at term. In addition, the age, marital status and ethnicity of the current primary caregiver was obtained at each subsequent follow-up interview. This data was transformed into four key variables: (1) maternal age at birth of child; (2) whether the caregiver was of majority (New Zealand European) or minority ethnicity; (3) whether the caregiver completed high school or left with no formal qualifications, and; (4) whether or not the caregiver had a partner or was a single parent.

Socio-economic status (Term and 18 months).

The Elley-Irving (E-I) scale was used to classify the primary caregiver and their partner's occupation to provide an estimate of socio-economic status (SES) (Elley & Irving, 2003). The E-I scale was developed based on New Zealand census data and has been widely used in social research to check representativeness of samples. The version used in this research was updated

with the 2001 NZ census data and lists 630 occupations classified into six levels scaled according to the average income and education level of workers in each occupation. The maternal SES from term was dichotomised to reflect whether or not they were in professional/technical employment (E-I levels 1-4), versus unskilled employment/unemployed (E-I levels 5-6, and those unemployed). At 18 months the highest SES score of either the primary or secondary caregiver was recoded to reflect the same two groups, 'professional/technical' or 'unskilled/unemployed' to create a variable to reflect the highest SES category of the household.

Housing (Term and 18 months).

In the maternal interview, at both the term and 18 month phases, caregivers were asked what kind of housing their family resided in. Responses were put into nine categories of owned/mortgaged house, owned/mortgaged flat, rented house from private landlord, rented flat from private landlord, rented state or council owned house, rented state or council owned flat, single room or bedsit, staying with family, and "other" such as a car, garage or caravan. This data was then transformed into a dichotomous variable coded as '0' for those who were living in social housing or unstable accommodation (state or council owned home, living with family or 'other'), or '1' for those who were living in a home that was owned or rented from a private landlord.

Maternal methadone dose (Term and 18 months).

The prescribed dose of methadone was taken for each ME group mother, recorded both as the average dose, and the highest dose prescribed during each trimester of their pregnancy. In addition, the gestational age of the infant on first dose was recorded, where those mothers who were already in the methadone maintenance program when they became pregnant were recorded as having a gestational age of zero at commencement. In the 18 month interview the primary caregiver was asked to disclose the highest dose they had ever used in one day. In this thesis both

the average dose in the third trimester of pregnancy and the highest dose ever used as at 18 months were used in the analyses.

Maternal depression (Term and 18 months).

Symptoms of depression were measured with the Edinburgh Post-natal Depression Scale (EPDS) at the term and 18 month phases (Cox, Holden, & Sagovsky, 1987). The EPDS is a 10-item measure including questions such as "I have been able to laugh and see the funny side of things" which are scored on a 4-point Likert scale measuring frequency of symptoms in the past 14 days from 0 (not at all), to 3 (most of the time). Items are then summed to find a total score with a possible range of 0-30. Any score 13 or greater is considered indicative of clinically significant depression, and the scores were recoded to reflect the two group, those with clinically significant depressive symptoms, and those who did not meet the threshold. Validity and reliability of the scale has been confirmed for antepartum women (Cox, Chapman, Murray, & Jones, 1996; Murray & Carothers, 1990).

Maternal anxiety (18 months).

At the 18 month follow-up phase anxiety was measured in primary caregivers using the state-trait anxiety inventory (STAI: Spielberger, Gorsuch, & Lushene, 1970). This measure has 20 items for assessing trait and 20 for state anxiety symptoms. State anxiety items include: "I am tense; I am worried" and "I feel calm; I feel secure." Trait anxiety items include: "I worry too much over something that really doesn't matter" and "I am content; I am a steady person." All items are rated on a 4-point scale, which are then summed for a total where higher scores indicate greater anxiety. This is a well-established measure of state and trait anxiety characteristics, with variable but consistently acceptable psychometric properties (Barnes, Harp, & Jung, 2002; Metzger, 1976). In a study conducted on participants from NZ, the internal consistency was

reported to be high for both the State and Trait subscales, with Cronbachs' alpha values of .93 and .87 respectively (Knight, Waal-Manning, & Spears, 1983).

Post-natal caregiver drug use (18 months).

In all follow-up caregiver interviews from the 18 month phase to the 9.5 year phase, self-reported drug use in the month preceding the assessment was recorded. At this phase the interviewer asked if heroin, cannabis, methadone, benzodiazepines, cocaine, amphetamines or hallucinogens had been used since the birth of the child, and in what quantity. In addition, rating scales for frequency of alcohol, cannabis and nicotine use were employed. Alcohol use was determined on a standard drink basis, and it was asked how much on average was consumed during the week, at the weekends or any times of heavy use during the year prior. Nicotine consumption was counted as a function of average number of cigarettes consumed by the caregiver and their partner each day. Regarding cannabis use, first it was asked whether cannabis had been used at any time since the prior interview, then caregiver was asked to rate how often they currently used cannabis on a 5-point Likert scale labelled "nearly every day", "at least once a week", "at least once a month", "less than once a month" and "not used cannabis in the past 12 months". For this analysis a composite scale of drug use since the birth of the child was created from the self-report data of each type of drug used, affirmative answers were summed for a total simple composite score.

Social support (18 months).

The 18 month interview included a measure of different types of support that were available to the primary caregiver, describing what access they had to help from family members and their social circle, as well as social support services which included health and mental health support, and parenting courses. The caregiver answered for each of the thirty-nine types of support that

may available to them and their child, "*how helpful is (support type)*?" on a scale of: 0 = not available/never used, 1 = Used, not helpful, 2 = Used, sometimes helpful to 3 = Used, very helpful. Two subscales were created from this data, first a scale of total family and social support was calculated as a sum of the nine items regarding either family members or wider social circle including church groups, grandparents, partner and employer/co-workers. The scale of family support had a possible score range of 0-27.

Second, a scale of involvement from support services was calculated as a sum of the thirty items which included support from Government agencies such as benefits and social workers, support from the health system for mental health, nutrition or general care, and support from non-governmental organisations such as the Women's Refuge, Family Help Trust and Plunket. The final scale had a possible score range of 0-90.

5.5.2 Infant data clinical and child measures.

Following the research supporting models of bidirectional influence, several measures of child characteristics were taken, including the infant's physiological health at birth, indicators of temperament, behaviour screens at 18mo and 4.5yrs, and whether the child had medical concerns.

Infant clinical data (Term).

Term data for the study children was gathered from their medical records. Measures included in this analysis were gestational age; infant birth weight, length and head circumference; number of days spent in hospital; whether treatment was required for NAS; and number of days of treatment for NAS. The research nurse took the infants' measurements, which were then standardized into z-scores to account for gestational age, given the high rate of premature birth in the methadone exposed sample.

Temperament (18 months).

The infant/toddler symptom checklist was completed by the primary caregiver during the 18 month follow-up (DeGangi, Poisson, Sickel, & Wiener, 1999). This measure was designed to provide a short form assessment of symptomology from nine different domains of child development theorised to be early indicators of self-regulation problems. The nine domains assessed are self-regulation; attention; sleep; eating or feeding; dressing, bathing and touch; movement; listening, language and sound; looking and sight; and attachment. Caregivers answer statements such as "My child is... [frequently irritable and fussy]" by circling one of three options; "never-sometimes", "yes, most times", or "past" which indicates the problem is not currently evident, but was true of their child in the past. Cut-off scores are provided to assess whether concerns are indicative of a self-regulation disorder in each domain. The scale is reported by authors to have adequate reliability and validity, with a false positive rate between $3 - 13\%$, and a false negative rate of $0 - 14\%$, although it was normed on a small homogenous sample of white, middle class participants, 154 controls and 67 infants with regulatory disorders (DeGangi et al., 1999). One subscale score, self-regulation, and the total scale score were used in the analysis of OOHC at 9.5 years.

5.6 Planned Data Analyses

Data will be analysed using the Statistical Package for Social Sciences (SPSS) version 24. First, to describe the psychosocial and personality characteristics of the ME sample at term they will be compared to the NME group. For all group comparisons throughout this thesis independent sample *t*-tests will be performed to describe group differences for continuous variables and chi-square tests of independence will be used to compare groups on nominal variables.

Then, analyses will be conducted in two stages for each follow-up phase, four in total. The first set of analyses for the 18 month OOHC placement will be to determine group characteristics ME children in the care of their mothers (maternal care – MC) and compare them to ME children who were in OOHC at follow-up. Subsequently, to examine if child placement outcome at 18 months can be explained by term variables, they will be entered into a step-wise multivariate logistic regression analysis. A final model will be presented from the logistic regression to show what early factors may be predicting placement outcomes at 18 months.

The characteristics of the sample will again be described at 9.5 years of age. Then, children that remained in their mothers' care (MC) will be compared to ME children placed in out-of-home care (OOHC). Finally, the extent to which these variables can explain child placement outcome will then be analysed using step-wise logistic regression analysis and a final model of significant predictors of OOHC produced.

