Promoting Social-emotional Development in Infants and Toddlers of Mothers with Postpartum Depression: An Integrative Review

by

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Abstract

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The effects of PPD may interfere with mothers' relationships (Murray et al., 2003) and interactions with their infants (Murray, 1992; Beck, 1998; Oberlander, 2005; Tronick & Reck, 2009), all of which increases children's risk for short and long-term social-emotional, cognitive, and behavioural challenges, as well as mental (Feldman & Eidelman, 2009) and physical health problems (NSCDC, 2008). Recent evidence advises that the potential negative sequelae to child development associated with PPD may be mediated by including maternal-child interventions and other mediating supports to the treatment regime for PPD. However, the best approaches to enhancing maternal mental health while promoting child development has not been established (Murray, 1992; Murray et al., 2003; Poobalan et al., 2007; Tronick & Reck, 2009). The findings of this integrative review support a correlation between PPD and maternal depressive symptoms during postpartum ,and negative social-emotional sequelae for young children. The findings also reveal emerging evidence on interventions to promote and improve the social-emotional development of infants and toddlers of mothers with PPD and postpartum depressive symptoms. This emerging evidence suggests that interventions that strengthen the dyadic relationship and enhance maternal knowledge and skills while promoting maternal mental health may help to mediate the effects of PPD on child social-emotional development.

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Promoting Social-emotional Development in Infants and Toddlers of Mothers with Postpartum Depression: An Integrative Review

The social-emotional, cognitive, and physical development of infants and young children unfold within the interactive context of parent-child relationships, early life experiences, and biology. Such a significant amount of development transpires over the first few years of children's lives that what occurs during this stage of life may have a disproportionate effect on future mental and physical health, school readiness, and academic and career success (Kershaw, Anderson, Warburton & Hertzman, 2009; National Scientific Council on the Developing Child [NSCDC], 2008; Shonkoff & Phillips, 2000). Infants of mothers experiencing postpartum depression (PPD) have a greater risk for social-emotional, cognitive, and behavioural problems than do infants of nondepressed mothers. PPD may interfere with mothers' ability to interpret their babies' cues, foster secure attachments, and provide appropriate stimulation (Beck, 1998; Centre of the Developing Child at Harvard University [CDCHU], 2009; Murray, Cooper, Wilson & Romaniuk, 2003; Oberlander, 2005; Sohr-Preston & Scaramella, 2006; Tronick & Reck, 2009). Many researchers associate these potential effects of PPD on mothers' behaviours and the mother-infant relationship, to children's short and long-term social-emotional and cognitive challenges and future behavioural, relational, and mental and physical health problems (CDCHU, 2009; Feldman & Eidelman, 2009; Goodman & Gotlib, 1999; NSCDC, 2008; Murray & Cooper, 1997; Murray et al., 2003).

While consensus exists on the risk PPD poses to child development, there are differing perspectives on which children are more likely to experience these potential consequences. The CDCHU (2009) proposes some children are more biologically vulnerable to the effects of PPD than are other children. Tronick & Reck (2009) found male infants of mothers with PPD were

more likely to have emotional and behavioural regulatory difficulties than were the female children, and Murray (1992) noticed male infants were more likely to be insecurely attached when their mothers had PPD. Similarly, whilst many agree there is a correlation between child development risk and the intensity, duration, and timing of depression during the perinatal period as well as the presence of other adverse conditions such as poverty or family violence (Ashman, Dawson & Panagiotides, 2008; CDCHU, 2009), some suggest otherwise. Tronick & Reck (2009) argue that even mild forms of depression during postpartum may hinder maternal psychosocial functioning and the mother-infant relationship and affect child social-emotional development. Furthering this argument, Anhalt, Telzrow & Brown (2007) noted that children in grade one whose mothers had experienced parenting stress and maternal depressive symptoms at one month postpartum, showed significantly higher *internalizing* (see internalizing in Appendix A) scores than did those children whose mothers had not had these experiences. Likewise, high maternal depressive symptoms and low levels of perceived support at one month postpartum were associated with greater likelihood of *externalizing* (see externalizing in Appendix A) scores for grade one students. However, there is growing evidence to suggest that early intervention and mediating factors may reduce the potential negative sequelae to child development associated with PPD.

The following integrative review of the literature on strategies and interventions that promote infant and toddler social-emotional development in the context of PPD is divided into four parts. Part One provides background information on infant social-emotional development, the effects of PPD on women and their families, and the organizational context of mental health services for women and children in British Columbia (BC), as well as the purpose, objectives, philosophical underpinnings, and key concepts for this review. The methodological approach to

this integrative review is detailed in Part Two. Part Three presents and discusses the findings from the review of the literature on infant and toddler social-emotional development in the context of PPD and the strategies and interventions that promote this development, prevent related problems from occurring, and address problems if they arise. Finally, Part Four explores the relevance of these findings to nursing and offers recommendations to inform practice, policy, and future research in infant and early childhood and maternal mental health.

Part One: Background

Part One of this integrative review provides the background for this report. It begins with an overview of infant social emotional development, the effects of PPD on that development, and an overview of PPD. Following that is a description of the organizational context of maternal and child mental health services in BC and a discussion of the values and beliefs influencing this context. A cursory review of the literature on strategies to promote infant social-emotional development in the context of PPD precedes a description of the purpose and objectives of this review as well as a discussion on the relevance of this topic to nursing. Part One concludes with the philosophical underpinnings guiding this work.

Infant Social Emotional Development

Infant social-emotional development is integral to other forms of development. It results from an integration of relational experiences and biological responses, some of which I discuss here. Mothers and other caregivers provide regulating and stimulating behaviours in response to the infants' cues, all of which contribute to the infants' development of emotional regulation, self-regulation, and sensory integration (Crockenberg & Leerkes, 2000; Tronick & Reck, 2009). This interactive dance of mutuality and reciprocity between an infant and his or her primary caregiver has been phrased the *serve and return* process. Of note, from here on in, I will use *her* to simplify gender terminology. For example, an infant gazes into her mother's eyes and she

returns the look and responds verbally. Healthy brain and child development relies on these kinds of regular, mutually rewarding, dyadic interactions. When parents and caregivers respond to a baby's behaviour with attuned, sensitive actions or *sensitivity* (see maternal sensitivity in Appendix A), they are helping to develop the connections in the brain related to social and communication skills (NSCDC, 2007). Conversely, parental responses that regularly disrupt the rhythm of the serve and return interactions, such as those that are either *intrusive* (see maternal intrusiveness in Appendix A) and angry, or withdrawn and disconnected, may weaken the brain architecture and affect the stress response system (Lovejoy, Graczyk, O'Hare & Neuman, 2000).

A parent's response to their infant contributes significantly to the quality of the infant-parent relationship. In order to survive and thrive, an infant must develop a relationship with someone that can help them meet their needs for safety, security, growth, and development: a task they are born ready to do (Thornton, 2010). With a preference for human faces (Feldman et al., 2009), and "wired for feeling and ready to learn" (Shonkoff & Phillips, 2000, p. 4), newborns less than one hour old can imitate others' facial expressions, demonstrating they are capable of recognizing other people as being "like me" (Gopnik, Meltzoff & Kuhl, 1999, p. 30). In addition to these rudimentary social-emotional and cognitive abilities, infants have a "biologically primed behavioural system which, under threatening conditions, enables [them] to seek safety through proximity to their mothers" (Bowlby as cited by Cohen et al., 1999, p. 432). Those interactions between biology and relationship are critical components of the infant-mother *attachment* (see attachment in Appendix A) relationship. The quality of security in this relationship relies on the infant's ability to give cues (Bowlby as cited by Weatherston, 2001) and the mother's capability to accurately perceive and respond to them, show affection, and accept her child's feelings and behaviours (Cohen et al., 1999). Subsequently, the quality of security in this relationship

influences the child's chance for survival and their social-emotional and cognitive development, and has implications for future health and well-being (Weatherston, 2001).

Parents are instrumental in helping their young children learn about and manage their emotions. Even though infants are much more sophisticated in their ability to think, feel, and make things happen than was once believed (Shonkoff & Phillips, 2000; Tronick & Beeghly, 2010), they rely on their caregivers to help manage their distress. Cole, Michel and Teti (1994) assert, "The infant-caregiver relationship provides the context for the socialization of emotion regulation" (p. 93). While young infants have some capacity to modulate their emotions by using gaze aversion and tactile stimulation, *emotional regulation* (see emotional regulation in Appendix A) during the first few years of life, is primarily a dyadic activity. However, when a young child's emotional needs chronically exceed their and their caregivers' capacity to adequately respond, they may be prone to developing *emotional dysregulation* ([see emotional dysregulation in Appendix A], Kopp, 2002), a challenge that may predispose them to future mental health problems (Cole et al., 1994) and childhood peer relationships issues (Kidwell et al., 2010).

Through another process, the emotional expressions of parents and caregivers shape infant social-emotional and cognitive development and behaviour (Grossman, 2010), especially when that expression is negative (Vaish, Grossman & Woodward, 2008). A mobile infant uses the emotional reaction of her parents to inform her response to a new or unusual situation or person. Known as *social referencing*, this social and cognitive skill means that older infants and young children can make discriminating observations of their caregiver's expressions, connect those to the current event and context, and use it to make choices about their current behaviour (Grossman, 2010).

Demonstrating the interplay between social-emotional and cognitive development is the process by which parents and caregivers support their young children to make meaning about their worlds: a process that involves symbols rather than the words they will use later in life (Tronick & Beeghly, 2010). These symbols represent their experiences of their world (Gopnik et al., 1999) and their relationships (Tronick & Beeghly). This biopsychosocial process transpires in the context of relationship and shapes infants' internal working model of relationships, which in turn, influences their current and future social behaviours. Tronick & Beeghly speculate that successful meaning making by an infant elicits feelings of well-being and joy, and when co-created with her parent, promotes feelings of connection or attachment. Conversely, when an infant struggles to make meaning in the milieu of relationship, she may feel angry, sad, or anxious: states that may precipitate emotional dysregulation and disconnection from her sense of self. Fortunately, meaning making and internal working models, while powerful, are amenable to moment-to-moment making of new experiences.

In summary, this overview of infant social-emotional development illustrates the significance of the milieu of the parent-child relationship to this component of development. While one can imagine how a mother's depressed affect may interrupt some of these processes essential to her child's social-emotional development, this is not the only hypothesis for the association between PPD and untoward social-emotional development.

Infant Social Emotional Development and PPD

There are several proposed pathways linking the effects of PPD to maternal child interactions and child social-emotional and cognitive development. Goodman & Gotlib (1999) offer a model that integrates biological, environmental, and transactional factors that "mediate

and moderate the effects of maternal depression on children" (p. 460) with developmental issues: a model supported in a meta-analysis on PPD and attachment by Martins & Gaffan (2000).

Biologically, the genes shared between infant and mother may predispose the child to future mental health problems or may reduce the infant's capacity to cope with the potential stressors associated with PPD on the dyadic relationship. Other biological factors include the potential inheritability of temperament or personality traits and the possibility that these children are born with neuroregulatory processes that hamper emotional regulation, thereby increasing their risk for mental health problems (Goodman & Gotlib, 1999).

Environmentally, contextual family challenges such as marital discord, poverty, or limited social support may compound the effects of PPD on child development (Cicchetti, Rogosch & Toth, 1998) and may be a factor in the development of and recovery from PPD.

Transactionally, PPD may interfere with mother-infant synchrony (Goodman & Gottlieb, 1999; Martins & Gaffan, 2000); perhaps as a direct result of the common behavioural manifestation of depression such as reduced emotional responsiveness and eye contact, and slowed speech (Thompson & Fox, 2010). Mothers experiencing depression may be withdrawn, less sensitive, hostile, or less stimulating in their interactions with their infants, all of which may negatively influence brain and social-emotional development (CDCHU, 2009). Further, these impaired transactional processes may contribute to the prevalence of higher rates of insecure attachment observed in young children of mothers who had experienced PPD (Murray, 1992; Moehler, Brunner, Wiebel, Reck & Resch, 2006). Finally, Goodman & Gotlib allege these children develop the affect, cognitions, and behaviours of their depressed mothers through social learning: a process that increases their risk for developing depression later on.

