



# Maternal stress and behavioral adaptation in methadone- or buprenorphine-exposed toddlers



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## ABSTRACT

The current study examined the relationship between early interaction, parenting stress, maternal psychological distress symptoms, and behavior problems and health-related quality of life among children born to mothers in opioid maintenance treatment (OMT) in Norway during the period 2005–2007 ( $N=36$ ). This group was compared with a normative sample of mothers without substance abuse problems and their children ( $N=36$ ). There were significant group differences ( $p<.01$ ) in perceived child problems in toddlerhood. In a regression model, mothers' self-reported psychological distress symptoms in terms of depression and anxiety symptoms significantly predicted child behavior problems ( $p<.01$ ) and health-related quality of life ( $p<.01$ ) rather than parenting stress. No significant, unique effect of exposure was found after controlling for other factors that could influence developmental outcomes. These findings add to the growing evidence on the importance of maternal psychological well-being for child development, and underscore the need to address opioid-maintained women's personal maladjustment and the constellation of stress experienced by mothers in recovery.

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## 1. Introduction

After the effectiveness of methadone and buprenorphine maintenance was demonstrated (Benningfield et al., 2010; Fischer & Kopf, 2007; Jones et al., 2010), opioid maintenance treatment (OMT) has been standard care for pregnant opioid-dependent women and their children. The Norwegian OMT program was established as a national publicly funded treatment program in 1998 as a high-threshold, high-dose maintenance program with strict intake criteria (Waal, 2007). According to recently published Norwegian guidelines (Welle-Strand & Bakstad, 2011), treatment with methadone or buprenorphine should be continued throughout pregnancy at the lowest efficient dose. This recommendation has been a controversial issue for medical experts and health practitioners who advocate a drug-free environment for the fetus and express concern for the well-being of the newborn infant. A solid research-based evaluation of this policy choice is thus imperative, and should be extended beyond pre- and post-natal observations to subsequent psychosocial development and adaptation in the toddler years.

The acute, postnatal effects of in-utero opioid exposure (NAS – the Neonatal Abstinence Syndrome), characterized by neurological excitability, gastrointestinal dysfunction and autonomic signs are well-known. This might require prolonged hospitalization, pharmacological intervention, and monitoring (Jones et al., 2010). Further, opioid-exposed

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infants might exhibit regulatory problems in terms of disrupted sleep-wakeful patterns (Sarfi, Martinsen, Bakstad, Røislien, & Waal, 2009), feeding difficulties, and hypersensitivity to environmental stimuli (Dysart, Hsieh, Kaltenbach, & Greenspan, 2007; Velez & Jansson, 2008). NAS responds well to pharmacological therapy and the regulatory problems to adequate non-pharmacological care (Feldman, 2009) the long-term developmental outcomes are insufficiently researched. Unlike research on alcohol, studies examining the neurobehavioral effects of opioids have produced inconclusive results. Nonetheless, these studies have found a wide range of impairment in attention, language and executive functioning, indicating that effects of prenatal substance exposure are likely present in early infancy. Research on behavioral outcomes of prenatal substance exposure indicate elevated risk for child maladjustment and parenting difficulties (Bagner et al., 2009; Finnegan, 1978), but the findings are difficult to interpret as a majority of the studies are based on populations where fetal exposure to drugs often occurs along with other factors known to affect child development (Whitaker et al., 2011). The high rates of life stress, the impact of poverty, and psychiatric disorders in substance-dependent parents confound the interpretations of findings. Health-related quality of life (HRQL), defined as self-reported health and ability to function physically, mentally and socially, is consistently poorer among substance-dependent treatment seekers compared to patients diagnosed with other severe mental disorders and healthy controls (Karow et al., 2011; Laudet, Becker, & White, 2009). Poly-drug use is more common than single-drug use in studies of treatment populations, and the effects of maternal poly-drug use in addition to, or in the absence of methadone is generally unknown (Jansson et al., 2012). Research investigating gender-, partnership and children-related aspects of HRQL is lacking, and there is no pregnancy-specific information about HRQL among opioid-dependent women.

OMT is effective in decreasing illicit drug use, criminal activity and other risk behaviors interfering with parenting (Dawe, Harnett, Rendalls, & Staiger, 2003), and HRQL has shown to improve significantly during maintenance treatment (Karow et al., 2011). However, an OMT program does not itself change family dynamics where parents have elevated rates of anxiety and depression which are problems known to predict subsequent child behavior problems independent of drug use (Accornero, Morrow, Bandstra, Johnson, & Anthony, 2002; Warner et al., 2006). Substance-exposed infants are thus prone to a number of risk factors known to be associated with aberrant social interaction (Luthar, Cushing, Merikangas, & Rounsaville, 1998), impaired peer relations (Kolar, Brown, Haertzen, & Michaelson, 1994) and behavior disorders (Ornoy, Segal, Bar-Hamburger, & Greenbaum, 2001). There are to date no studies on HRQL in substance-exposed children, but a recent review on children with ADHD indicate that HRQL is impaired in these children (Danckaerts et al., 2010).

Given this background, studies of OMT in populations that are less affected by these problems are warranted. The Norwegian national OMT treatment program has a strong focus on rehabilitation, control and targeted delivery of services to pregnant patients, which creates a situation suitable to study care for opioid dependent women. Also, supportive and interdisciplinary services generally offered to at risk populations in the country are considerable. Consequently, substance using women are spared from many of the most severe psychosocial burdens that have often characterized similar cohorts in, for instance, the US and New Zealand (Martin et al., 2009; Velez et al., 2006).

The current report originates from an ongoing longitudinal national cohort study of children born to mothers in OMT in 2005–2007. Despite some regional differences in how services are combined, organized and delivered, all pregnant women in the Norwegian OMT program are closely monitored and subjected to the same strict drug control procedures. As a result, the cohort in this study is a methadone/buprenorphine-only sample with minimal use of illicit drug use in pregnancy and in the first postnatal year (Lund et al., 2012b). This group was compared to a group of women without substance use problems. The aim was to examine the relationship between caregiver-reported stress and adaptive functioning in 2½ year old children exposed to methadone or buprenorphine in pregnancy compared with a sample of children without prenatal substance exposure. If findings of interactional and developmental problems correlate at a higher level with OMT status than to maternal stress in both groups, it is likely that this originates from intrauterine opioid exposure. If not, maternal health and stress management should be seen as primary intervention areas.

## 2. Methods

### 2.1. Participants

#### 2.1.1. The OMT cohort

All pregnant women in OMT in Norway with delivery dates between January 2005 and January 2007 were invited to participate through the local treatment centers. Of 47 eligible women, 6 declined. Forty-one women gave informed consent to participate in the study. Two of the 41 women had miscarriages and one withdrew consent before delivery, resulting in a total of 38 mother–child dyads at study start. One mother left the study 3 months postpartum and one family was excluded after delivery because of congenital malformations. The study group therefore consisted of 36 mother–infant pairs. Mean maternal age was 32, 3 years. Lifetime injection heroin use was 8 years on the average before entering OMT (Lund et al., 2012a). Average treatment time in OMT was 2.7 years (Fitzsimons, Tuten, Vaidya, & Jones, 2007). Twenty-four mothers were maintained on methadone and twelve on buprenorphine (Subutex). Two women reported one single episode each of illegal substance intake (heroin, amphetamine, cannabis) in the last trimester of pregnancy, the others claimed to be abstinent. All women were cigarette smokers.

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