Chapter 6: Results

6.1 Order of the Results

This results chapter is divided into three primary sections, guided by the aims of the research. First, the maternal psychosocial characteristics and living arrangements of our methadone exposed (ME) group will be described and compared with our non-exposed (NME) group. The second section will describe the antecedents of out-of-home care (OOHC) at 18 months, presenting the association between maternal, social and infant variables and care status within the methadone exposed group, followed by the results of a binary logistic regression to identify the best predictors of early OOHC placement. The last section details the analysis of OOHC at 9.5 years, testing the association between participant variables collected at term and 18 months and OOHC status at 9.5 years, and concludes with the results of a binary logistic regression to find a model that best predicts later OOHC placement from early maternal, social and child factors.

6.2 Psychosocial Characteristics of ME and NME Group Mothers.

6.2.1 Characteristics of participants in the MIP study at term.

To describe the characteristics of our sample at term, the ME group was compared to the NME group on several key variables derived from infant clinical data, and the maternal interview. The results from the term phase are presented in table 6.4. Overall, the ME sample represent a high-risk group when compared to NME dyads. They were born earlier, to younger mothers of a lower socio-economic status who were more likely to be single-parenting and experiencing mental-health concerns. There was no significant difference in proportion of each group who

identified as being of Maori descent. The children were also smaller on measures of weight, head

circumference and length at birth after adjusting for gestational age by standardizing scores. A

large majority (86%) of the methadone exposed infants required treatment for NAS, and spent

more time in hospital post-birth; an average of 15.3 days, compared to 3.5 days for the NME group.

Table 6.4: Psychosocial characteristics of ME and NME group at term

Characteristics at Term	NME $n = 110$	ME $n = 100$	t/χ^2	p
Low maternal SES, %	76.2	23.8	95.54	<.001
Maternal age at birth of child, $M \pm SD$	31.58 ± 5.60	30.04 ± 5.28	-2.05	.04
No formal qualification, (%)	20.9	82.0	78.20	<.001
Single parent, (%)	10.0	51.0	42.32	<.001
Minority ethnicity, (%)	18.2	22.0	.48	.61
Social housing or unstable accommodation, %	12.0	23.3	4.40	.04
Maternal depressive symptoms (EPDS score), $M \pm SD$	5.13 ± 4.71	11.99 ± 6.57	8.76	<.001
Clinically significant depressive symptoms (EPDS score $\geq$ 13), %	8.2	45.0	37.17	<.001
Gestational age of infant (weeks), $M \pm SD$	38.80 ± 1.70	39.30 ± 1.70	-2.15	.03
Infant birth weight (z-score), $M \pm SD$	$-.48 \pm .74$	$.144 \pm .903$	-5.3	< .01
Infant head circumference (z-score), $M \pm SD$	$-.27 \pm .88$	$.217 \pm .847$	-4.02	< .01
Infant birth length (z-score), $M \pm SD$	$.19 \pm 1.12$	$.92 \pm 1.12$	-4.55	< .01
Drug intervention required to treat NAS, %	86.0	0.0	-	-

Drug use during pregnancy

Table 6.5 summarises analysis of range, central tendency and meconium results among ME

group mothers for each individual drug class that was used to create the composite variable of drug

use during pregnancy. Results show a high rate of cigarette use during pregnancy, one mother used up to 40 cigarettes per day. Approximately half the sample were also using cannabis, and the urine analysis shows this was close to accurate self-reporting. The rate of illicit opioid use was exactly the same in self-report and urine analysis. In contrast, a much higher rate of benzodiazepine use was evident from the meconium analysis than was reported in the interview. The composite scale showed that 97.8% of all mothers in MMT either reported or were found to have evidence of some type of drug use in pregnancy. The average composite scale score of 3.36 also indicates there was likely a relatively high rate of poly-drug use.

Table 6.5: Summary of drug use during pregnancy among methadone maintained mothers.

Drug use variable	Median	Mean (*SD*)	Range	% with evidence of use in pregnancy
Cigarette use (cigarettes per day)	11.67	13.43 (9.18)	0 – 40	92.5
Alcohol use (units per week)	0.0	1.03 (3.05)	0 – 20	19.4
Stimulant use (pills per week)	0.0	0.61	0 – 9	19.4
Cannabis use (joints per week)	0.33	1.23 (2.09)	0 – 10	50.5
'Any use' of cannabis, including urine analysis	-	-	-	53.8
Illicit benzodiazepine use (pills per week)	0.0	.75 (2.00)	0 – 14	26.9
'Any use' of benzodiazepines, including meconium analysis	-	-	-	39.8
Illicit opioid use (units per week)	0.0	1.23 (2.92)	0 – 19	25.8
'Any use' of opioids, including urine analysis	-	-	-	25.8
Composite scale of drug use in pregnancy	**3.0**	**3.36 (1.62)**	**0 – 8**	**97.8**

Maternal Personality

Maternal personality was measured using the TCI-125, presented as part of the maternal interview at term. First, the internal consistency of the TCI subscales were assessed with our sample. This was compared to the reported internal consistency from the TCI manual, in which the value for the internal consistency of the Persistence dimension was not available. The Cronbach's alpha values are presented in table 6.6 below. Our internal consistency scores are similar to the authors' reported scores and of adequate value. These scores indicate the items on each scale are reliably measuring the same construct.

Table 6.6: Internal consistency of the TCI-125.

Personality Dimension	Cronbach's Alpha	
	This study	Authors' report [a]
Novelty Seeking	.80	.78
Harm Avoidance	.88	.87
Reward Dependence	.74	.76
Persistence	.68	-
Self-Directedness	.90	.86
Cooperativeness	.84	.89
Self-Transcendence	.85	.84

[a] (Cloninger et al., 1993)

ME and NME group mothers were then compared on their Temperament and Character Inventory (TCI-125) scale scores as shown in table 6.7. Group comparisons were completed using two-tailed independent samples t-tests. To facilitate the interpretation of group differences Cohen's d effect sizes were also calculated and also reported in table 6.7. Compared to NME group mothers at term, mothers in MMT were higher in Novelty Seeking, and lower in Self-Directedness and Cooperativeness with a large effect size (>.80). In addition, mothers in MMT were higher in

Harm avoidance, and lower in Reward Dependence and Persistence with a medium effect size (>.50). This indicates that the group means differed by at least half a standard deviation, and is therefore an observable difference unlikely to be due to statistical artefact (Cohen, 1988). There was no group difference on just one scale, Self-Transcendence.

Table 6.7: ME and NME group differences in personality using the TCI-125.

Personality Dimension, $M \pm SD$	NME ($n = 108$)	ME ($n = 99$)	t	p	d
Novelty Seeking	8.03 ± 3.76	12.10 ± 3.98	7.55	<.001	1.05
Harm Avoidance	8.13 ± 4.81	11.57 ± 5.38	4.82	<.001	.67
Reward Dependence	10.79 ± 2.94	8.98 ± 3.19	-4.23	<.001	.60
Persistence	3.14 ± 1.51	1.96 ± 1.54	-5.56	<.001	.77
Self-Directedness	21.47 ± 3.38	13.69 ± 5.44	-12.23	<.001	1.72
Cooperativeness	22.29 ± 2.92	18.92 ± 4.76	-6.05	<.001	.85
Self-Transcendence	4.69 ± 3.41	5.18 ± 4.19	.93	.35	-

6.2.2 Characteristics of participants in the study at 18 months

The psychosocial characteristics of ME and NME groups were again compared at the 18 month follow-up. Data were derived from the maternal interview, and the results from these analyses are presented in table 6.8. When compared to the NME group, ME group caregivers were more likely to be low SES, in unstable accommodation or social housing, have clinically significant depressive symptoms, and were higher in anxiety symptoms. The ME group caregivers reported significantly lower average support from their family and social circle than the NME group caregivers. The ME group caregivers reported significantly higher average access to and support from formal social services than the NME group caregivers.

Table 6.8: Psychosocial characteristics of ME and NME group caregivers at 18 months

Characteristics at 18 months	NME *n = 107*	ME *n = 93*	t/χ^2	*p*
Low family SES, %	22.9	77.1	70.19	<.001
Social housing or unstable accommodation at 18 months, %	11.1	29.0	10.26	<.01
Depressive symptoms (EPDS raw score), $M \pm SD$	5.23 ± 3.96	10.03 ± 7.00	6.06	<.001
Clinically significant depressive symptoms (EPDS score ≥ 13)	4.7	34.4	29.18	<.001
Trait anxiety (STAI subscale score), $M \pm SD$	31.63 ± 7.61	41.21 ± 12.92	6.42	<.001
State anxiety (STAI subscale score), $M \pm SD$	27.60 ± 6.65	36.06 ± 11.62	6.42	<.001
Support from family and friends composite scale	13.27 ± 3.91	9.51 ± 3.78	-6.86	<.001
Support from social services composite scale	9.70 ± 5.08	16.18 ± 6.82	7.64	<.001

Post-natal drug use.

Drug use patterns among the ME and NME group caregivers derived from the 18 month interview are summarised in table 6.9 below. Results show that ME group caregivers were significantly higher drug users than the NME group caregivers in the 30 days prior to the 18 month interview. Almost three-quarters of the ME group were still prescribed methadone. There was a higher rate of cigarette use in the ME group, as well as cannabis, and benzodiazepines. In contrast, NME group caregivers were significantly higher users of alcohol. No evidence of inhalant or hallucinogen use was found in either group.

Table 6.9: Summary of drug use among primary caregivers at 18 months.