Other researchers offer their perspectives on the pathways by which PPD negatively influences the mother-infant interactions and child development. Tronick & Reck (2009) assert that healthy child development does not require mothers to respond synchronously to every one of their infants' cues: nondepressed mothers are not always in harmony with their infants' emotions or cues. However, they note that nondepressed mothers are more likely to quickly match their infants' emotions or repair the asynchronous interaction than are mothers with PPD. They propose that an accumulation of non-repaired mismatches may negatively influence the infant's affect, which, if not mediated, may decrease the infant's ability to give appropriate cues to her mother and subsequently, influence her interactions with other adults. Finally, they suggest "maternal depression [is] a communicable disorder" (p. 147) by which the mothers' negative affective states distorts their communication of emotion to their infants. Alternatively, Forman et al. (2007) suggest the negative perceptions mothers with PPD may have of their infants, formed in the cloud of depressive symptoms, persists over time and influences mothers' behaviours towards their children. While these speculations centre on the psychological, biological, or transactional factors inherent in the mother-infant relationship, there are other confounding factors to consider as well.

Postpartum Depression

PPD is the most common postpartum complication for women (Grace, Evindar & Stewart, 2003) affecting 13% (O'Hara & Swain, 1996) to 19.2% (Gavin et al., 2005) of them. It is often higher for women with a history of depression during pregnancy, postpartum, or unrelated to the perinatal state (Leigh & Milgrom, 2008; Thompson & Fox, 2010); low incomes (Segre, O'Hara, Arndt & Stuart, 2007); substance use problems; and recent or historical experiences with abuse (Ross & Dennis, 2009). Even though this is a common postpartum

complication, women with PPD continue to be under-recognized and under-treated (Beck, 2008; Misri & Kendrick, 2007; Pearlstein, 2008). This disorder reduces the quality of life for women (Beck & Indman, 2005). For example, it moderates their physical, mental, and social functioning and general health (de Tychey et al., 2007), and may be compounded by accompanying anxiety and irritability (Beck & Indman, 2005). PPD also predisposes mothers to the same potential complications as others with a major depressive disorder, including interpersonal problems, occupational issues, substance abuse, and suicide. Lastly, although rare, PPD has been linked to infanticide (Beck, 2008).

PPD may affect mothers' experiences of parenting as well as their parenting behaviours. Barr (2008) conceptualized the parenting experience of women with PPD as "mechanical infant care giving" (p. 366). The women in Barr's study described mechanically carrying out parenting activities while feeling disconnected from the task and their infants. PPD may interfere with the maternal behaviours associated with maternal-child bonding. Feldman & Eidelman (2007) found that the presence of PPD at three months postpartum interfered with the maternal child bonding process, typically fostered by affectionate touch, smiling, mother–infant gaze, and "motherese vocalization" (p. 291); all of which may be hampered by the potential slowing of mothers' responses to their infants' cues and distress. These behavioural changes are not unlike the reduced emotional responses and eye contact and slowed speech experienced by others during a major depressive episode (Thompson & Fox, 2010).

While there are several options for treating PPD, including pharmacological and non-pharmacological interventions, such as individual or group psychotherapy, many women are reluctant to seek treatment (Pearlstein, 2008). "PPD is a mental illness that often is covertly suffered" notes Beck (2002, p. 468). Women must overcome guilt, shame, self-blame, fear of

judgment (Beck, 2002; Berggren-Clive, 1998), stigma (Miles, 2011), and the social discourse of *the good mother* (Edhborg, Friberg, Lundh & Widstrom, 2005), in addition to structural barriers and preference for psychosocial support (O'Mahen & Flynn, 2008), before seeking formal help from health professionals.

Moreover, even when women receive treatment for PPD, studies indicate that successfully treating maternal depression may not ameliorate the developmental risks for these children (Forman et al., 2007; Murray et al., 2003). These researchers suggest that treatment for PPD include maternal child interventions although there is less evidence to indicate the best approaches to support maternal mental health while promoting child development (Murray, 1992; Tronick & Reck, 2009).

PPD affects family health and well-being. Not only does it affect the mother, her child's development, and their relationship; it may also affect the mental health of the father, the marital or couple relationship, and the extended family. Paternal depression ranges from 1.2 to 25.5 per cent, a rate that tends to increase amongst men whose partners are experiencing PPD (Goodman, 2004). The presence of paternal depression coinciding with PPD further compounds the risk to the offspring's development (Goodman, 2004) and their future mental, emotional, and behavioural health (Ramchandani, Stein, Evans & O'Connor, 2005; Ramchandani et al., 2008). Even when fathers do not experience their own mental health concerns, PPD may increase parental stress (Goodman, 2004), reduce fathers' availability to provide social support to the mothers (Letourneau, Duffet-Leger & Salmani, 2009) and influence paternal child bonding (Feldman & Eidelman, 2007). Further, if a father misses work to care for his infant and partner, it may affect the family income. The potential effects of PPD on fathers and the role they play in mediating the effects of PPD on infants prompted Thornton (2010) to advocate for routine

support to the partners of women with PPD. Additionally, the presence of PPD in the family may negatively affect siblings and grandparents (McKay, Shaver-Hast, Sharnoff, Warren & Wright, 2009). Finally, given the prevalence of PPD and the potential associated sequelae for affected women, their children, partners, and families, PPD is arguably a significant public health issue (Barr, 2008; Hayes, 2010), and one that BC has yet to be comprehensively address.

Organizational Context

In BC, the publicly funded services for women with PPD and their infants and young children are located within the health care and social services systems, respectively. This means that women with PPD may access services provided by the health authorities (HA), under the Ministry of Health, while the services for infants and young children, at risk for, or with social-emotional problems, are under the auspices of the Ministry of Children and Family Development (MCFD). In addition to service delivery, each of these systems has branches that develop *micro policy*, referred to by Scott & West (2000) as program and practice policy and standards, and contribute to *macro policy* or public policy and legislation, all of which influence the strategic directions of the distinct service streams.

The Infant Early Childhood Mental Health program (IECMH) of the MCFD serves young children from birth to five years of age and their families. These services of the MCFD work dyadically with an infant or young child and her parents and/or caregivers but do not provide mental health care to adults experiencing mental health problems. Additionally, the MCFD has several contractual arrangements with community agencies to provide preventative aspects of infant mental health such as the Infant Development Program and Aboriginal Infant Development Program. These two programs support infants at risk for, or with, developmental

delays, including infants of mothers with mental health problems, by providing education and support to these families.

Similarly, the HA counterparts tend to work individually with adults but not directly with their children, even when providing perinatal mental health services (PMHS). During a practicum in PMHS in 2010, I asked the IECMH and PMHS services providers and public health nurses I met what services and supports were available in their community to support infant and toddler social-emotional development in the context of PPD. Additionally, on behalf of PMHS, I coordinated and facilitated a meeting of service providers working with this population of families. Following this meeting, I used a framework of promotion, prevention, and intervention to collate the information on roles and services the participants described and sent it to them. This informal inquiry revealed that while the practitioners were aware of the potential risk PPD poses to child development, most of them had not considered providing services directly to support the social-emotional development of this population. Some practitioners assumed that addressing PPD would be sufficient while others were unaware of the range of local resources, such as the IECMH services of the MCFD that could be engaged to support this population of infants and their families. In all cases, those I met had had little opportunity to work collaboratively to support these families; something others have told me has changed subsequent to the meeting noted earlier.

Contextual discourses, values and beliefs. Adding to the complexity of the mental health system, social discourses, values and beliefs, and philosophical perspectives influence professional practice and strategic goals of the respective systems. For example, the good mother image (Edhborg et al., 2005) and myths about the prevailing joys of pregnancy and motherhood (Lusskin, Pundiak & Habib, 2007), may influence the beliefs and attitudes of

clinicians in a position to detect PPD. In other words, if clinicians expect to see women enjoying pregnancy and motherhood, they may be less likely to take the time to inquire about the women's mental health and well-being (Nylen, Segre & O'Hara, 2005). Furthermore, ideological principles, traditional values and beliefs, and philosophical perspectives may interfere with cross-sector collaboration. *Neoliberalism* has been shaping social and health policy in North America and abroad since the 1970's (Navarro, 2007). Neoliberal principles of self-determination, self-responsibility, and free choice (Bay-Cheng & Eliseo-Arras, 2008), are consistent with an underpinning of *individualism*: a discourse that proposes human beings exist independently from their context (Anderson, 2000). These influences are evident in the individualized practice of BC's mental health system (Teghtsoonian, 2009). Traditional post-war values of bread-winning fathers and stay-at-home mothers (Kershaw et al., 2009) and persisting beliefs that the minds of newborns and infants are unsophisticated (Gopnik et al., 1999) and unaffected by early life experiences (NSCDC, 2008) may reduce the motivation for infant and adult mental health clinicians to work cross-sectorally. These elements contrast with the evidence on child and brain development (NSCDC) and the Convention on the Rights of the Child ([CDC], United Nations, 1989).

The CRC, adopted by the General Assembly of the United Nations in 1989 (Twum-Danso, 2009), and later ratified by Canada and endorsed by the BC government (BC, n.d.), promotes the human rights of children (BC, n.d.). Its primary principle, *the best interest of the child,* Article 3, is foundational to its key tenets, some of which define children's rights to life and development, to non-discrimination, and to express one self and be heard. The CRC simultaneously upholds the responsibility of parents for their children's development and care and their involvement in decisions regarding their children, while underscoring children's

broader social, civil, and political rights, as well as the role of government to uphold children's rights (BC, n.d.). BC exemplifies its covenant to share the responsibility for upholding children's rights and promoting their development with families and communities, the whole of government, its ministries, and agencies, in a cross-government policy document, *Strong, Safe, and Supported: A Commitment to BC's Children and Youth* (BC, n.d.). This policy document with its pillars of prevention, early intervention, intervention and support, the Aboriginal approach, and quality assurance, underpins the goals of MCFD. However, the operationalization of the tenets of the CRC is a work in progress for the MCFD, other ministries, and health authorities. Nonetheless, practitioners and researchers are striving to understand how best to support this population of infants and their mothers and families.

Promoting Social Emotional Development in the context of PPD

A cursory review of the literature offers some suggestions for promoting social-emotional development in this population. In the first systematic review of randomized controlled trials evaluating the effects of maternal treatment on child mental and physical health, Poobalan et al. (2007) conclude these intervention have some short-term benefit to the mother-infant relationship and child development. However, Murray et al. (2003) and Forman et al. (2007) found that successful treatment of PPD did not mitigate the negative sequelae to child development over the long term. Nonetheless, there is some evidence to support the use of intensive home-visiting (Olds et al., 2004) or infant massage (Field, Grizzle, Scafidi, Abrams & Richardson, 1996; Onozawa, Glover, Adams, Modi & Kuman, 2001) to strengthen the mother-infant interaction in this population. In recognition of family triads, other researchers emphasize the role nondepressed fathers may play in mediating the effects of PPD on child social-emotional development (Field 1998 as cited Goodman, 2004; Letourneau et al., 2009). Similarly, McKay

et al. (2009) describe a family model to reduce the effects of PPD on the infant and father while supporting the mother to regain her mental health. Poobalan et al. (2007) and Murray et al. (2003) suggest that offering interventions over longer periods may increase their effectiveness. Others recommend combining maternal mental health care with efforts to strengthen the parent-child relationship (Forman et al.) and address infant affect (Tronick & Reck, 2009). In summary, several studies recommend maternal-child approaches be included in the treatment regime for PPD (Forman et al., 2007; Murray et al.; Poobalan et al.) as does a review by CDCHU (2009). However, a synthesis of effective practices for enhancing maternal mental health while promoting child development, preventing child development problems, or treating them, is not readily available.