Drug use since birth of child	NME (95)	ME (75)	χ^2/t	p
Any Methadone use (prescribed and/or illicit) (%)	0	73.3	102.99	<.01
Any other opioids (%)	0	4.0	3.87	.08
Any tobacco (%)	17.9	78.7	62.62	<.01
Any alcohol (%)	74.7	49.3	11.67	<.01
Any cannabis (%)	4.2	37.3	30.09	<.01
Any benzodiazepines (%)	0	17.3	17.83	<.01
Any sedatives (%)	1.1	1.3	.03	1.00
Any inhalants (%)	0	0	-	-
Any stimulants (%)	0	4.0	3.87	.08
Any hallucinogens (%)	0	0	-	-
Composite scale of drug use (M ± SD)	.05 ± .22	.64 ± .78	6.97	<.01

6.3 Living Arrangements of the Children at 18 months and 9.5 years

At the 18 month follow up almost one-fifth ($N = 18$; 19.4%) of the ME group children were no longer in the care of their biological mother. In contrast none of the NME group children had left the care of their biological mothers by the age of 18 months. Living arrangements of the ME group are summarised in table 6.10. Seven ME infants (7.5%) were placed into OOHC directly from the hospital for two reasons; maternal imprisonment ($n= 2$) and history with CPS of substantiated reports of abuse or neglect against the mother relating to their older children ($n = 5$). The remaining children ($n = 11$) were removed between leaving the hospital and 18 months of age, for reasons including critical incidents such as finding the children at immediate risk of harm, and longer more complicated cases involving ongoing exposure to drug abuse, neglect, family violence and one case of serious maternal illness. Of the eighteen children who entered OOHC before the

18 month follow-up, eleven of them were stable with one primary caregiver and the remainder experienced between one and six caregiver changes up to the age of 18 months. Almost half (48.0%) of the MC families at 18 months had contact with CPS and, two further children experienced at least two changes in primary caregiver before returning to their mothers. These findings indicate a pattern of early instability of caregiving and contact with child protective services throughout the entire ME group.

Table 6.10: Living arrangements of ME children at 18 months and 9.5 years of age

	18 month Phase ($n = 93$)		9.5 year Phase ($n = 75$)	
	MC	**OOHC**	**MC**	**OOHC**
Proportion of retained sample, *n* (%)	75 (80.6)	18 (19.4)	43 (57.3)	32 (42.7)
With whānau/ in kinship care, *n* (%)	-	8 (44.4)	-	22 (68.8)
Has contact from CPS since last phase of follow up, *n* (%)	36 (48.0)	5 (27.8)[a]	26 (60.5)	16 (50.0)[a]

Number of caregiver changes from birth to follow-up, *n* (%):

	MC	OOHC	MC	OOHC
None:	73 (97.3)	0	29 (67.4)	0
One:	0	11 (61.1)	2 (4.7)	13 (40.6)
Two:	1 (1.3)	2 (11.1)	10 (23.3)	6 (18.8)
Three:	1 (1.3)	4 (22.2)	2 (4.7)	7 (21.9)
Four:	0	0	0	2 (6.3)
Five or more:	0	1 (5.6)	0	4 (12.5)

[a] Contact with CPS for additional care and protection concern. Excludes those contacted for ongoing support while in OOHC

At the 9.5 year follow up 42.7% of children (n = 32) that remained in the study were no longer in the care of their biological mothers. This number includes the nineteen children who were placed in OOHC between the 18 month and 9.5 year phases who will be the focus of the analysis determining antecedents of OOHC placements for the 9.5 year follow-up. In addition, five of the children in OOHC at 18 months were reunited with their mothers and are included in the MC group at 9.5 years. Over half (n = 26, 60.5%) of mothers who had the care of their child at 9.5 years were contacted by CPS for care and protection investigations. Some of the reasons for CPS contact included investigation of anonymous reports, ongoing review of families deemed to be at-risk of neglect or abuse, and referral by other government agencies such as the Police or health services following family violence, illness or evidence of continuing drug use by a caregiver. Of the MC group children at 9.5 years, one-third (n = 14, 32.6%) had previously experienced OOHC and more than one-fifth (n = 10, 27.9%) had two or more changes in primary caregiver during their lifetime.

The majority of children in OOHC at 9.5 years were in kinship care (n = 22, 68.8%), which includes those with their biological father or any other family member. Children in OOHC at 9.5 years old also experienced a greater number of caregiver changes; only 13 children (40.6%) were stable with one caregiver once placed away from their mothers, where 13 children (40.6%) had more than three changes during their lifetime. These results show that caregiving continued to be inconsistent for some ME children in both OOHC and MC groups, but the majority of those who remained in the care of their mothers at 9.5 years experienced fewer changes than those placed into OOHC.

6.4 Analyses of Predictors of OOHC at 18 months

6.4.1 Association between term characteristics and OOHC placement up to 18 months of age.

To determine the antecedents to OOHC placement by 18 months the OOHC group were first compared to the MC group on several key psychosocial variables. The group differences are shown in table 6.11. Mothers who no longer had care of their children were significantly younger, had a higher number of depressive symptoms, were more likely to be single parenting, smoked more cigarettes and used a greater number of different types of drugs during their pregnancies. There were no significant group differences in infant characteristics suspected to contribute to parenting difficulty, such as treatment for NAS, days in hospital or size at birth. In addition, the socio-economic indicators, SES scale score and whether they were living with family, in social housing or independently, were not different between groups.

Table 6.11: Comparison of MC and OOHC groups at 18 months on term characteristics

	Placement at 18 months		t/χ^2	p
	MC (*n* = 75)	OOHC (*n* = 18)		
Infant characteristic -				
Treated for NAS, %	85.3	100.0	2.99	.12
Total days in hospital, $M \pm SD$	16.08 ± 12.65	12.50 ± 5.29	1.17	.24
Birth weight z score, $M \pm SD$	-.55 ± .73	-.26 ± .69	-1.54	.13
Head circumference z score, $M \pm SD$	-.33 ± .89	-.09 ± .83	-1.04	.30
Birth length z score, $M \pm SD$	.13 ± 1.16	.46 ± .95	-1.12	.27
Maternal characteristic -				
Maternal age, $M \pm SD$, years	30.64 ± 4.73	26.28 ± 5.75	3.37	.001
Low education [a], %	78.7	88.9	.97	.51
Minority ethnicity, %	26.7	44.4	2.18	.16
Single parenthood, %	44.0	72.2	4.63	.04
High depressive symptoms at term [b], %	38.2	70.6	5.93	.01
Unplanned pregnancy, %	72.0	94.4	4.05	.06
Indifferent/upset about pregnancy (versus delighted/happy), %	38.7	66.7	4.62	.04
Maternal drug use in pregnancy -				
Average prescribed methadone dose in third trimester of pregnancy (mg per day) $M \pm SD$	65.40 ± 29.17	61.74 ± 42.59	.43	.67
Composite scale of drug use in pregnancy	2.51 ± 1.27	3.44 ± 1.15	-2.87	.01
Family background characteristic -				
Low socio-economic status [c], %	93.3	100.0	1.27	.58
Living in state house/with family, %	34.7	50.0	1.45	.28

[a] Low education: leaving school with no formal qualifications
[b] High depression: reaching clinical threshold (≤ 13) on the Edinburgh Post-Natal Depression scale
[c] Low SES: Semi-skilled, unskilled or unemployed on the Elley-Irving SES scale

Table 6.12 shows the comparison between MC group and the OOHC group at 18 months on maternal personality, as measured by the TCI scale scores in the term interview. On average mothers who no longer had care of their children scored higher on the dimensions of Novelty Seeking, but had lower scores on Self-Directedness, Reward Dependence and Cooperativeness. Together these findings indicate mothers who no longer have the care of their child may be less compliant and attached to significant others, as well as more impulsive, independent and withdrawn from others as measured just prior to the birth of their child. Many of the subscales were significantly, but weakly, inter-correlated. Significant correlations of moderate strength were found between the subscales of Self-Directedness and Novelty Seeking ($r = .51$), Self-Directedness and Harm Avoidance ($r = .51$), Cooperativeness and Reward Dependence ($r = .52$), and Self-Directedness and Cooperativeness ($r = .67$). Based on these results, Self-Directedness was not included in the final model as an independent variable to predict OOHC. This is a method to avoid the concern of multicollinearity in the binary logistic regression analysis, suggested in a review of binary logistic regression methods by Midi, Sarkar, and Rana (2010).

Table 6.12: Comparison of MC and OOHC mothers on the TCI-125 personality inventory

	Placement at 18 months		*t*	*p*	*d*
	MC (***n* = 75**)	**OOHC** (***n* = 18**)			
Novelty Seeking	11.56 ± 4.13	13.76 ± 3.32	-2.10	.04	.59
Harm Avoidance	11.43 ± 5.39	12.76 ± 4.92	-.96	.34	
Reward Dependence	9.23 ± 3.07	7.35 ± 3.31	2.29	.02	.59
Persistence	2.03 ± 1.61	2.06 ± 1.21	-.08	.93	
Self-Directedness	14.44 ± 5.02	10.76 ± 5.91	2.69	.01	.67
Cooperativeness	19.72 ± 4.05	15.06 ± 5.71	4.03	< .001	.94
Self-Transcendence	5.03 ± 4.30	4.59 ± 3.26	.48	.64	

6.4.2 Predictors of OOHC placement before 18 months of age.

Binary logistic regression was performed to assess what impact a number of maternal characteristics and social factors had on the likelihood that a child would be in OOHC at the age of 18 months. Variables that reached the cut-off of $p \leq .1$ for statistical significance were tested in a step-wise fashion, both forwards and backwards methods were used. The final model with best fit was determined to contain five independent variables; maternal age at birth of child, Cooperativeness score from the TCI-125, composite score of drug-use in pregnancy, whether the mother was a single parent, and whether the mother reached the threshold for clinically significant depression. The Box-Tidwell procedure was used to assess the linearity of continuous variables, with no significant results for interaction terms proving that all continuous independent variables are linearly related to the logit of the dependent variable.

The model containing all the predictors was statistically significant, $\chi^2 (5, n = 93) = 42.858$; $p = <.001$ indicating this model can distinguish between those who were in OOHC at 18 months, and those who remained in the care of their biological mothers. The final model explained between 36.9% (Cox and Snell R square) and 59.0% (Nagelkerke R square) of the variance in placement status, and correctly classified 87.1% of cases. As shown in table 6.13 all variables except made a unique statistically significant contribution to the model. The strongest predictor of being placed out of home was maternal age at birth, with an odds ratio of .75 indicating that each additional year of age at the birth of their child reduced the risk that their child would be in OOHC at 18 months, controlling for all other factors in the model. A higher Cooperativeness score was also associated with reduced risk that their child would be in OOHC, each point increase reduces the risk by a factor of 1.2. The other factors were all related to increased risk of OOHC, being a single parent increased the risk by a factor of 6, having clinically significant depressive symptoms

increased the risk by a factor of 8, and each point increase in the composite drug use in pregnancy

scale score increased the risk almost 2-fold.

In sum, the model suggests that those children with mothers who were single parents, used

more types of drugs during their pregnancy, were younger, and had greater depression, and were

lower in Cooperativeness, were more likely to be in OOHC by 18 months of age.

Table 6.13: Fitted binary logistic regression model: Predictors of OOHC at 18 months

Characteristic	B (SE)	*p*	OR	95% CI for Odds Ratio	
				Lower	Upper
Maternal age at term	.29 (.09)	.001	.75	.63	.89
Single parenthood	1.87 (.91)	.04	6.50	1.10	38.53
Cooperativeness (TCI-125 scale score)	-.19 (.08)	.02	.83	.71	.97
High depressive symptoms at term [a]	2.13 (.92)	.02	8.42	1.38	51.41
Composite scale of drug use in pregnancy	.60 (.25)	.02	1.83	1.11	3.00

Model fit
Omnibus test: $\chi^2 = 42.86$; $df = 5$; $p < .001$
Hosmer and Lemeshow test: $\chi^2 = 5.92$; $df = 8$; $p = .66$

[a] High depression: reaching clinical threshold (≤ 13) on the Edinburgh Post-Natal Depression scale

6.5 Analyses of Predictors of OOHC at 9.5 years

6.5.1 Association between maternal, child and social characteristics and OOHC placement from 18 months to 9.5 years of age.

For the multivariate analysis, MC and OOHC groups were compared on a number of

variables, including maternal demographic data, mental health and personality, child behaviour

and temperament at 18 months of age, and social support factors.

As shown in table 6.14 below, The OOHC families differed significantly from MC families on four key variables collected at 18 months. First, mothers who lost custody of their child between 18 months and 9.5 years were of lower-SES compared to those who retained custody. Second, mothers of children placed in OOHC between 18 months and 9.5 years reported a history of higher methadone doses, taken as the highest dose ever used, than those in the MC group. While this difference is statistically significant the result should be interpreted with caution as there was a large standard deviation. Third, mothers of OOHC group children reported significantly higher involvement from social services than those in the MC group. Lastly, a greater proportion of mothers of children in OOHC had clinically significant depressive symptoms than those who retained the care of their child. The TCI-125 personality scales were re-examined and methadone maintained mothers in the OOHC group at 9.5 years had similar scores to the MC group. Only the difference in Novelty Seeking scores approached significance ($p = .09$). Similarly, there were no group differences found on measures of maternal age and drug use during pregnancy. Some variables showed high standard deviations within each group; where this was identified the variables were checked for outliers and those cases checked for scoring errors, and corrected where necessary.

Table 6.14: Comparison of MC and OOHC groups at 9.5 years on psychosocial characteristics at term and 18 months.

	Placement at 9.5 years		t/χ^2	p
	MC (*n* = 43)	OOHC (*n* = 19)		
Maternal social characteristics (Term)				
Maternal age at birth of child, $M \pm SD$, years	30.65 ± 5.12	30.32 ± 4.53	.25	.81
Average methadone dose in 3rd trimester, (mg/day), $M \pm SD$	60.68 ± 30.01	65.33 ± 25.07	-.59	.56
Composite scale of drug use in pregnancy, $M \pm SD$	3.07 ± 1.65	3.42 ± 1.57	-.78	.44
Maternal personality (Term)				
Novelty Seeking, $M \pm SD$	11.14 ± 3.90	13.00 ± 3.74	-1.75	.09
Harm Avoidance, $M \pm SD$	10.58 ± 5.23	11.31 ± 5.71	-.50	.62
Reward Dependence, $M \pm SD$	9.00 ± 3.09	9.89 ± 2.88	-1.07	.29
Persistence, $M \pm SD$	2.16 ± 1.60	2.26 ± 1.69	-.22	.82
Self-Directedness, $M \pm SD$	15.44 ± 5.21	13.79 ± 5.21	1.15	.25
Cooperativeness, $M \pm SD$	20.05 ± 4.19	18.84 ± 4.25	1.04	.30
Self-Transcendence, $M \pm SD$	5.19 ± 4.26	6.052 ± 4.75	-.71	.48
Infant-Toddler Symptom Checklist (18 months)				
Self-Regulation, $M \pm SD$	5.44 ± 5.70	8.21 ± 4.86	-1.84	.07
Total Score, $M \pm SD$	32.67 ± 20.38	36.42 ± 20.10	-.67	.51
Maternal characteristics (18 months)				
Depression score, (EPDS) $M \pm SD$	9.88 ± 7.25	12.42 ± 7.91	-1.57	.12
High depressive symptoms [a], %	27.9	57.9	5.08	.04
State anxiety score, (STAI) $M \pm SD$	36.53 ± 11.49	38.68 ± 14.67	-.62	.54
Trait anxiety score, (STAI) $M \pm SD$	40.98 ± 13.01	47.95 ± 16.56	-2.33	.08
Single Parent, %	48.8	63.2	1.09	.41
Family SES (Elley-Irving scale), $M \pm SD$	6.19 ± 1.82	7.32 ± 1.20	-2.48	.02

Table 6.14: Comparison of MC and OOHC groups at 9.5 years on psychosocial characteristics at term and 18 months.

	Placement at 9.5 years		t/χ^2	p
	MC (*n* = 43)	OOHC (*n* = 19)		
Low SES [b], %	79.1	100.0	4.65	.05
Living in state house or with family, %	23.3	31.6	.48	.54
Caregiver drug use (18 months)				
Any methadone use since term, %	90.7	84.2	.55	.67
Methadone dose at 18m interview (in grams), $M \pm SD$	54.15 ± 38.79	58.72 ± 33.48	-.43	.67
Highest methadone dose ever used (in grams), $M \pm SD$	56.51 ± 37.59	87.74 ± 72.79	-2.22	.03
Any 'other' opioid use , %	7.0	0.0	-	-
Any cannabis use, %	41.9	47.4	.16	.78
Any methamphetamine or amphetamine use, %	2.3	10.5	1.93	.22
Any benzodiazepine use, %	23.3	15.8	.44	.74
Any barbiturate or sedative use, %	2.3	0.0	-	-
Any alcohol, %	34.9	57.9	2.87	.10
Alcohol use, standard drinks per week, $M \pm SD$	2.97 ± 8.93	1.78 ± 5.69	.52	.61
Social support (18 months)				
Support from family scale, $M \pm SD$	6.71 ± 2.33	6.05 ± 2.93	.95	.35
Support from services scale, $M \pm SD$	15.45 ± 6.14	19.58 ± 7.43	-2.28	.03
Partner deviance scale, (*n* = 38 [c]) $M \pm SD$	5.65 ± 3.68	8.08 ± 4.94	-1.70	.10

[a] High depression: reaching clinical threshold (≤ 13) on the Edinburgh Post-Natal Depression scale
[b] Low SES: Semi-skilled, unskilled or unemployed on the Elley-Irving SES scale
[c] Missing cases as many had no partner at time of interview

6.5.2 Predictors of OOHC placement between 18 months and 9.5 years of age.

A second binary logistic regression was performed to assess what impact a number of maternal characteristics as assessed at 18 months had on the likelihood that a child would be placed into OOHC between 18 months and 9.5 years of age. Variables from the between groups analyses that reached the cut-off of $p \leq .1$ were entered into the model in a step-wise fashion, both forwards and backwards methods were tested. The partner deviance scale was unable to be tested as there were many missing data points due to the high rate of single mothers. When controlling for covariates the TCI Novelty Seeking scale, the Trait Anxiety scale, the child's self-regulation score and measure of support from services were no longer accounting for variance in OOHC placement. The final model with best fit was determined to contain three independent variables; maternal high depressive symptoms as measured using the cut-off score of 13 for the EPDS, family socio-economic status, and the highest dose of methadone the mother had used in her lifetime.