Summary

In BC, despite the empirical evidence, women with PPD may go undetected and untreated, and their infants and young children may remain vulnerable to social-emotional and other developmental problems. Families may be unaware of the risk PPD poses to their child's development and the parent-child relationship and how they might mediate this potential impact. Health care and social services professionals may not recognize the continued developmental risk for the infants of mothers whose PPD is successfully treated. Fortunately, emerging evidence indicates that sensitive, responsive care and early interventions can reduce the effects of significant, early life stresses in animals (Nachmias, Gunnar, Mangelsdorf, Parritz & Buss, 1996) and "intensive, well-designed interventions for depressed mothers and their children can improve both parenting behaviours in the mothers and developmental outcomes in the children" (CDCHU, 2009, p. 6).

Purpose and Objectives of the Project

The purpose of this project is to use an integrative review to examine strategies to promote the social-emotional development of infants and young children of mothers experiencing PPD, prevent social-emotional problems in this population, and treat these problems when they occur. The outcome of this review has the potential to contribute to nursing knowledge, and in turn, inform practice and policy in infant, early childhood, and maternal mental health.

The goal of this project is to provide an exactant synthesis of current knowledge derived from empirical sources on the social-emotional development of infants and young children of mothers with PPD, which may be used to build nursing knowledge and, in turn, inform infant, early childhood, and maternal mental health practice, policy, and research. The objectives of this project include:

1. reviewing the theoretical, primary sources of experimental, non-experimental, descriptive, and qualitative literature on infant and early childhood social-emotional development in the context of PPD as well as systematic reviews and secondary sources such as policy documents and frameworks;
2. identifying the facilitators and barriers to infant and early childhood social-emotional development for this population;
3. examining strategies that promote social-emotional development of infants and young children of mothers with PPD, prevent social-emotional developmental problems for this population, and treat these problems when they occur; and
4. providing suggestions to inform practice, policy, and future research in infant and early childhood and maternal mental health.

The scope of this review involves the literature pertaining to the general population. Out of scope is the integration of the literature on PPD or postpartum depressive symptoms in women in Aboriginal, ethno-cultural, immigrant, or refugee communities, despite the worthiness of this endeavour. While evidence exists to support the presence of this experience in a multitude of cultures and countries (Oates et al., 2004), a higher prevalence of PPD in sub-populations of minority communities struggling with poverty (Thompson & Fox, 2010), and a cross-cultural desire for optimal child development (Maggi, Irwin, Siddiqi & Hertzman, 2010), this topic deserves its own examination. Further, attachment theory, which provides a significant conceptual framework for considering child social-emotional development and has influenced much of the literature reviewed here as well as informed many of the strategies examined, may not fully align with Aboriginal and other cultural parenting practices (Neckoway, Brownlee & Castellan, 2007).

According to Neckoway et al., many cultures, including Aboriginal, provide their infants with either *selective* or *shared parenting*, rather than the sensitive parenting style idealized within attachment theory. They describe selective parenting style as one where the parents are "less intensive in meeting infant's needs" (p. 68) while shared parenting involves multiple caregivers nurturing and caring for the infant. Finally, Rubin (1998) emphasizes the major role that culture plays in influencing the acceptability of certain social-emotional characteristics and interpersonal behaviours. For example, behavioural inhibition has been valued in the People's Republic of China while in North America it is referred to as being shy and a contributor to poor social relations, loneliness, and even depression (Rubin). Therefore, while this project is underpinned by the bio-ecological system theory (Williams, 2010), which underscores the function of culture as a component of the macrosystem, and a sphere within the child's ecology,

examination of strategies to support dyads from various ethno-cultural groups will be left to another scholar. Nevertheless, this project will highlight the role of culture when it is identified in the integrative review process.

Statement of the Problem. The effects of PPD may interfere with mothers' relationships (Murray et al., 2003) and interactions with their infants (Beck, 1998; Murray, 1992; Oberlander, 2005; Tronick & Reck, 2009), all of which increases children's risk for short and long-term social-emotional, cognitive, and behavioural challenges, as well as mental (Feldman & Eidelman, 2009) and physical health problems (NSCDC, 2008). Recent evidence advises that the potential negative sequelae to child development associated with PPD may be mitigated by including maternal-child interventions and other mediating supports to the treatment regime for PPD. However, the best approaches to enhancing maternal mental health while promoting child development has not been established (Murray; Murray et al.; Poobalan et al., 2007; Tronick & Reck). In BC, the artificial division between infant and early childhood and maternal mental health care further complicates the provision of services and supports for this population. Finally, social discourses of individualism and the good mother, along with lingering myths on child development hinder significant progress in practice and policy at all levels.

Significance to Nursing

This review offers a synthesis of the current knowledge on strategies to promote the social-emotional development of infants and young children of mothers experiencing PPD, prevent social-emotional problems in this population, and treat these problems when they occur. This information may assist nurses in practice, leadership, policy, and research in the fields of child development, and infant, early childhood, and maternal mental health. Nursing has an integral role in maternal and infant care. From preconception through the postpartum period and

beyond, nurses are involved in the health care of women, men, children, and families. In a variety of roles and contexts, nurses have countless opportunities to support women and families to make informed decisions about promoting their own and their children's mental health and selecting appropriate treatment options. As well, nurses have a responsibility to advocate for and promote the conditions that support healthy early childhood development, one of the social determinants of health (Canadian Nurses Association, 2005, 2008) and a contributor to the mental health of children and youth. Child and youth mental health problems are "the leading cause of health-related disability ... [in childhood and adolescence with] long lasting effects throughout life" (Kieling et al., 2011, p. 1515); therefore, nursing activities that contribute to healthy social-emotional development of young children will help to lessen this health burden. This integrative review will assist nurses to use knowledge translation to enhance the health literacy of parents, caregivers, family members, and other professionals involved with infants and young children of mothers with PPD and as a resource for determining evidence-informed interventions, developing health and social policy, and pursuing related research.

Philosophical Underpinnings

Infants exist within a "rich web of relationships" (Sved Williams, 2008, p.3) which are contextualized in and influenced by the broader socio-cultural, economic, and political settings, as well as the child's biology (Zeanah, 2005). It is in this inter-related, dynamic context of intersecting factors and experiences that infants grow, develop, and learn. In recognition of the complex influences on infant and early childhood development, the bio-ecological system theory constitutes the philosophical underpinnings for this project.

Ecological system theory, as its developer Bronfenbrenner (1917-2005) originally named it, offers an approach to understanding child and human development. This theory defines the

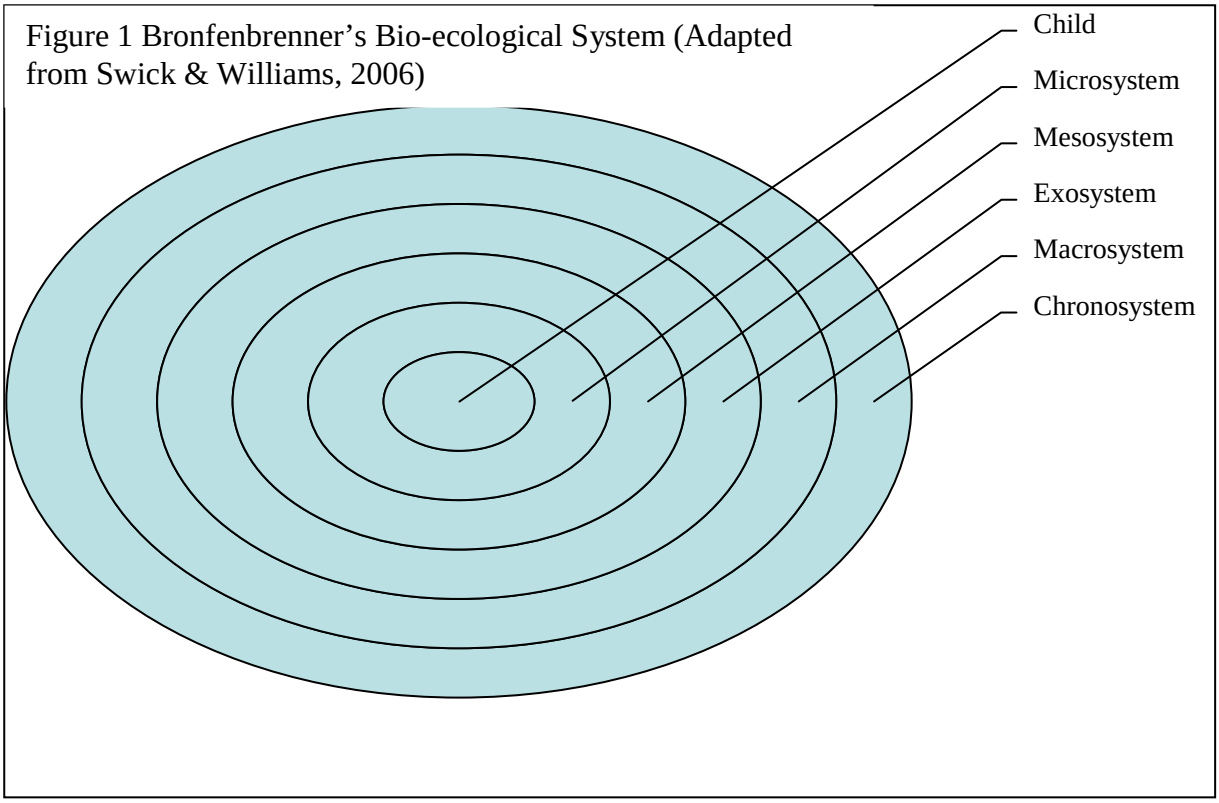
systems in which we live and emphasizes the interactive processes between individuals and their environments. In other words, human "development is the product of a constellation of forces – cultural, social, economical, political – and not merely psychological ones" (Ceci, 2006, p. 173). Bronfenbrenner later added *bio* to his theory to represent the biological potential inherent in human beings that transpires because of interactive processes between an individual and others, and the environment (Ceci).

This theory conceptualizes "child development nested in a series of environments which affect their development" (Williams, 2010, p. 37). The five interrelated environmental systems, namely *microsystem, mesosystem, exosystem, macrosystem, and chronosystem,* (see Figure 1) influence child and human development in a complex, interactive manner. Closest to the child is the *microsystem,* which is composed of the bi-directional relationships and interactions the child has with her family, care providers, neighbours, and school. The family provides the child's most intimate learning environment, a context influenced by the other systems and the child. The *mesosystem* represents the connections between the child and the other significant people in her life and the wider community. The broader social system comprises the *exosystem,* which individuals experience vicariously rather than directly. Cultural values, customs, laws, social and economic conditions and political philosophy are parts of the *macrosystem.* The components of this layer infiltrate the other layers and hold the threads of people's lives together. The *chronosystem* incorporates the influence of external life events and internal developmental processes as well as the historical context of families (Swick & Williams, 2006).

The bio-ecological system theory is relevant to this review because it recognizes the numerous, multifaceted, interconnected influences on child development and families. This framework is flexible enough to lend itself "to a multiplicity of compositional factors and

measurement models" (Williams, 2009, p. 45). It aligns with the neuroscientific knowledge that emphasizes the inextricable interconnection between children's brain, social-emotional, and overall development, the environment of their relationships, and their biology and genetics (NSCDC, 2007, 2008; Shonkoff & Phillips, 2000). It reflects the influence of the social determinants of child development, such as family and peer relationships, socio-economic family status, and socio-political context that interact in complicated ways to influence the trajectories of child health and development (Maggi et al., 2010). It expands the possibilities of options for promoting social-emotional development, preventing problems in this area of development, and addressing them if they arise. Finally, while this review examines literature based predominantly on an analysis of the microsystem, the bio-ecological system theory reminds us that even the most rigorous research methodologies may not eliminate the unmeasured influence of confounding variables on such complex processes as the social-emotional development of infants and young children of mothers with PPD.