The final model was statistically significant, (χ^2 (3, $n = 61$) = 17.45; $p = .001$) indicating this model can distinguish between those who were moved to OOHC between 18 months and 9.5 years of age, and those who were in the care of their biological mothers at 9.5 years of age. The final model explained between 24.5% (Cox and Snell R square) and 34.6% (Nagelkerke R square) of the variance in placement status, and correctly classified 74.2% of cases. As shown in table 6.15 all variables except Family SES made a unique statistically significant contribution to the model. The strongest predictor of being placed out of home was the mother having a high number of depressive symptoms at 18 months, indicating that those with significant depressive symptomology when their child was 18 months old had four times the odds of having their child placed in OOHC by the age of 9.5 years, controlling for all other factors in the model. The highest methadone dose the mother had ever used also predicted placement at 9.5 years such that for each milligram increase in dose, the risk of their child entering OOHC increased by a factor of 1.02.

The family socio-economic status was measured using the Elley-Irving scale and risk of OOHC was shown to increase by a factor of 1.60 for a single unit increase in score, although the confidence intervals are wide thus we cannot be sure of the significance of this result. In sum those mothers who had a lower socio-economic status, a high amount of depressive symptomology and a history of higher doses of methadone as measured when their children were 18 months old, were less likely to retain care of their child until 9.5 years of age.

Table 6.15: Fitted binary logistic regression model: Predictors of OOHC at 9.5 years

Characteristic	B (SE)	*p*	OR	95% CI for Odds Ratio	
				Lower	Upper
Family SES	.60 (.28)	.03	1.83	1.05	3.18
High Depressive Symptoms (EPDS score <13)	1.60 (.69)	.02	4.97	1.29	19.15
Highest methadone dose ever prescribed (mg)	.02 (.01)	.03	1.02	1.00	1.03

Model fit
Omnibus test: $\chi^2 = 19.30$; $df = 3$; $p < .001$
Hosmer and Lemeshow test: $\chi^2 = 5.63$; $df = 8$; $p = .69$

Chapter 7: Discussion

The current study examined the living arrangements of children born to mothers in methadone maintenance treatment during pregnancy, with the aim of identifying characteristics that may distinguish mothers with children who remained in their care (maternal care – MC) from those who had children moved into out-of-home care (OOHC). To achieve this, the current study assessed key characteristics of mother-child dyads when the child was 18 months of age, and again at 9.5 years to determine if (i) out-of-home care at 18 months can be predicted by characteristics identifiable at term, and (ii) out-of-home care at 9.5 years can be predicted by factors identifiable at or before 18 months of age. In the following section the analyses are first summarised, and the key findings are then discussed.

7.1 Summary of Main Analyses at 18 months and 9.5 years

At 18 months of age approximately one in five children prenatally exposed to methadone was in OOHC, cared for by someone other than their biological mother. OOHC group mothers had higher rates of clinically significant depressive symptomology, higher rates of drug use in pregnancy, were younger in age, more likely to be a single parent, and had lower Cooperativeness personality scale scores than MC group mothers, as measured at the birth of their child. Together these variables created a model which was a significant predictor of OOHC at 18 months, and the amount of variance in the sample that was accounted for by this model was adequate.

By 9.5 years of age just over two in five children prenatally exposed to methadone were in OOHC. It was found that OOHC group mothers had higher rates of clinically significant depressive symptomology, lower socio-economic status and had higher doses of methadone in their treatment for opioid addiction than MC group mothers, at the 18 month follow-up. This model successfully

predicted OOHC by the age of 9.5 years, although the amount of variance in the sample that is accounted for by these variables is low. This would indicate that there is likely another factor that was not tested in this study that contributes to OOHC placement.

While the analyses at each time point were conducted independently, there were a number of similarities apparent in the findings. At both time points, a significant predictor for OOHC was maternal depressive symptomology. As measured by the EPDS, mothers who were likely to qualify for a diagnosis of Major Depression at term, and again at 18 months, were more likely to have their children entering OOHC by 18 months and 9.5 years respectively. Indicators of social risk were also evident in both analyses, these include single parenthood and young maternal age which were related to higher risk of OOHC at 18 months, and low family SES at 18 months which predicted OOHC at 9.5 years. This suggests that adequate economic support for the mothers may act as a protective factor against having their child moved to OOHC. Finally, the severity of drug dependence was a strong predictor of OOHC in each analysis, at 18 months the quantity of drug use in pregnancy, and at 9.5 years the highest dose of methadone ever taken by the biological mother. The primary difference between the two analyses is in the contribution of maternal personality. While the personality subscale of Cooperativeness independently predicted OOHC at 18 months, none of the subscales of the same personality measure were predictive of OOHC by the 9.5 year follow up.

7.1.1 Maternal personality.

No other studies have assessed the personality of mothers in MMT during pregnancy. The current study has shown that the TCI-125 is a short form personality scale sensitive enough to detect differences between the MMT group and controls, as well as identify differences within this high-risk group. Low Cooperativeness and Self Directedness scores are associated with personality

disorder diagnoses (Svrakic et al., 1993). However, whether ME group mothers reached the threshold for personality disorder was not directly assessed as this study used the short form version, and cut-off scores for clinical significance were not available. For this reason, subscale scores were used and the NME group data analysed to identify what might be an expected range of scores among a sample of mothers from the Christchurch community. Compared to these NME mothers, ME mothers were higher in Novelty Seeking and Harm Avoidance, and lower in Reward Dependence, Persistence, Self-Directedness and Cooperativeness.

Novelty Seeking is the preference for, and behavioural activation in response to, novel stimuli, exhibited by behaviours such as impulsivity, exploration and extravagant enthusiasm (Cloninger et al., 1994). In contrast, Harm Avoidance is related to the behavioural inhibition system, and associated with traits such as pessimism, shyness and wariness of strangers (Cloninger et al., 1994). Results of this thesis match the findings of prior studies, it has been consistently found that drug users of all types score higher on the dimension of Novelty Seeking, which is also linked to drug-seeking behaviour in adolescence (Ball, Tennen, & Kranzler, 1999; Bardo, Donohew, & Harrington, 1996; Helmus, Downey, Arfken, Henderson, & Schuster, 2001; Wills, Vaccaro, & McNamara, 1994). Further, Vukov, Baba-Milkic, Lecic, Mijalkovic, and Marinkovic (1995) found particularly high Harm Avoidance in substance dependent women due to their increased scores on the 'fear of uncertainty' subscale. Results are mixed regarding the dimension of Reward Dependence, those low on this scale can be described as detached from others, withdrawn and independent. Vukov and colleagues (1995) determined that substance-dependent women were no different to controls on the overall dimension, but somewhat less independent than their non-using counterparts. In contrast, Ball and colleagues (1999) found substance-abusers were lower in Reward Dependence than non-abusers.

Verheul (2001) proposed there are three different pathways linking the temperament dimensions and the onset of drug addiction, and it is likely each individual is subject to a combination of these depending on their personality profile. For those high in Novelty Seeking with behavioural disinhibition it was proposed that a lack of appropriate socialisation, or deviant socialisation, means the individual is more open to taking illicit drugs despite the social norms which usually operate to constrain this behaviour, ultimately leading to more regular use and dependence. For those high in Harm Avoidance it was proposed their sensitivity to stress, anxiety and tendency toward pessimism make them more likely to seek substances as a remedy, known as the "self-medication" pathway. Finally, it is thought that those scoring high in extraversion and reward-seeking (high Novelty Seeking) have an increased sensitivity to positive reinforcement. This means that when the individual consumes drugs they are more susceptible to the reward of the "high" from intoxication, driving them to seek and consume drugs again as the behaviour is strongly positively reinforced, leading to dependence.

While these temperament dimensions have been studied in-depth, there is less evidence regarding the character dimensions of substance abusers. Unlike temperament, which is partly biologically determined, character dimensions are thought to develop over time through reciprocal interactions between the person and their environment (Cloninger et al., 1993). Some studies indicate substance abusers typically have low Self-Directedness scores compared to controls, and those dependent on opioids might have even greater deviance on character subscales than those dependent on other substances; opioid dependents scored significantly lower on Self Directedness than those dependent on alcohol (Le Bon et al., 2004; Milivojevic et al., 2012; Yoon, Kim, & Kim, 2007). Ball and colleagues (1999) found having higher Cooperativeness was associated with the individual having fewer indicators of substance-dependence than those low in Cooperativeness.

Finally, in one study, those who were poly-drug users scored much lower in Self-Directedness than those who used methamphetamine alone, indicating a link between severity of drug use and Self Directedness (Yoon et al., 2007). Overall, this sample of women in MMT might be summarised as prone to anxiety and shyness, impulsivity and excitability, independence and withdrawal, and have learnt to be more intolerant, unhelpful and blaming of others.