Figure 1 Bronfenbrenner's Bio-ecological System (Adapted from Swick & Williams, 2006)



Key Concepts

Key concepts relevant to this project include post-partum depression, infants, early childhood and young children, social-emotional development, infant mental health, promotion, prevention, and intervention.

A primary concept of this proposed project is *postpartum depression.* The operationalization of this term derives from the definition provided by the Diagnostic Statistical Manual, 4th ed. text revision (American Psychiatric Association [APA], 2000). This diagnostic manual describes PPD as a moderate to severe major depressive episode that begins within the first four weeks postpartum. The criteria for a major depressive episode include depressed mood and/or loss of interest for at least two weeks, and four of the following symptoms: disturbances with sleep and/or appetite and eating, physical agitation or slowing down, fatigue, cognitive changes such as decreased concentration, unreasonable guilt, and suicidal ideation (APA, 2000). However, the literature describes mood problems during post partum in a variety of ways. For example, it is referred to as depressive symptoms (Edhborg et al., 2005), maternal depression (Forman et al., 2007), postnatal depression (Buultjens, Robinson & Liamputtong, 2008; Murray et al., 2003), and depressed mothers (van Doesum, Riksen-Walraven, Hosman & Hoefnagels, 2008). Further, Oates et al. (2004) offer the phrase “morbid unhappiness” (p. s13) as a way to encompass the universality of postpartum mood problems. Therefore, the secondary search terms included some of the alternative synonyms noted here.

For the purposes of this review, *infants* refer to young children from birth to twelve months of age (American Academy of Pediatrics, n.d.; Statistics Canada, 1999) and *early childhood* denotes those children aged one to four years (American Academy of Pediatrics, n.d.). Although PPD begins during infancy, it may persist beyond this period of the child’s life.

Therefore, in order to capture the literature pertaining to the effects of chronic PPD, *early childhood*, is included in this review. As well, for grammatical purposes, *young children* will represent early childhood, where appropriate.

For infants and young children, *social-emotional development* refers to the emerging abilities to experience, express, and regulate emotions and manage their stress responses: functions that underlie future, related development of autonomy and mastery (Crockenberg & Leerkes, 2000). Founded in the mother-infant relationship and fostered by maternal sensitivity (Feldman & Eidelman, 2009) and other significant family relationships, this burgeoning capacity to regulate affect is critical to forming relationships, developing language, understanding communication, developing other cognitive skills, and promoting physical growth (NSCDC, 2008). Many consider social-emotional development of infants and young children as an essential component of future mental and physical health and well-being, positive relationship, as well as academic success (Barblett & Maloney, 2010), and synonymous with infant mental health (Nelson & Mann, 2010).

When infants and toddlers experience social-emotional developmental challenges, practitioners and researchers consider these problems as having a relational component. Moreover, consensus exists amongst IECMH professionals that the approach to addressing these issues must include enhancing the parent-infant relationship (Cohen et al., 1999). In the context of PPD, social-emotional problems manifest in the expression of negative affect, difficulty managing anger, reduced interpersonal skills, increased stress levels, higher incidence of insecure infant-parent attachment (Encyclopaedia on Early Childhood Development [EECD], 2010), and parent-reported bonding or relational issues (Cohen, Lojkasek, Muir, Muir & Parker,

2002). Behaviourally, this population of infants may exhibit problems with sleeping (Owens, 2004), aggression, cooperation (EECD, 2010), and excessive crying (Oberlander, 2005).

Infant mental health (IMH) encompasses the social-emotional development of infants and young children, from birth to three years of age, in the context of their relationships with their parents/caregivers, family, culture, and environment. Additionally, it includes their abilities to form secure interpersonal relationships and to learn and explore (ZEROTOTHREE, 2004; Zeanah, Nagle, Stafford & Rice, 2005). Originated in the 1970's by Selma Frailberg and colleagues, IMH practice pertains to those efforts aimed at supporting and promoting social-emotional development of children from birth to three years of age within the context of their families and reducing the potential for future social-emotional, cognitive, and behavioural problems (Weatherston, 2001). However, in many settings, including here in BC, these services focus on children from birth to five years of age (Nelson & Mann, 2010). This multidisciplinary practice centres on parent/caregiver-child relationships and both the parent/caregiver and child needs. IMH services represent a continuum of mental health promotion, prevention of social-emotional development problems, assessment, and treatment (Tomlin & Vieheweg, 2003).

Promotion, in the context of the mental health of infants and young children, refers to strategies to foster social-emotional development and mental wellness. These strategies include supporting parents and caregivers to provide young children with safe, responsive, and nurturing interactions and relationships in their home and care environments. This support involves enhancing the knowledge professionals, parents, and caregivers have about the significant interconnectedness of early life experiences, caring environments, and child development (Bagdi & Vacca, 2006; Nelson & Mann, 2010; Zeanah et al., 2005).

Prevention of social-emotional problems in infants and young children means identifying and mitigating the conditions or factors that may predispose them to mental health problems. This includes striving to provide all children with relationships and environments that promote social-emotional development and resiliency (Bagdi & Vacca, 2006; Nelson & Mann, 2010). Another aspect of prevention is access to screening and early identification of problems, along with supports to assist the families of those infants and young children at risk for social-emotional difficulties, to form and sustain responsive, secure relationships. Prevention strategies recognize the contribution of the family and social milieu to childhood social-emotional development: Therefore, it involves an array of activities dedicated to improving parental mental health and family situations such as perinatal mental health and substance use services, and efforts to reduce intimate partner violence (Nelson & Mann, 2010).

The Cochrane Collaboration (2010) defines *intervention* as "to intervene to modify an outcome for prevention, treatment, and rehabilitation" (Cochrane Reviews, 2010). Traditionally, mental health interventions refer to specific treatments to address mental health problems. Interventions in infant and early childhood mental health involve "efforts that create positive change in children's mental health" (Miles, Espiritu, Horen, Sebian & Waetzig, 2010, p. 25). These may involve home-visitation, office-based counselling, and telephone support (Zeanah et al., 2005) that are "child and family-centred" (Bagdi & Vacca, 2006, p. 148). Interventions may also be referred to as activities, approaches, strategies, and treatments.

These key concepts serve several purposes for this project. They represent the elements of the problem under review and inform the literature search. As well, they guide the analysis and presentation of the review findings.

Part Two: Approach to the Inquiry

A detailed description of the methodology used for this integrative review comprises Part Two of this report. Using the framework of an integrative review as defined by Whittemore & Knafl (2005), this section will detail the five steps used to review the literature, namely, problem identification, literature search, data evaluation, data analysis, and presentation.

Methodology

I used an integrative review process to synthesize the empirical literature on strategies and interventions to promote the social-emotional development of infants and young children of mothers experiencing PPD, prevent social-emotional problems in this population, and address these problems when they occur. An integrative review facilitates the development of a broad understanding of issues by drawing from diverse perspectives including quantitative and qualitative forms of research as well as theoretical literature. It is useful when the empirical evidence on a phenomenon is insufficient to conduct a systematic review or meta-analysis (Whittemore, 2005) and when the intention is to inform policy, practice, and research (Whittemore & Knafl, 2005).

Integrative Review Steps

Step 1: Problem identification. The problem identification stage involves defining the problem under review as well as the specific variables of key concepts, health problem, target population, and sampling frame, all of which, I have hereto defined. Whittemore & Knafl (2005) recommend identifying the philosophical underpinnings informing an integrative review and using a diverse sample frame that includes empirical and theoretical literature, in order to strengthen the rigor of this stage. I described the philosophical underpinnings guiding this project earlier and will now discuss the type of literature reviewed as well as describe the remaining stages of this methodology.

Step 2: Literature search. The literature search stage, a critical component of an integrative review, needs to be as complete and unbiased as possible to enhance rigor (Whittemore & Knafl, 2005). To this end, I developed questions to guide the search, used a broad search strategy, established specific search criteria, and noted decision points and rationale on an audit trail (see Appendix B). The following questions, derived from a cursory review of the literature on infants of mothers with PPD while writing the proposal for this project, guided the search process. The questions are as follows:

1. what strategies promote the social-emotional development of infants and young children of mothers with PPD?
2. what strategies prevent social-emotional problems in infants and young children of mothers with PPD?
3. what interventions address social-emotional problems in infants and young children of mothers with PPD? And,
4. what other categories of supports, strategies, or approaches are related to this population?

Search strategies involved a purposive review of selected databases; websites; journals; and references lists of reviews, theoretical articles, secondary sources, and policy documents, for primary sources of experimental, non-experimental, descriptive, and qualitative studies related to the search questions. I used combinations of the terms listed in Table 1 during the search. The primary terms are derived from the preceding questions and the secondary terms are synonyms of those terms. I systematically searched the databases, websites, scanned journals, and documents using the primary terms first followed by successive combinations of the primary and secondary terms. For example, one primary search started with postpartum depression, infants,

social-emotional development, and promotion. Then, after reviewing the results of that search, I exchanged the primary terms for secondary ones, for instance, maternal depression, infants, social-emotional development, and promotion, and postpartum depression, toddlers, emotion, and promotion, and so on. I used a similar approach when scanning electronic journals and websites except in those cases, I often used shorter combinations of words.

Table 1

Search Terms

Primary Terms	Secondary Terms
Postpartum depression; Infants, early childhood, young children; Social-emotional development, infant mental health; and Promotion, prevention, and interventions.	Maternal depression, postnatal depression, depression, depressed mothers; Emotion, social; Toddler, preschooler; Biological, foster, adoptive; and Clinical, strategies, approaches, and reviews.

Since the mental health and well-being of infants and mothers is of interest to practitioners, administrators, researchers, and academics in a variety of fields including nursing, medicine, psychology, social work, child and youth care, and early childhood development, I searched databases containing literature from these fields. They include: Academic Search Premier, Cumulative Index to Nursing & Allied Health Literature, ERIC, HealthSource Nursing/Academics, Medline, PsychArticle, PsychInfo, PubMed, and Social Work Extracts. As well, I searched databases where systematic reviews of primary research are stored such as the Campbell Collaboration, and Evidence Based Medicine Reviews, which is comprised of Cochrane Databases of Systematic Reviews, Cochrane Methodology Register, Database of Reviews of Abstracts of Effectiveness, Cochrane Controlled Trials Register, and ACP Journal Club. Finally, I used the University of Victoria library search engine, Summon, to access a centralized index of the library's books, journals, e-journals and other sources.

Websites devoted to early childhood development, maternal mental health, evaluation of clinical studies, and practice guidelines; topic-based journals; and reference lists of selected literature were also searched. Websites focused on early childhood development such as Encyclopaedia on Early Childhood Development, Human Early Learning Partnership, National Scientific Centre of the Developing Child at Harvard University, Offord Centre for Child Studies, and ZEROTOTHREE, were searched. Provincial websites addressing perinatal depression, such as BC Perinatal Services and Pacific Post Partum Support Society, were scanned for relevant literature. As well, I scanned websites from Canadian provinces and territories, American states, English-speaking countries such as Great Britain, Australia and New Zealand, and international organizations such as the World Health Organization. Further, the tables of contents of journals, focused on infant, child, and maternal mental health, such as Infant Mental Health, Journal of American Academy of Child and Adolescent Psychiatry, and Canadian Journal of Psychiatry, were examined. Finally, I inspected the bibliographies of selected reviews and theoretical papers as well as relevant documents I had encountered in the course of my work.

The intention of the selection criteria described in Table 2 was to increase the likelihood of eliciting the most rigorous studies to assist in answering the research questions and they comprise the first step in evaluating the primary studies. Subsequently, I excluded some studies that did not meet the inclusion criteria, some of which are discussed later. I provide the rational for the selection criteria in the audit trail (see Appendix B).