Since his original work on the process model Belsky has continued to review the literature finding support for his hypothesis that personality is in fact an inner resource. This resource is both distally and proximally related to parenting capacity, through reciprocal interactions with the child and their environment. For example, personality influences the parent's reactions to their child, but also influences the development of other social relationships parents have which may determine the level of social support and/or conflict they encounter (Belsky & Barends, 2002). Lester and Tronick (1994) purport personality is closely associated with the onset and maintenance of substance dependence, which both affect mothers' capacity to perform tasks necessary for successful mutual regulation. While Belsky, and Lester and Tronick, highlighted the importance of maternal personality as a contributor to parenting behaviour and maltreatment, more recent researchers working on models within Bronfenbrenner's (1979) ecological tradition have ignored personality in their discussion of risk factors for poor parenting and OOHC, favouring indicators of clinically significant psychopathology from the DSM's classifications (Cash & Wilke, 2003; English et al., 2015). Much criticism has been made of the current categorical classifications of personality disorder and having a comprehensive dimensional measure of personality to describe mothers in MMT is a significant advantage of this study (Reardon, Mercadante, & Tackett, 2018).

Within the ME group, mothers who had a child placed in OOHC by 18 months were higher in Novelty Seeking and lower in Reward Dependence, Self-Directedness and Cooperativeness than

those who retained care of their child. These results describe individuals who are more likely to be impulsive, have poor attachment to other persons, be less goal-oriented and organised, and be less likely to agree or cooperate with others. From these domains, only Cooperativeness independently predicted OOHC by 18mo of age. In this study the scales of Self-Directedness and Cooperativeness were highly intercorrelated and therefore just Cooperativeness was chosen for testing in the final model as this scale showed greater between-groups differences than Self-Directedness.

No personality dimensions predicted OOHC placement to 9.5 years of age, and the MC and OOHC groups had no differences in their scale scores. Although, group differences in Novelty Seeking approached significance, and this scale was unsuccessfully tested for inclusion using the stepwise method for the logistic regression model. One explanation, in line with our understanding of ecological models of parenting, could be that personality is a distal factor influencing parenting style, which is mediated by the proximal factors of social risk, drug-use or depression that were significant predictors of OOHC in the final model.

Clark, Kochanska and Ready (2000) showed that maternal personality measured at 8-10 months of age could predict parenting behaviours five months later. This author found no other evidence of personality predicting parenting in a longitudinal study, hence the current results from birth up to the age of 18 months are a significant contribution to the field. Traditionally, personality was thought to be stable across the lifespan, however, more recent data is challenging this view, suggesting that personality changes with age alongside the experience of significant life events (Caspi, Roberts, & Shiner, 2005; Specht, Egloff, & Schmukle, 2011). Over the duration of the MIP study the participants may have matured, had children, learned to parent, got married, suffered loss, and so on, and their personalities may have developed or changed in response to these events.

Perhaps a re-analysis of personality in early childhood would be warranted to determine if assessed again, personality might still be predicting OOHC at the later stage.

7.1.2 Maternal depression.

Maternal depressive symptoms measured in an earlier phase predicted subsequent placement into OOHC, and was the only factor directly associated with OOHC at 18 months and 9.5 years. For the 18 month analyses, being above the cut-off score for clinically relevant depressive symptoms on the Edinburgh Post-Natal Depression Scale (EPDS) measured at term was related to an 8-fold increase in the likelihood of OOHC. In the 9.5 year analyses a score above the clinical cut-off on the EPDS as measured in the 18 month interview was associated with an almost 5-fold increase in the likelihood of OOHC. Using the dichotomised variable derived from the EPDS score is a significant advantage as it identifies those who have meaningfully elevated depressive symptoms, as opposed to identifying the statistical differences between raw scores that do not delineate those at risk for a depressive disorder (Matthey, 2004).

Current findings are consistent with findings from three prior studies that suggested OOHC was related to, or could be predicted by, maternal depression for women dependent on drugs when controlling for other psychosocial variables (Gilchrist & Taylor, 2009; T. Grant et al., 2011; Nair et al., 1997). Two further studies found maternal depression was related to contact with child protective services (Lean et al., 2013; Taplin & Mattick, 2013). These studies all employed different measures of depression making discussion of the relative magnitude of influence difficult. Further, a study on a sample of non-substance using mothers reported that depression was independently related to risk of entry into foster care when controlling for other social risk factors (English et al., 2015).

Lester and Tronick (1994), and Belsky (1984) claim mental health is part of the personality, a key psychological resource that affects the mothers' capacity to parent. In line with the author's models maternal depression may be interpreted as a significant risk factor for maladaptive parenting that is likely to influence placement into OOHC in high-risk, or socially disadvantaged, populations. Empirical studies have consistently found support for the conclusion that maternal depression is associated with greater difficulty in the parenting role. A meta-analysis concluded that maternal depression was associated with decreases in positive behaviours such as warmth and responsivity; increases in negative behaviours such as intrusiveness and hostility; and increases in disengaged behaviours such as withdrawal or lack of involvement (Lovejoy et al., 2000). Since this time, more work has been completed to understand *how* depression might influence poor parenting which can lead to OOHC. Hien et al. (2010) found that mothers diagnosed with a depressive disorder were no more or less likely to have high child abuse potential scores than those with substance use disorders, but the association between diagnosis and child abuse was almost entirely mediated by emotion regulation ability (a measure of anger expression and reactivity). This highlights a mechanism through which both depression and substance use might contribute to child maltreatment; child abuse is more likely when mothers have difficulties with emotion regulation, and emotion regulation difficulties are common to both substance use disorders and depressive disorders (Sloan et al., 2017).

Rates of depression during pregnancy among women dependent on opioids is high, in one review approximately one-third of all women met criteria for depressive disorder, but estimates ranged from 25-50% depending on the age of the sample and which measure was used (Arnaudo et al., 2017). When considering whether depression is an appropriate target for intervention to help prevent OOHC it is useful to consider what is causing and maintaining the disorder in this

population to determine how one might treat it. Research has shown that social factors, namely both poorer neighbourhoods and low family SES, are associated with both higher rates of depression and parenting outcomes such as low maternal warmth. Each of these pathways were independently significant, for example, poverty predicted low warmth, and maternal depression did not entirely explain this effect (Klebanov, Brooks-Gunn, & Duncan, 1994). Protective factors have been shown to mediate the impact of low SES on parenting behaviours, for example having a supportive partner alleviates the impact of depression on the mother (Simons, Lorenz, Wu, & Conger, 1993). From this brief discussion it is evident there are several pathways through which maternal depression has an effect on parenting and likelihood for OOHC. While a constellation of family based psychosocial risk factors together might influence OOHC, depression has a robust effect on the mother's ability to parent and intervention to treat depression might alleviate some of this risk.

7.1.3 Pre- and post-natal drug-use.

Higher drug use during pregnancy was associated with a greater risk of OOHC placement before 18 months of age. The composite scale of drug use in pregnancy measured both the quantity and number of commonly misused drugs, therefore those who scored higher might be considered 'riskier' drug abusers. Results from the current study are in line with some previous research; higher cocaine use during pregnancy among drug dependent women was related to risk of OOHC in two studies (Eiden et al., 2007; Minnes et al., 2008).

Lester and Tronick (1994) indicated that the impact drug use had on parenting was through two distinct pathways; first, the effect of ongoing drug use on parenting capacity as economic and attentional resources are diverted to obtaining and taking drugs; second, the indirect effect from *in-utero* exposure which affects the neurobehavioural functioning of the child and therefore makes

them more difficult to parent. This second effect is particularly evident through early infancy as opioid exposed infants are very likely to develop NAS, and therefore be difficult to soothe (LaGasse et al., 2003).

Women who had used higher doses of methadone in the past were more likely to have their child placed in OOHC by age 9.5 years. To the best of this authors' knowledge, no existing research has investigated this association. Within this study sample the variance in reported methadone doses was high at the 18 month interview, ranging from 1 to 150 milligrams per day. The range in highest dose ever used in one day was even greater, ranging from 9 to 600 milligrams. For comparison, 60-100 milligrams per day is typically considered a high dose (Bell, 2014). Why we found this association is not clear, as high doses of methadone have several conflicting implications. First, those maintained on higher doses are more likely to be compliant with MMT protocol as higher doses are related to retention in MMT (Faggiano, Vigna-Taglianti, Versino, & Lemma, 2003). Second, those disclosing very high doses might have supplemented their dose with methadone from another illicit source. Thirdly, it may be that they have required one-off high doses for pain relief as prescribed by a doctor. The context in which the highest dose was used was not recorded by those administering the interview, and so whether this represents illicit supplementation or short-term increases in prescribed doses is only conjecture.

Alternatively, higher prescribed methadone doses are common in those who have been in MMT for longer, or are more tolerant to opioids when they start treatment (Bakker & Fazey, 2006). If this is the case a higher tolerance to opioids might be linked to OOHC as high tolerance indicates a pattern of heavy drug use, although maternal history of drug use and tolerance should be assessed in future research to test this assumption.