Table 2

Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
Sample: Women who had experienced PPD or maternal depressive symptoms during the first year postpartum, as determined by the use of	Sample: Women whose experience of major depression or depressive symptoms occurred antenatally or outside of the first year

an instrument with recognized reliability and validity, and their healthy infants; Dependent variables including infant, toddler, or early childhood social emotional development; Post-intervention measurement of social-emotional development during early childhood; Longitudinal design; Attrition rate < 20%; Pre and post-intervention measurements, where appropriate, for example, of PPD or maternal depressive symptoms; Available in English; Available in peer-reviewed journals; Sample size of a minimum of 100 dyads in the non-experimental studies on child social-emotional development in the context of PPD or maternal depressive symptoms; and Published in any year.	postpartum or men with paternal postpartum depression; Studies focused exclusively on specific ethno-cultural groups or inclusive of infants with specific health concerns such as low birth weight, prematurity or sensory concerns; Dependent variable of infant, toddler, or early childhood cognitive development only; Lack of post-intervention measurement of social-emotional development during infancy or early childhood; Absence of pre-intervention measurements; Attrition rate > 20%; Cross-sectional design; and Not available in English.

Literature search results. Table 3 summarizes the search results. The initial results reflect the number of journal articles initially drawn from the database searches while the numbers listed for selection incorporate studies found through the multiple search strategies described earlier. As well, the searches for promotion, prevention, and intervention resulted in studies pertaining to one or the other category. The last column reflects the final number of studies included in the review following the evaluation stage. While a log of the excluded studies is not included, I comment on some of the excluded studies when discussing the limitations of this review. A few of the reasons for excluding studies include lack of infant or early childhood social-emotion developmental outcome measures, high attrition rates, or inclusion of women with antenatal and major depression during the second year of the child's life.

Table 3

Search Results

Search Category	Initial Results	Selected for Initial Review	Included in Integrative Review
Objective 1: SED and PPD	+1600	16	7
Objective 2: Promotion	+565	2	2
Objective 3: Prevention	+474	13	10
Objective 4: Intervention	+288	15	2

Step 3: Data evaluation. Whittemore and Knafl (2005) advise that the data evaluation phase of integrative reviews can be complex thus this step requires explicit criteria to support the rationale for the inclusion of specific studies. To assist in this process, I used three steps. First, after ensuring the selected study fulfilled the selection criteria, I reviewed the study and completed a literature review protocol adapted from Polit & Beck (2008, p. 120). I provide an example of a complete literature review protocol in Appendix C. Second, I completed evaluation matrices drawn from Polit & Beck (2008) and Polit & Beck (2004) on both sets of selected studies. The first evaluation matrix contained the selected studies drawn in response to objective one: to review the literature on infant and early childhood social-emotional development in the context of PPD. The second evaluation matrix, displayed in Appendix D, involved the studies selected to respond to research questions one, two, and three while question four is addressed in the analysis. Questions one to three include:

1. what strategies promote the social-emotional development of infants and young children of mothers with PPD?
2. what strategies prevent social-emotional problems in infants and young children of mothers with PPD?

3. what interventions address social-emotional problems in infants and young children of mothers with PPD?

Lastly, I evaluated the experimental studies using the *Quality Assessment Tool for Quantitative Studies* created by the Effective Public Health Practice Project at McMaster University's Faculty of Health Sciences ("*Quality Assessment Tool"*, n.d.). This tool offers 18 criteria to evaluate the methodological components of selection bias, study design, confounding, blinding, data collection methods, and withdrawals. After scoring each component using the accompanying dictionary, an overall value of weak, moderate, or strong can be assigned to each reviewed study. I recorded my assessment of the studies in Appendix D.

Table 4 presents the data evaluation steps and corresponding appendices.

Table 4

Data Evaluation Steps

Step	Appendix	Title
1	C	Literature Review Protocol
2	D	Evaluation Matrix: Interventions for Infants and Young Children of Mothers with PPD that Promote Social-emotional Development, Prevent Social-emotional Development Problems, and Treat Social-emotional Problems (Evaluation Matrix)
3	D	Evaluation Matrix

Originally, I had intended to include the feasibility of implementing the intervention types in the BC context in the evaluation matrix. However, determining the feasibility of each intervention type requires more information than is available in primary studies. For example, feasibility involves exploring such dimensions as the cost of implementation including access to intervention curriculum, materials and equipment, training, and supervision; as well as service provider and public acceptability. In addition, this process must consider the political philosophy and values of the macro and meso systems along with the social and economic

conditions. Therefore, I will explore the feasibility of implementing the identified intervention types during the discussion by using the information available through this review and that gained through my clinical employment as a registered nurse in community-based, Child and Youth Mental Health Services.

Step 4: Data analysis. Data analysis involves reduction, display, comparison, and conclusion components (Whittemore & Knafl, 2005). To analyse the literature for objective one, social-emotional development of infants and toddler of mothers with PPD, I used an evaluation matrix and developed a table listing the correlations of child and maternal outcomes identified in the studies. To analyse the intervention studies selected to answer research questions one, two, and three, I used the evaluation matrix shown in Appendix D and created a table listing the child and maternal outcomes associated with the interventions. To further support the latter analysis, I created three additional tables. The first one, shown in Appendix F, listed the following elements of the interventions: intervention type, theoretical underpinnings, intervener (e.g. nurse, counsellor, paraprofessional, layperson, or parent/caregiver), location (e.g. home, office, and hospital), and target of intervention (maternal, infant, maternal-infant, and parent/caregiver-infant), methods, duration, and child age. The second table highlights the specific elements of intervention target, location, and intervener as shown in Appendix G. Finally, the last table, shown in Appendix H, displays the significant effects on maternal and child outcomes associated with the specific interventions.

In two separate processes, I used the aforementioned tables to display, compare, extract, and code the data, and then used an iterative process to identify the substantive themes. As noted, the analysis of the experimental literature involved pre-determined elements. Finally, I discuss the generalizations of the analyses in a narrative conclusion.

Table 5

Data Analysis Tables Used to Address Research Questions

Appendix	Title
D	Evaluation Matrix: Interventions for Infants and Young Children of Mothers with PPD that Promote Social-emotional Development, Prevent Social-emotional Development Problems, and Treat Social-emotional Problems
E	Descriptions of Interventions
F	Elements of Interventions
G	Significant Effects of Interventions on Mother and Child Outcomes

Step 5: Presentation and interpretation. The presentation of this review strives to balance the recommendations of Kirkevold (1997) and Whittemore & Knafl (2005), that is, to present the review in such a way that is meaningful to the intended audience, while maintaining the academic requirements inherent to this project. Although the original purpose of this proposed project is academic, its findings will be relevant to professionals with limited time and resources for seeking and reading literature, such as those working in practice, policy, or research. To increase the acceptability of the literature review synthesis for multiple audiences, I used Promoting Action on Research Implementation in Health Services (PARiHS), a knowledge translation framework, to frame recommendations arising from this review. The PARiHS framework offers a model for fostering practise or systemic change by conceptualizing the critical elements of successful implementation of evidence: quality of evidence, context, and facilitation (Kitson et al., 2008). It has concept and face validity and conceptual integrity (Kitson et al., 2008). Utilizing this conceptualization increases the report's relevance to practitioners and policy-makers by acknowledging the integral roles of systems, teams, individuals, and facilitators on the complex knowledge transfer process (Kitson, 2008).

This report strives to include sufficient, explicit detail to assist the reader to form their own conclusions, as recommended by Whittemore & Knafl (2005). Tables offer consolidated

information and an audit trail provides the rationale behind the decision-making processes. The limitations of the review, implications for practice, policy, and recommendations for future research are highlighted following the review findings and discussion.

Part Three: Findings

Part Three addresses objective one and responds to the research questions. It begins with a review of the literature on infant and early childhood social-emotional development in the context of PPD, and is organized by the substantive themes resulting from the thematic analysis of the selected literature. Following, are the results and discusssion of the integrative review on the interventions to support social-emotional development of infants and young children of mothers with PPD, prevent these problems from occurring, and address them when they occur.

Postpartum Depression and Social-emotional Development of Young Children

The accumulated literature on the relationship between infant and early childhood social-emotional development and PPD spans over five decades and has established an association between PPD and negative child sequelae. An initial scan of the literature summarized in the background of this document presents a unified conclusion on this association. A secondary review of the selected, empirical primary studies provided here supports the existence of that relationship (Forman et al., 2007; Moehler et al., 2006; Murray, 1992; Murray et al., 2003; Murray, Fiori-Cowley, Hooper & Cooper, 1996: Murray et al., 1999; Wu, Selig, Roberts & Steele, 2011). The following thematic analysis of five longitudinal studies and two randomized control trials, discusses the substantive themes related to the association between PPD or maternal depressive symptoms during postpartum and child social-emotional development and maternal sensitivity.

Social-emotional development. Evidence exists of a correlation between PPD and maternal depressive symptoms during postpartum and infant-parent attachment security; child

affect and emotional regulation; infant behavioural problems including sleeping, eating, cooperation and aggression; and child internalizing and externalizing problems. Murray (1992) compared the attachment security of 18-month-old toddlers, whose mothers' PPD had been confirmed by a standardized clinical interview at two to three months postpartum, to that of children whose mothers had not experienced PPD, and found that the former group was significantly more likely to be insecurely attached. The group of toddlers with an increased rate of insecure attachment had either mothers with PPD and a history of depression prior to postpartum or mothers who were experiencing depression for the first time. However, the rate of insecure attachment was not significantly correlated to the severity of the mother's depressive symptoms or the presence of depression at the time of assessment.

Treatment for PPD did not have a positive effect on the prevalence of insecure attachment in toddlers. Forman et al. (2007) and Murray et al. (2003) each conducted a randomized controlled trial in the USA and Britain, respectively. Their samples, $N = 120$ and $N = 138$ respectively, were similar in that the majority were either married or cohabitating, and Caucasian, and all had healthy infants. The intervention groups were comprised of women with PPD confirmed by clinical interview. The samples differed in that the women in Murray et al. (2003) had a stated range of 10 to 30% high social disadvantage and 23.5% of them had post-secondary education while the majority in Forman et al. (2007) were well educated. The control groups in these studies differed in that Forman et al. engaged a sample, $N = 56$, of nondepressed women and their infants while Murray et al. involved a cohort, $N = 52$, of depressed women and their children. The interventions included Interpersonal Therapy (Forman et al,) and non-directive supportive counselling, Cognitive Behavioural Therapy, or brief psychodynamic psychotherapy (Murray et al.) and both control groups received routine primary care support.

Forman et al. obtained child outcome measures pre and post the twelve-week, office-based intervention, at six, nine, and 24 months postpartum respectively. Similarly, Murray et al. collected child outcome measures pre and post the home-based interventions at eight and 18 weeks postpartum, 18 months, and five years. Forman et al. reported the intervention group mothers were significantly more likely to rate their 24 month-old toddlers with insecure attachment behaviours compared to the mothers who had not experienced PPD. Alternatively, Murray et al. found no significant difference in the attachment security for the 18-month-old toddlers in the intervention groups compared to the control group, even after controlling for social adversity.

Murray et al. (1996) and Murray et al. (1999) who followed the cohort of Murray (1992) also made observations related to attachment security. Murray et al. (1996) found the toddlers of mothers who had experienced PPD continued to have significantly higher rates of insecure attachment in comparison to another group at risk for insecure attachment, that is, those dyads that had experienced adversity during the child's lifetime, and these effects were not mediated by gender or maternal-child interactions at two months postpartum.