Lester and Tronick (1994) suggest that ongoing drug use might impact on parenting capacity as resources are directed toward drug use. This may certainly be the case for those in MMT, as even though it is a well-supported treatment that improves outcomes compared to ongoing illicit opioid use, there are daily challenges involved in participating in MMT. First, MMT has been described as 'liquid handcuffs' due to the highly regulated way in which it is dispensed (Carville, 2014). Patients are required to collect doses almost every day, unless they have a limited "takeaway dose" which is given to those considered to be at low risk for diverting the medicine and are compliant with the MMT program. In addition, patients are subject to regular visits to their general practitioner and specialised clinics to ensure compliance. Other difficulties explained by those in MMT in qualitative research include the enduring stigma of being in the treatment program, poor treatment by staff, and poor access to resources (Deering et al., 2011). Daily hassles increase stress, and for under-resourced parents the effect can be particularly potent. Increased parenting stress has been linked to child maltreatment in a sample of children that were exposed to drugs *in-utero* (Kelley, 1992).

When interpreting findings regarding the impact of drug use and MMT on entry into OOHC, it is important to note that different CPS jurisdictions have differing policies regarding parental drug use and measuring the risk it presents to the child. For example, some jurisdictions have policies stating that drug use during pregnancy must be reported, and some states in the USA have policies mandating that where drug use during pregnancy is confirmed, children must be removed from the home (Guttmacher Institute, 2018). This study did not take the decision-making process of New Zealand's CPS, Oranga Tamariki, into account or determine why the children entered other care arrangements away from their biological mothers. New Zealand does not have laws requiring mandatory reporting, and whether OOHC is necessary is typically determined in a

family group conference. Determination of the reason for placement into OOHC might aid the interpretation of whether higher doses of methadone or higher drug use in pregnancy are taken into account in the decision-making process.

7.1.4 Social risk factors.

This study has shown that opioid-dependent women experience a range of social risks that can understood as the lack of both social and economic support. As a direct measure of economic support, this study employed the Elley-Irving scale which stratifies job titles into bands according to the average market income as determined by the census data (Elley & Irving, 2003). This provides a simple scaled score of likely income. In both analyses, maternal, paternal and highest family SES were all tested in the model as many women at the time of the interview were not employed, in part due to pregnancy or motherhood. Other measures of economic and social support that were tested included maternal age, single parenthood, and maternal education.

Socio-economic status.

In the 9.5 year analysis the highest family SES score as measured at 18 months was a significant predictor of entry into OOHC. This finding is in line with Lester and Tronick's (1994) model, and with previous research which has established a tenuous link between SES and OOHC (Eiden et al., 2007; Grella et al., 2006; Lean et al., 2013). It is a strength of this study that the Elley-Irving scale has been found useful to delineate small SES differences within this group that are altogether typically low SES when compared to the wider community.

Lester and Tronick (1994) described the effect of SES together with the lack of social support in a broad domain they believed reflected the effect of a 'poverty lifestyle' on parenting and mutual regulation. How SES affects parenting has been studied widely, but how it interacts with drug dependence or MMT is less well-known. An early study of mothers in MMT showed

that they were more likely to need assistance with parenting, and have poor social support than a control sample matched for age and SES (Fiks et al., 1985). This led the authors to conclude that the children of women in MMT were particularly high risk due to the interaction between social factors and the effects of having a mother in treatment for drug dependence. This might reflect the cumulative impact of stressors, whereby the psychological demands of the treatment program compound the stress from social factors such as poor social support and lack of resources for the family.

How SES might influence parenting is disputed in the wider literature also. Some researchers suggest that SES is a single factor that affects a broad range of outcomes, whereas others believe that SES is a proxy for a variety of other social risks that independently predict differences in parenting, such as the impact of education on choice of discipline (Hoff et al., 2002). SES itself has been shown to predict parenting styles, attitudes and beliefs about the need for obedience and control versus support for autonomy (Hoff et al., 2002). Importantly for parenting and OOHC, low SES is related to a greater use of physical punishment for discipline, as opposed to verbal or psychological techniques such as reasoning (Hoff et al., 2002). One explanation is that a low SES means there are fewer resources for the family, which increases the stress placed on parents, which in turn increases the chance of poor parenting, maltreatment and OOHC (Gelfand, Teti, & Radin Fox, 1992; Rodgers, 1998). In sum, it is likely that the mechanisms linking SES and OOHC are a complex interaction of a lack of resources, parenting attitudes and behaviours. The other findings in the domain of social risk, and possibly related to SES, are discussed in the following sections. Results showed that SES at the birth of the child did predict entry into OOHC by 18 months, but single parenthood and maternal age were predictors.

Single parenthood.

This author found no previous studies which examined the population of drug-dependent women in treatment that has established marital status, or single parenthood, as a predictor of child OOHC. Single parenthood was not described specifically in Lester and Tronick's' model but may be best considered as part of the Lifestyle factor. There may be several mechanisms of action through which single parenthood affects parenting practices and therefore OOHC; of note are the dual effects of having a single income for the household, and lack of support in the parenting role. Single parenthood has consistently been linked to occurrence of family violence, and child neglect, both of which are associated with to placement into OOHC (Gelles, 1989; Schneider, 2017). For example, an older study looked into family composition and found that single parenthood was associated with risk of child abuse even when considering confounds of SES and maternal age (Daly & Wilson, 1985). These researchers further found that abuse was more likely when living with a step-parent than a single parent, which was not considered in this analysis. A more recent study quantified the risk to show that those living with step-parents were eight times more likely to die from child maltreatment than those living with their biological parents (Stiffman, Schnitzer, Adam, Kruse, & Ewigman, 2002). While beyond the scope of this study, these findings highlight the need to consider the social support network of the parent, what behaviours and attitudes are being influenced by the processes of socialization, and family composition more broadly. There is a lack of recent research into the impact of single parenthood, possibly due to a reluctance to characterise an increasing number of families in our society as being at risk for child abuse. However, in higher risk populations, future research should aim to disentangle the association between single parenthood and OOHC to better understand where and how to intervene.

Maternal age.

The current finding that younger maternal age was associated with an increase in risk for OOHC was similar to findings in other populations of drug-dependent mothers in treatment. Overall, the results from the literature review were mixed, likely due to different methodologies for measuring age, which confounding variables were included in the analyses, and study design. However, in studies which showed age had a significant effect on outcome, all concluded that being younger was associated with risk of losing care of the child (Grella et al., 2006; Lean et al., 2013; Meier et al., 2004; Nair et al., 1997).

The association between maternal age and OOHC may be explained in a variety of ways. Firstly, those who are younger may be more likely to depend on family members to provide support and care for their children as they have less experience with caring for children, and lower maturity (Nair et al., 1997). Secondly, it has been shown that younger age is associated with negative parenting behaviours (among other social risk factors) whereas positive parenting behaviours are associated with parental self-efficacy, perceived competence in the maternal role, and having support from a partner, all of which might be less likely present in the lives of younger, inexperienced mothers (Thomson et al., 2014). Finally, younger age might be an indicator of the lack of availability of practical resources such as income, transportation, and housing, that increases parenting stress, which negatively affects parenting behaviours (Gelfand et al., 1992; Rodgers, 1998).

It should be noted that whether the mothers in this study had older children prior to the study child was not considered when assessing age as a possible contributor to OOHC. While this analysis would aid interpretation of the results regarding maternal age, helping determine maturity and experience in the parenting role, it is interesting that despite these limitations the effect for age at birth of the index child was a highly significant predictor of OOHC by 18 months.

It is evident that further research is required to elucidate what mechanisms are operating to link maternal age, single parenthood and SES to risk for OOHC, however the existing research highlights several key mechanisms that might be operating all together, or independently for different cases. As such, broad group methods may simply be insufficient to address these questions, and individual needs should be considered when designing interventions.

7.2 Non-significant findings

The theoretical models indicated that certain findings could be expected that were not supported in the current study. Importantly, it was expected that some characteristics of the child would influence OC placement. Lester and Tronick (1994) proposed that challenging behaviours associated with the drug-exposed infant would impact upon the mother's parenting behaviour through the dyadic process of mutual regulation. In a broad review, global scales of child behaviour were not linked to initial foster care placement (Oosterman et al., 2007). However, once in OOHC, child behaviour problems were linked to placement disruption and subsequent changes in caregivers (Oosterman et al., 2007). Only three studies of drug dependent women and their children assessed the contribution of child characteristics to risk of OOHC, two of these determined that children who entered OOHC were smaller, more likely to be premature and more likely to have health complications other than NAS than those remaining with their mothers.

This thesis examined whether the severity of NAS impacted the risk of OOHC as NAS makes infants more difficult to soothe and therefore more difficult for the parent to bond with. The severity of NAS, and other early health problems that cause similar difficulties with parental bonding, were assessed using a proxy measure of the number of days spent in hospital. Contrary to our expectations, children in OOHC by the age of 18 months spent less time in hospital than those in the MC group on average, however these differences were not significant, and there was

high variation within the sample. It may be that number of days spent in hospital was not an adequate measure of NAS, and future research may wish to employ a scale that assesses the severity of NAS more directly. Alternatively, it may be useful to use a scale that assesses the mothers' perception of the infants' difficulty, as the mothers' perception is related to bonding and early attachment styles, and such a scale would capture the differences in the mother's individual capacity to manage a difficult infant (Zeanah & Benoit, 1995; Zeanah, Benoit, Hirshberg, Barton, & Regan, 1994).