Postpartum maternal mood may influence child emotional development. While assessing the effects of a range of parental psychiatric characteristics on child behavioural inhibition, Moehler et al. (2006) noted that the 14-month-old toddlers of mothers, whose major depressive symptoms had begun abruptly between six weeks and four months postpartum, expressed significantly greater behavioural inhibition and fearful dispositions in response to unfamiliar items and people. This was in comparison to young children whose mothers experienced lower or no depressive symptoms during the first year postpartum and this was not mediated by gender, maternal education, or other major, maternal or paternal personality characteristics. In another

context, mothers with PPD rated their infants' affect pre and post treatment and at 24 months as significantly more negative than did the nondepressed mothers (Forman et al., 2007). Similarly, treatment effects were not significant regarding the emotional development of five-year-olds whose mothers had had PPD in comparison to the mothers who had PPD but had not received treatment, based on maternal and teacher reports (Murray et al., 2003).

Social-emotional problems with behavioural manifestations in young children may result from exposure to PPD. Murray (1992) found that 15% of the 18-month-old toddlers of mothers who had had PPD, including those whose mothers had experienced PPD with and without a history of depression, demonstrated mild problems related to eating, sleeping, temper tantrums, and separation, with sleep disturbances being the most common challenge. While this percentage of children with behavioural problems is low, it is significantly associated with PPD but not to attachment security. Murray et al. (1999) assessed the Murray (1992) children at five years old and found that according to maternal reporting, PPD had a strong effect on the behaviours of the children at home. Indeed, 50.9% of them had behavioural scores in the clinical range compared to 15% of the children in the control group. Similar to Murray (1992), Murray et al. (1999) found that quality of infant attachment security at 18-months did not mediate this finding on child behaviour. Murray et al. (1999) also found that, according to maternal reporting, these five-year olds were significantly less responsive and cooperative with their mothers than were their peers of nondepressed mothers; however, this finding was significantly related to the insecure attachment of these children at 18 months old. In another study, Forman et al. (2007) noted that 18-months post intervention, mothers who had had PPD indicated their 24-month-old toddlers had significantly more internalizing and externalizing problems than did the children in the control group, and six of the children's behaviours were in the clinical range.

The effects of PPD may extend to preschoolers and primary school children as noted in the researcher observations of the social skills and types of play seen in the Murray (1992) sample at five years old. Murray et al. (1999) observed these five year olds and found that the ones whose mothers had had PPD were significantly less involved in creative play, more involved in physical play activities with low levels of cognitive components, and more reactive to peers' approach. In contrast, Wu et al. (2011) found something different in the social skills of 4.5 year-olds whose mothers had experienced depressive symptoms. Wu et al. (2011) used a sample drawn from the National Institute of Child Health and Human Development Study of Early Child Care, a longitudinal, multi-site study in the USA that follows children birth to age 15, to examine the social skills of 4.5 year olds whose mothers had experienced high rates of depressive symptoms at one month postpartum. These mothers were more likely to rate their 4.5 year olds' social skills significantly lower than did the mothers with nondepressed mood during postpartum. However, these findings did not hold when the mothers and teachers rated these children again 1.5 years later (Wu et al., 2011). Nonetheless, this study identified certain contextual factors, including married parents, older mothers, high family income, and female gender, significantly predicted better social skills for children at 4.5 and six years of age, according to maternal and teacher reports, respectively. While the disparate findings from Murray et al. (1999) and Wu et al. (2011) suggest that PPD may have a significant effect on the social skills of primary school age children, more research is needed to explore the multiple influences on child social skills.

Although it is not the focus of this review, it is worth mentioning the associations between PPD and child cognitive development. Murray (1992) noted significant differences in the cognitive outcomes of nine-month-old infants of mothers with PPD with those of mothers

experiencing their first depressive episode having the lowest scores, in comparison to those infants of mothers who had PPD and a prior episode of depression and the control group. Similarly, Murray et al. (1996) noted that PPD had a significant effect on the cognitive development of 18-month-old male toddlers compared to the female children. Finally, Murray et al. (2003) did not find significant benefit in the cognitive development of children at 18 months and five years, whose mothers had had PPD and treatment in comparison to those children of mothers who had had PPD but not been included in the interventions.

Maternal sensitivity. PPD may affect maternal sensitivity. Leerkes (2010) writes "sensitive responses to infant distress or needs for safety and protection may be of the greatest developmental significance in relation to children's social emotional development" (p. 219). The interactions of two-month-old infants with their mothers were significantly correlated to their mother's interactions: the more sensitive the mother, the more engaged her infant (Murray et al., 1996). Those women who had had PPD at two months postpartum were less sensitive to their infants and offered them fewer affirmatives and more negations while mothers who had not experienced PPD or adversity were more sensitive (Murray et al.). Interestingly, these researchers indentified a transactional pattern in the mothers with PPD: that is, infant expression of negative affect preceded maternal negation, which preceded infant disruption in the maternal-child interactions. When considering the effects of treatment for PPD on maternal sensitivity and responsiveness, Forman et al. (2007) and Murray et al. (2003) found that the treatments offered in their studies did not have a significant effect on this maternal characteristic, except in one group. Murray et al. (2003) found the women with PPD and high social adversity who received non-directive counselling had higher rates of sensitivity than did the control group of

untreated depressed mothers at 4.5 months (Murray et al., 2003). However, by nine months postpartum, the benefits of treatment were not significant.

Discussion

The evidence to support a correlation between PPD and maternal depressive symptoms during postpartum and negative social-emotional sequelae for young children continues to grow and be refined. Some researchers are increasing the objectivity of their findings by including teacher reports (Murray et al., 1999; Murray et al., 2003; Wu et al., 2011). This step may help address the controversy over the validity of maternal reports by depressed mothers. However, Forman et al. (2003) found that depressed mothers were only less accurate than non-depressed mothers in their reports on their six-month-old infants' negative emotions but not on their positive ones, and this effect size was only small.

Prospective, longitudinal studies that track the same sample over the course of several years offer compelling evidence. Researchers have been assessing the original sample of Murray (1992) intermittently for over 16 years (Murray et al., 1996; Murray et al., 1999; Halligan, Murray, Martins & Cooper, 2007; Murray et al., 2010). While I excluded the two latter cited studies for this review because they did not include child social-emotional development outcome measures, they offer information to support an association between PPD and child development. Halligan et al. (2007) engaged 91.4% of Murray's (1992) sample to find that the 13-year-olds whose mothers had had PPD at two months postpartum had an increased prevalence of anxiety disorders. In contrast, these youth had increased prevalence of mood disorders only when their mothers had experienced PPD and subsequent depressive episodes during their child's lifetime. However, the researchers did not rule out the potential confounding variables of prenatal or paternal mood disorders, which could have compounded the risk for mental health problems for

these youth. Assessing the Murray (1992) cohort three years later, Murray et al. (2010) considered the effects of PPD and child gender on academic success. They assessed 94% of the original sample and determined that the 16-year-old sons, but not daughters, of mothers who had had PPD were more likely to do poorly on the *General Certificate of Secondary Education* exam than were the control group youth, a finding not mediated by recurrent maternal depressive episodes. In summary, these studies support the original premise of the risk PPD poses to child development and future child mental health and school success.

While the long-term follow-up of the original Murray (1992) sample demonstrates the effects of PPD on a sample of children, its homogeneity limits the generalizability of the findings of this analysis, since three out of the four longitudinal studies followed this cohort of children and mothers. Conversely, the stable sample helps to strengthen the findings by managing the confounding sample characteristics (Polit & Beck, 2008).

While all but one sample in the studies reviewed is comprised of women with PPD, it seems the development of infants exposed to maternal depressive symptoms may also be at risk. Less than the average percentage of women in Moehler et al. (2007) experienced depressive scores in the clinical range and none were treated for PPD. Nonetheless, there was a significant relationship between maternal depressive symptoms and toddler behavioural inhibition and fear responses. Tronick and Reck (2009) echo the concern over the potential impact of maternal depressive symptoms on infants. In their review, they assert maternal depressive symptoms may interfere with mothers' ability to repair misattuned interactions and promote infant emotional regulation (Tronick & Reck). They also propose a connection between infant affect and maternal depressive symptoms whereby the infants of mothers with intrusive behaviours and maternal depressive symptoms tend to develop an angry affect while those infants of mothers

with maternal depressive symptoms who are less engaged and more withdrawn, tend to express a sad or depressed affect. Further, they hypothesise that these infants generalize their predominant affects of anger or sadness to other relationships, thereby compounding their risk for further relational and emotional problems.

Although out of scope for this project, it is interesting to note that the association between maternal depression and child psychopathology extends beyond the postpartum period. In their meta-analysis on maternal depression and child psychopathology, Goodman et al. (2011) confirm a significant association between maternal depression and child emotional functioning and behavioural problems; however, the effect size is small. Of interest to this project, they were unable to examine the relationship between the severity and timing of maternal depression, despite reviewing 193 studies. They were able to ascertain that the younger the mean age of the samples of the children, the stronger the associated effects for four child variables: externalizing problems, internalizing problems, general psychopathology, and negative affect and behaviour.

Despite the ongoing exploration, the mechanism by which PPD effects child social-emotional development remains uncertain. PPD may affect maternal sensitivity (Forman et al., 2007; Murray et al., 1996; Murray et al., 1999); a factor Murray & Cooper (1997) suggest in their review may have more of an impact on child development than PPD per se. Alternatively, Tronick & Reck (2009) suggest compromised maternal affect misrepresents emotional communication between mother and infant, thus affecting infant social-emotional development.

Longitudinal studies on the children of women who experienced spontaneous remission of PPD or remission precipitated by psychotherapy or psychosocial support has shown that the potential for negative sequelae persist for these children (Forman et al., 2007; Murray, 1992; Murray et al., 2003). The remission of PPD by three months postpartum did not improve the

mother-child relationship or child outcomes for 18 month-old toddlers (Murray 1992). Remission of PPD was not associated with long-term, significant benefits to the social, cognitive, and behavioural development of five-year-old children whose mothers received one of three psychological interventions (Murray et al., 2003). Finally, these findings and their own, prompted Forman et al. to conclude, "effective treatment for PPD is not sufficient to improve the developing mother-child relationship" (p. 585).

Subsequently, many have advocated for strategies to influence the microsystem of a child's ecology. Strategies include prevention of PPD; early identification and treatment of PPD provided for sufficient duration (Murray et al., 2003); as well as interventions to improve maternal sensitivity (Feldman et al., 2009), strengthen parenting, and enhance maternal-child interventions (Foreman et al., 2007). While these strategies may affect a child's microsystem, it may take changes in the meso, exo, and macro systems to see them implemented. For example, universal screening for perinatal depression, which would assist with early intervention, has not yet been fully implemented in BC even though PPD is a significant public health issue (Barr, 2006; Hayes, 2010) and the BC government has identified universal screening for perinatal depression as a priority (British Columbia, 2006). Others recommend early identification and intervention for infants and young children with social-emotional and behavioural problems (Moehler et al., 2007), including those that address infant affect (Tronick & Reck, 2009); approaches that recognize the influence of characteristics within the child on the microsystem. Finally, many researchers are striving to understand what strategies and approaches promote the social-emotional development of young children of mothers with PPD, prevent social-emotional problems from developing in this context, and treat these problems effectively should they occur. I address these questions next in this report.

Interventions Supporting Infant Social-Emotional Development

The following exactant synthesis of the current knowledge on interventions that promote the social-emotional development of infants and toddlers of mothers with PPD or postpartum maternal depressive symptoms, prevent these problems from occurring, and address them when they do occur, results from an integrative review of twelve primary studies and two longitudinal, follow-up studies. Two of these primary studies, Forman et al. (2007) and Murray et al. (2003) were also included in the review of the correlations between PPD and child social-emotional development. Here, I offer a comparison of the elements of the studies, which precedes a description of the interventions, categorized by promotion, prevention, and treatment; and followed by a discussion on the outcomes of the interventions.

Research design. The selected studies use randomized controlled trial (RCT) designs, except Cohen et al. (1999), Cohen et al., (2002), Goodman, Broth, Hall & Stowe (2008), and Paris, Bolton & Spielman (2011). The two former studies compared the outcomes of one intervention to another, which they reassessed six-months later, but did not include a control group for ethical reasons. Their sample involved infants and toddlers referred for infant mental health treatment, thus making these young children wait for treatment was seen as potentially maleficent (Cohen et al., 1999). The latter studies conducted a quasi-experimental evaluation of a new intervention using a within-subject design. Four of the primary studies identify themselves as pilot or preliminary studies (Baggett et al., 2010; Clark, Tluczek & Brown, 2008; Clark, Wenzel & Tluczek, 2003; Paris et al., 2011) and Cohen et al. (2002) and Kersten-Alvarez et al. (2010) are follow-ups to Cohen et al. (1999) and van Doesum et al. (2008), respectively. Pilot studies are often one of the early steps in determining the effectiveness of an intervention and researchers sometimes refer to them as *efficacy* (see efficacy in Appendix A) studies (Polit &

Beck, 2008). In summary, most of the studies use an RCT design, the most "powerful method available for testing hypotheses of cause-and-effect relationships between variables" (Polit & Beck, p. 263). RCT design not only increases the validity of the inferences made in a study, it is ranked at level two, in the most common evidence hierarchy, with ranking from one to seven, with one being the highest and represented by systematic reviews of RCT's or nonrandomized trials (Polit & Beck). However, since the research design does not guarantee the reliability of the findings, this discussion will consider the additional design elements of sample size and characteristics.

There was variability between the sample sizes, which, in some cases, may have contributed to the level of significance in the findings. The pilot studies of Baggett et al. (2010), Clark et al. (2003), and Paris et al. (2011) have samples of less than forty dyads; sizes that might be more cost-effective than a larger sample at this stage of evaluation but that may decrease their statistical power and increase the risk for Type II error (Polit & Beck, 2008). Finally, while the remaining studies had sample sizes between 58 and 138, excluding Clark et al. (2008) who had $N = 32$ and Goodman et al. (2008) who had $N = 44$, only Letourneau et al. (2011) used a power analysis to determine their sample size and reduce their risk for Type II errors.

There was wide variability in the level of depression experienced by the study participants. The levels of depression ranged from being at risk to having low (Ammaniti et al., 2006) to moderate (Baggett et al., 2010) levels of severity to those with scores in the clinical range (Letourneau et al., 2011; O'Higgins, St. James Roberts & Glover, 2008). For many of the women, PPD was confirmed by clinical interview (Clark et al., 2008; Forman et al., 2007; Goodman et al., 2008; Murray et al., 2003; van Doesum et al., 2008) while for others, a diagnosis was made using rating scales only (Clark et al., 2003; Cohen et al., 1999; Letourneau et al.,

2011; O'Higgins et al., 2008). This variability is appropriate considering the potential for negative child sequelae associated with postpartum depressive symptoms identified by Moehler et al. (2007) and asserted by Tronick & Reck (2009). As well, since remission or reduction of maternal depressive symptoms alone may not reliably mitigate the risks to child outcomes (Forman et al., 2007; Murray et al., 2003), it is important to discern the effectiveness of interventions to mediate the effects of PPD as well as postpartum depressive symptoms on child outcomes.

Dependent variable. All selected studies hold an intention to examine the effects of a specific intervention on four dependent variables in the context of mothers with either PPD or postpartum maternal depressive symptoms, all of which are a component of the microsystem. Maternal sensitivity is a primary target for most of the intervention in the studies, which is not unexpected since PPD is a factor recognized as interfering with maternal sensitivity (Forman et al., 2007; Shin, Park, Ryu & Seomun, 2008). Forman et al. (2007), Goodman et al. (2008), and Murray et al. (2003) target it indirectly through the provision of maternal mental health treatment while the other researchers aim to enhance maternal sensitivity with maternal-child or infant targeted strategies.

Simultaneously to improving maternal sensitivity, the second aim of each of the interventions is to enhance the quality of the mother-child interactions and relationships by working individually or dyadically with the mother, infant, and in some cases, the father. The interventions used by Forman et al. (2007), Goodman et al. (2008), and Murray et al. (2003) involve only the mother. In contrast, the model used by Clark et al. (2008) and Clark et al. (2003) involve the infants with individual therapists in a group setting as well as the mothers and fathers in separate groups, and dyadic or triadic therapy involving the infant with either the

mother alone or with both parents. The remaining interventions focus on the mother-infant dyad as well as providing support and education to the mother (Ammaniti et al., 2006; Baggett et al., 2010; Letourneau et al., 2011; O'Higgins et al., 2008; Paris et al., 2011; van Doesum et al., 2008; Cohen et al., 1999). Thirdly, by virtue of the selection and evaluation process, all the studies assess the outcomes of the interventions on a range of infant and toddler social-emotional development outcomes, a topic discussed later. Finally, all the studies, except one of the two on promotion interventions (Ammaniti et al., 2006), consider maternal depressive symptomology as a dependent variable.

Promoting infant social-emotional development. The promotion of the social-emotional development of infants and toddlers typically involves strategies aimed at fostering that development. These include providing parents and caregivers with information, education, and support so that they can respond to their children in a sensitive, safe, and nurturing manner. When risk factors exist that could impede the social-emotional development of young children such as is the case for infants of mothers with postpartum depressive symptoms, interventions that improve maternal sensitivity and parent-child interactions may promote child development (Nelson & Mann, 2010). Ammaniti et al. (2006) and Baggett et al. (2010) were innovative in their efforts to promote the social-emotional development of children early in life.

In Italy, Ammaniti et al. (2006) evaluated a non-manualized, home-visiting program, based on attachment and bio-ecological theory and delivered by trained and supervised social workers and psychologists, to a sample of women (N = 110) with either risk for depressive symptoms or low depressive symptoms and either no or more than one psychosocial risk factors, and their infants. Home visiting was unfamiliar in Italy at the time, thus families may have perceived it as being intrusive; a factor thought to contribute to this study's recruitment

challenges and the sample's over-representation of infants with secure attachment styles. Despite this increased risk for self-selection bias, this home visiting program was lengthy and intensive, beginning when the women were eight months pregnant and continuing until the child was one year old.

Baggett et al. (2010) also offered an intervention that was delivered in the home to women with depressive symptoms and low income, and their infants (N = 38). In contrast to Ammaniti et al. (2006), Baggett et al. (2010) used computer and internet technology to deliver, *Infant Net*, a 10-week, parenting program adaptation of *Play and Learning Strategies*, an evidence-based program, based on the principles of adult education and responsive parenting. Infant Net uses multimedia modalities including video recordings of the mother-child interactions, 90 minutes of weekly telephone coaching, daily homework, online information, questions and answers, and access to an internet bulletin board for peer and professional contact, parenting support, and information. The participants found the program acceptable and the completion rate for Infant Net was higher than that for more traditional home-visiting programs.

Preventing infant social-emotional development problems. Prevention of social-emotional problems in infants of mothers with either PPD or postpartum depressive symptoms requires a similar approach to promotion: They both involve providing young children with a context of relationships that are as sensitive and as responsive as possible to the child's developmental needs. Prevention strategies include efforts to improve parental mental health and family functioning, for example, by identifying women at risk for or with PPD, providing them with effective treatment, and supporting the mother-child relationship.

Location and Intervener. Strategies used to prevent social-emotional problems in this population were provided either in the home (Letourneau et al., 2011; Murray et al., 2003; Paris

et al., 2011; van Doesum et al., 2008) or in an office setting (Clark et al., 2008; Clark et al., 2003; Forman et al., 2007; Goodman et al., 2008; O'Higgins et al., 2008). Each intervention required trained and supervised professional clinicians, except Letourneau et al. (2011) who involved women who had had PPD trained as peer support, home visitors, and Murray et al. (2003) who included health visitors trained in two of the three interventions provided in their study to compare "expertise effects" (Cooper, Murray, Wilson & Romaniuk, 2003, p. 413).

Interventions. Various interventions are used to prevent social-emotional challenges in the young children of mothers with PPD and postpartum depressive symptoms. Clark et al. (2008) and Clark et al. (2003) used *Mother-Infant Therapy Group*, a manualized, family-centred, relational approach to treating women with moderate to severe PPD. Mother-Infant Therapy Group involves the women and their infants and partners in three separate group components of adult therapy, infant development therapy, and dyadic or triadic therapy, respectively. This comprehensive model integrates theoretical principles from attachment, family systems, self-psychology, psychodynamic, cognitive-behavioural, and interpersonal theories and involves different clinicians for each group component, making it a costly and complex endeavour. Group therapists provide group therapy to the women and partners separately while dyadic therapists work in a group format with the mother and infant or the mother, partner, and infant. Interestingly, this is the only intervention that promotes infant development by working directly with the infant alone. In this case, an infant mental health therapist is assigned to each infant who provides the individual child intervention in a facilitated, group setting. This intervention involves the provision of attuned and responsive interactions and appropriate developmental stimulation in order to foster the infant's emotional regulation capacity, relational responsiveness, and range of affect. Mother-Infant Therapy Group supports family relationships

by having the father or partner attend two group sessions as well as two sessions focused on triadic interactions with the infant and mother.

Many of the studies used preventions interventions that focus on the mother-infant or dyadic relationship. These include Keys to Caregiving (Letourneau et al., 2011), Infant Massage (O'Higgins et al., 2008), Early Connections (Paris et al., 2011), or a hybrid of strategies intended to improved maternal sensitivity (van Doesum et al., 2008). Keys to Caregiving, a manualized program, promotes the quality of mother-child interactions by systematically helping mothers to understand their infants' cues, affects, and behaviours, and respond contingently. Peer mentors use written materials and videotapes, modeling, and positive reinforcement in this 12-week process (Letourneau et al., 2011). Specially trained clinicians provide six, one-hour infant massage group sessions to the mothers in the intervention group in order to increase their awareness and responsiveness to their infants' cues (O'Higgins et al., 2008). Early Connections, a non-manualized, 12-16 week, dyadic intervention draws from attachment theory and uses a combination of therapeutic techniques such as active listening, building therapeutic alliance, promoting emotional expression along with strategies to facilitate the mother-infant interactions (Paris et al., 2011). Finally, Van Doesum et al. (2008) integrated cognitive restructuring, modelling, infant massage, and practical childcare support with videotaped recordings of mother-infant interactions in their 8-10 week, home-based intervention.

In contrast to the dyadic interventions, several maternal mental health interventions were used to directly address PPD and accompanying issues with the intention of preventing child social-emotional problems. Women with PPD received 12 weeks of medication and office-based support and education (Goodman et al., 2008). Interpersonal Therapy is offered in a 12-session, individual format as the only intervention in Forman et al. (2007) and as a comparative one to

Mother-Infant Therapy Group in Clark et al. (2003). Interpersonal Therapy is a manualized psychotherapy for people experiencing depression that uses a biopsychosocial approach to address interpersonal issues, grief and loss, and role transitions (Clark et al., 2003). Murray et al. (2003) offer three treatment options, non-directive supportive counselling, cognitive behavioural therapy, and brief psychodynamic psychotherapy. While non-directive supportive counselling provided women with an opportunity to explore any concern or issue, the cognitive behavioural therapy offered by Murray et al. (2003) focused on problems identified by the mothers concerning caring for their infant, and the brief psychodynamic psychotherapy explored maternal attachment history in order to enhance the mother-child relationships.

Of interest, almost two-thirds of the promotion and prevention studies reviewed reference an educational component in the intervention. Even when the intervention is minimally described, such as the Italian home-visiting protocol (Ammaniti et al., 2006), Early Connections (Paris et al., 2011), infant massage (O'Higgins et al., 2008), and medication, education, and support (Goodman et al., 2008), each one provides reference to such activities as maternal education and helping the mother to read and interpret her baby's cues. Others, including Infant Net (Baggett et al., 2010), Keys to Caregiving (Letourneau et al., 2011), hybrid home visiting (Kersten-Alvarez et al., 2010; van Doesum et al., 2008), and even the non-directive counselling intervention (Murray et al., 2003) identify such educational elements as coaching, offering internet-based information, and providing practical support. In summary, while education was only one component of the promotion and prevention interventions noted here, it is a common element in six of the eight primary studies that indicated at least one significant effect for the children.