For the analyses at 9.5 years the self-regulation and total difficulties scale from the Infant-Toddler Symptom Checklist were used to assess child temperament, under the assumption that children with a greater number of problems would be more difficult to parent. This scale is parent-rated, so parent perception of the child's difficulties were taken into account. While there were significant differences between groups on the scale of self-regulation, whereby children in the OOHC group had poorer skills of self-regulation at 18 months of age, this subscale did not predict entry into OOHC by the age of 9.5 years when covariates were entered into the model. This means that it is possible that those at risk for OOHC might have poor skills of self-regulation, but other factors, namely maternal depression, SES and methadone dose, are more important when predicting risk of entry into OOHC.

7.3 Strengths and Limitations of the Current Study

The MIP study has a number of strengths, including its prospective longitudinal design, high recruitment rates, subsequent strong retention rates and use of detailed child and family social demographic information and measures that allowed us to adequately test the contribution of a number of domains from the family's ecology. This thesis utilised many of these measures to test

Lester and Tronick's (1994) understanding of what factors contribute to parenting, and therefore to OOHC.

There are several limitations to this study, some of which are inherent to any study attempting longitudinal follow-up of a high-risk population. Limitations of the MIP study at large, and this thesis in particular, are discussed below.

7.3.1 Retention and recruitment.

Participant retention was lower in the ME group than the NME group. While retention rates up to 9.5 years of age were good compared to similar studies of women and children in MMT (Hunt, Tzioumi, Collins, & Jeffery, 2008; Rosen & Johnson, 1985; Soeptami, 1994; Walhovd et al., 2007); it is possible that those who were not retained represented those who were most at-risk of OOHC or perhaps had entered into OOHC and could not be traced. At each stage multiple attempts were made to recruit each participant, but those who were no longer with their mothers were with caregivers who had little or no prior involvement with the study, and therefore perhaps has less motivation to return with the study child. It is possible that the characteristics of the OOHC sample would be altered if these cases were included, although relatively high retention at each follow up phase allows some tentative generalisation of results to the New Zealand population of ME children.

7.3.2 Measures.

The majority of measures used in the methadone study were standardised tests with good reliability and validity. However, many of the items used in this research were from the mothers self-report. While this was often necessary due to the nature of the information being obtained, it is possible that mothers were subject to a bias of social desirability when answering these scales and items (Paulhus, 2002). For example, post-natal drug use relied entirely on maternal self-report,

and while many did disclose drug use, the fear of repercussions likely impacted upon the accuracy of findings, a fear which has been identified as a barrier to accessing care in prior research (Stone, 2015). It is possible that the rate of drug-use after the birth of the child was much higher, and perhaps future studies could include a method to confirm the accuracy of maternal self-report of drug use. The TCI scale was also self-report and therefore subject to a pattern of socially desirable responding, although it has been designed and used widely to identify individual differences, validated for use in other cultures, and can reliably distinguish those who might be at risk for personality disorder (Svrakic et al., 1993).

7.3.3 Challenges of researching a high-risk population.

Assessments were conducted in the morning to ensure the child was in their most alert state to undertake the neurodevelopmental assessment. However, most mothers in MMT took their dose of methadone in the morning and methadone has a sedating effect. Some women were noticeably drowsy while answering questions and had difficulty in recall. This drowsiness was not measured in any formal manner, although the interviewer would work with the mother to clarify the dates, times and circumstances of events and information provided.

Aside from the direct impact of methadone, mothers in MMT were characterised by high rates of social adversity, which may have not have been adequately captured with the design of this study. Some research indicates that it is not specific risk factors, but the accumulation of risk factors that most influences parenting beliefs, behaviours and stressors that lead to maltreatment and OOHC (Nair, Schuler, Black, Kettinger, & Harrington, 2003). It was beyond the scope of this research to test the cumulative impact of social risks, or how they interact to produce outcomes and this may be an avenue for future exploration.

Most importantly, ME children in the study were highly transient between caregivers, which was recorded from retrospective recall of caregiver changes at each follow-up phase. However, this thesis only assessed living arrangements at the time of the follow-up interviews, regardless of how long they had been stable in their mothers' care. It is possible that some highly transient children were misrepresented by being placed in the group of those 'remaining' in maternal care by virtue of timing of the assessment. It may be useful in future research to utilise a survival analysis, or another suitable statistical method, to account for stability in the care of their mothers.

7.4 Practical and Theoretical Implications

This study makes a novel and important contribution to the field in both theory and practise. Recently, in a comprehensive review of the literature on opioid dependent parents, Peisch and colleagues (2018) suggested that the primary relationship between parental substance use and OOHC was through how drug use and related risk factors from their social ecology affected parenting. This view is in line with Lester and Tronick's (1994) conclusion that parental drug use and related risk factors affect the parent's capacity to perform critical tasks of mutual regulation, and therefore affect child outcomes. While useful to have an updated account of the parenting of opioid abusers specifically, Peisch and colleagues (2018) used a broad ecological model that was not tailored to the population of those dependent on substances during pregnancy, and therefore Lester and Tronick's' (1994) model was selected for use in this thesis to account for characteristics specific to the high-risk drug-exposed dyad. While this model was intended to account for child developmental outcomes following exposure to drugs *in-utero*, our study found support for the extension of this model to account for the outcome of child entry into OOHC. Variables from all three domains that were purported to affect the mothers' parenting, substance abuse, personality

and lifestyle, were related to placement into OOHC in this thesis. In addition, drug use in pregnancy, which was suggested to affect child neurodevelopmental outcomes was also implicated in the analyses, although no direct link was found between infant NAS or clinical characteristics and OOHC.

The findings of the current study make a contribution to the limited empirical research regarding the caregiving arrangements and entry into OOHC of the children of women in MMT. Just one prior study had researched a sample of women in opioid substitution treatment, and looked at the caregiving arrangements of their children in a cross-sectional design. No published study has assessed OOHC in a longitudinal study of ME children until the age of 9.5 years. The advantage of this study is that early factors were tested for their ability to predict OOHC at a later stage, eliminating the concern that maternal depression, drug use and other psychosocial indicators were a consequence of child placement into OOHC, rather than a cause of OOHC. This information might be able to be used to identify those children most at risk of placement into OOHC at an early age, and allow intervention services to target their resources where they are most need to prevent this outcome. Current results indicate that parents will likely benefit from support to rectify domains of family functioning including economic/social support, substance abuse and particularly maternal depression. The EPDS, used at term and 18 months to assess depression, is a very short measure that is not restricted by copyright agreements, and therefore administration can be easily implemented as standard practise.

One intervention for women maintained on methadone is known as the Parents Under Pressure (PUP) program (Dawe, Harnett, Rendalls, & Staiger, 2003). This program aligns with our findings, recognising the importance of targeting multiple domains of family functioning with an intervention consisting of modules to increase self-efficacy in the parenting role, mindfulness to

improve tolerance of negative emotional states, parenting skills, life skills and social support. This has been shown to improve scores in child abuse potential, rigid parenting attitudes and child behaviour (Dawe & Harnett, 2007; Dawe et al., 2003). Further research is required to determine the long term effects of intervention and whether it can produce effective results in other cultures, however the results so far are further support for the theoretical model and putting it into practise.

In summary, the current study has found a high rate of OOHC in the children born exposed to methadone *in-utero* up to 9.5 years of age. OOHC likely represents an additional risk to the well-being of children. It is therefore of great importance that those who are at risk for OOHC can be identified using known risk factors at an early age, as early intervention might be able to alleviate these risks before the child is placed in OOHC.

7.5 Conclusion

In New Zealand, and around the world, illicit drug use during pregnancy remains a significant issue. MMT is an evidence-based treatment for opioid dependence during pregnancy associated with benefits for the women and their child as opposed to continuing dependence on illicit opioids (Minozzi et al., 2013). The effects of methadone on the child have primarily been studied through a neurodevelopmental lens. It is known that MMT in pregnancy leads to greater incidence of NAS and associated outcomes in early childhood, however researchers have so far been challenged to disentangle the effects of the drug from other psychosocial characteristics of growing up with a mother who is in the MMT program (Conradt et al., 2018; Shearer et al., 2018). These women are characterised by high rates of social and psychological adversities that make caring for their children difficult, and place them at risk for entering OOHC (Davie-Gray et al., 2013; Taplin & Mattick, 2013). OOHC might be protective where the child is removed from an abusive or neglectful household, but also can lead to higher rates of mental health difficulties due

to early disruption in primary attachment relationships (Tarren-Sweeney, 2008, 2018). Children in foster care are equally likely to have adverse outcomes as those raised in high-risk households known to child welfare services (Goemans et al., 2016).

This thesis confirms previous findings that multiple domains of risk factors, maternal personality, mental health and social risk, influence whether a child will enter out-of-home care, even among those in treatment for their drug addiction. No prior research has studied what factors predict OOHC for children up to the age of 9.5 years, and research into earlier OOHC placement for children exposed to methadone *in-utero* is limited. Early identification of those at risk for entry into foster care is important as receipt of services matched to the needs of those identified to perpetrate child abuse is positively associated with family reunification from foster care, and therefore might also help alleviate the need for OOHC arrangements in the first instance (Doab, Fowler, & Dawson, 2015).

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