There is variability amongst the studies concerning the control or comparison groups. Some control groups received waitlist support (Baggett et al., 2009; Letourneau et al., 2011; O'Higgins et al., 2008; van Doesum et al., 2008), while others did not (Ammaniti et al., 2006; Goodman et al., 2008). Alternatively, some control groups were offered the intervention after waiting (Clark et al., 2008; Forman et al., 2007) and others received an alternative intervention (Cohen et al., 1999; Clark et al., 2003). Finally, Paris et al. (2011) compared the same sample to itself, before and after the intervention.

In summary, several interventions types strengthen the microsystem of the infant and mother in the context of PPD and postpartum depressive symptoms by addressing maternal mental health, promoting the dyadic relationship, providing education, and fostering the conditions for healthy social-emotional development. Nevertheless, children may develop infant mental health problems and require specialized treatments.

Treating infant and toddler social-emotional development problems. Infant mental health treatment is a form of early intervention. When children's social-emotional challenges are addressed early in life, these approaches may reduce the incidence of future mental health problems or, if problems occur, the early intervention may reduce the severity. Nevertheless, only one of the selected studies addressed the infant mental health needs of young children when their mothers experienced postpartum depressive symptoms or other maternal stressors. Cohen et al. (1999) compared the outcomes of Watch, Wait, and Wonder to Parent-Infant Psychotherapy with infants and toddlers, referred to a children's mental health centre for chronic problems related to sleeping, feeding, and behaviour, or for issues within the mother-child relationship, and their mothers ($N = 67$). Both these infant mental health interventions are based on attachment theory and involve the mother playing with her child. However, Watch, Wait, and

Wonder contrasts to Parent-Infant Psychotherapy in that it is an infant-led psychotherapy instead of a parent-focused one. During Watch, Wait, and Wonder, the mother is encouraged to follow her child's lead during the first half of the session and afterwards, with the therapist, she explores the meaning of her child's behaviour and works through her reactions to following her child. Alternatively, throughout the Parent-Infant Psychotherapy play session, the mother explores with her therapist, her past experiences, and present feelings and perceptions in relation to her child.

Outcomes of the Interventions

I have divided the thematic analysis of the studies' findings into child and maternal outcomes in order to facilitate the discussion on the effects of the strategies to promote the social-emotional development of infants and toddlers of mothers with PPD and postpartum depressive symptoms, prevent these problems from occurring, and treat them when they occur.

Child outcomes - attachment security. Amongst these studies, only dyadic interventions had significant effects on the attachment security style of young children. The only infants and toddlers to experience a significant change in their attachment security style because of one of the interventions were those involved in a home-based, mother-child intervention (van Doesum et al., 2008) and those who received either Watch, Wait, and Wonder or Parent-Infant Psychotherapy in an office setting (Cohen et al., 1999). The former intervention had a significant effect on the attachment security of the intervention group infants of 11.5 months: so much so that the prevalence rate of secure attachment in that group was equal to that of the general population following intervention. Following Watch, Wait, and Wonder, the children in that group were significantly more likely to shift to either a secure or an organized attachment style (Cohen et al., 1999). However, six months later, while the children in the Watch, Wait, and Wonder group maintained their gains, the children in Parent-Infant Psychotherapy continued to

improve, thus leaving no remaining significant difference in the attachment security between the two groups of children (Cohen et al., 2002). Conversely, the mothers who had received Interpersonal Therapy when their infants were six-months-old, rated their 24-month-old toddlers with significantly more insecure attachment than did the mothers who had not experienced PPD (Forman et al., 2007).

Child outcomes - emotional regulation. Significant effects on the emotional regulation of infants did not result from the interventions used in these studies except for the children involved in the infant mental health clinic treatment interventions or those whose mothers received one of three maternal mental health interventions; however, in some cases, the effect was only short-term. The toddlers who engaged in Watch, Wait, and Wonder with their mothers showed significantly more improvement in their emotional regulation than did their peers who participated in Parent-Infant Psychotherapy (Cohen et al., 1999). However, similar to attachment security, six months later, the children in the Parent-Infant Psychotherapy continued to improve and this difference was no longer significant (Cohen et al., 2002). Similarly, the 18-month-olds whose mothers had received one of the three interventions in Murray et al. (2003) had significantly better emotional regulation in comparison to the control group whose mothers also had had PPD. However, when these children were five-years-old there was no significant differences between them and the control group in relation to their emotional, behavioural, or cognitive development.

Child outcomes - infant affect. The only intervention to have a significant effect on infant affect was Early Connections. However, this home-based intervention had a significant effect on the positive, but not negative affect of 7.5 month-old infants (Paris et al., 2011). Alternatively, some mothers rated their children's affect as significantly more negative than did

the nondepressed mothers, both before and after the mothers received Interpersonal Therapy (Forman et al., 2007).

Child outcomes - infant and toddler behaviour problems. Two interventions, one promotion and one prevention, achieved significant effects on infant and toddler behavioural problems. The promotion strategy, Infant Net, had a significant effect on infants' feeding, sleeping, and crying challenges (Baggett et al., 2010) while non-directed counselling had a significant but short-term effect on toddler behavioural problems in relation to feeding, sleeping, crying and temper tantrums (Murray et al., 2003). As previously noted, when Murray et al. (2003) reassessed these children at five years of age, there were non-significant differences between them and the control group, in relation to their emotional, behavioural, or cognitive development.

Child outcomes - internalizing and externalizing problems. None of the interventions had a significant effect on the prevalence of internalizing or externalizing problems, except for the hybrid, home visiting program of van Doesum et al. (2008) and that was for only one subsample in their study. At five-years-old, the children whose mothers had participated in this hybrid, home-visiting program and whose families had experienced several, major life events during the interim period between intervention and follow-up, had significantly fewer externalizing problems as rated by their mothers than did the control group children whose families had had similar events. In contrast, these control group children had a significantly higher prevalence of both internalizing and externalizing problems in comparison to the aforementioned intervention group, as rated by their mothers (Kersten-Alvarez et al., 2010). However, Kersten-Alvarez et al. admitted that differential attrition may have biased these long-term outcomes. As with infant affect, the mothers who had received Interpersonal Therapy when

their children were infants, rated their toddlers with a significantly higher prevalence of internalizing and externalizing problems than did the nondepressed control group mothers (Forman et al., 2007). Finally, as noted, none of the interventions offered by Murray et al. (2003) had a significant effect on the behaviour of the five-year-old children, according to maternal and teacher report.

Child outcomes - cognitive development. Although not a focus of this review, it is interesting to note that in those studies that assessed cognitive development, neither Mother-Infant Therapy Group (Clark et al., 2008) nor directive supportive counselling, cognitive behavioural therapy, and brief psychodynamic psychotherapy (Murray et al., 2003) had a significant effect on this aspect of child development. However, the toddlers from the Watch, Wait, and Wonder group showed significantly greater improvement in cognitive development (Cohen et al. 1999) compared to those children in the Parent-Infant Psychotherapy group, but those differences were not significant six months later (Cohen et al., 2002).

Child outcomes – mother child interactions. In contrast to limited treatment effects on child outcomes, many interventions that focused on enhancing mother-child interactions and providing the mother with information and support, had a significant effect on the dyadic relationship. The child outcomes result from the assessment of child behaviours during the mother-child interactions and in some cases, maternal report. In some cases, the infants became significantly more attentive and engaging with their mothers following home-based, Infant Net (Baggett et al., 2010), Early Connections (Paris et al., 2011), and the hybrid model (van Doesum et al., 2008). However, the hybrid model did not lead to significant long-term improvements in maternal-child interactions at five-year follow-up (Kersten-Alvarez et al., 2010). In other contexts, infants became less challenging for their mothers following maternal peer support

(Letourneau et al., 2011), and more engaged in playing with their mothers after receiving maternal mental health care, education, and support (Goodman et al., 2008). Additionally, following Mother-Infant Therapy Group or Interpersonal Therapy (Clark et al., 2003), mothers rated their infants as significantly more adaptable and reinforcing. Of note, when Mother-Infant Therapy Group was offered as the only intervention in a pilot study, the before and after results did not reveal a significant effect in this domain; however, there was a significant age difference between the intervention and control groups with the younger mothers in the intervention group (Clark et al., 2008). While mothers indicated they had significantly less problems in their relationships with their four-month-old infants following one of the three interventions offered by Murray et al., (2003) in comparison to the control group, and after controlling for adversity, this difference did not persist to the re-assessment at five years of age. Conversely, both groups of dyads who participated in Watch, Wait, and Wonder and Parent-Infant Psychotherapy showed significantly more reciprocity and less conflict during their playtime together (Cohen et al., 1999).

Maternal Outcomes - Maternal Sensitivity. A few of the interventions had a significant effect on maternal sensitivity, although not always in the expected direction or to a significant level. Only the home-based, non-directive supportive counselling (Murray et al., 2003) and the hybrid home-visiting program (van Doesum et al., 2008) had a significant effect on maternal sensitivity. While there had been improvement in maternal sensitivity following Watch, Wait and Wonder and Parent-Infant Psychotherapy, there were non-significant between-group differences, although there was a significant reduction in maternal intrusiveness for both groups of women (Cohen et al., 1999). As well, the mothers who participated in Infant Massage had sensitivity levels equivalent to the nondepressed control group at one-year post intervention

(O'Higgins et al., 2008) and the maternal sensitivity of the Italian mothers who received home-visiting improved (Ammaniti et al., 2006). In some cases, the maternal sensitivity of women who had received an intervention was either significantly less than the mothers in the control groups, at five year follow-up (Kersten-Alvarez et al., 2010), or remained significantly lower than the nondepressed mothers, even after treatment (Forman et al., 2007).

Maternal outcomes - maternal depression. Several interventions helped to reduce the level of maternal depressive symptoms but only a few had a significant effect. Mother-Infant Therapy Group (Clark et al., 2008); medication, education, and support (Goodman et al., 2008); Early Connections (Paris et al., 2011); and Interpersonal Therapy (Forman et al., 2007) had a significant effect on maternal depression. However, over half the sample in Paris et al. (2011) was on antidepressants at the onset of Early Connections and since the researchers did not track this variable, the relationship between Early Connections and maternal mood improvement could be spurious. Conversely, Infant Net (Baggett et al., 2010), Infant Massage (O'Higgins et al., 2008), Watch, Wait, and Wonder and Parent-Infant Psychotherapy (Cohen et al., 1999), and hybrid home visiting (van Doesum et al., 2008) had a positive but non-significant effect on maternal depression. Surprisingly, the women who received Keys to Caregiving via home-based peer support showed significantly less improvement in maternal depressive symptoms than did the control group (Letourneau et al., 2011). Finally, although Murray et al. (2003) did not report on the effects of their interventions on maternal depression, part one of the study report indicates the mothers in each of the three intervention groups experienced a significant reduction in maternal depressive symptoms (Cooper et al., 2003).

Maternal outcomes – mother child interactions. Similarly, to the child component of mother-child interactions, a few of the interventions had a significant effect on maternal

interactive behaviours. Three of the six interventions that had a significant effect on the child while interacting with their mother, also had a significant effect on maternal interactive behaviour (Baggett et al., 2010; Murray et al., 2003; van Doesum et al., 2008). However, the differences did not persist for either the mothers in van Doesum et al. (2008) as shown by Kersten-Alvarez et al. (2010) or in Murray et al. (2003). As well, the mothers in van Doesum et al. (2008) were receiving maternal mental health care simultaneously to participating in the home-visiting program, thus the significance of these findings may not be fully attributable to their intervention. Additionally, the office-based, infant mental health strategies had a significant effect on reducing maternal intrusiveness with their toddlers (Cohen et al., 1999; Cohen et al., 2002). In contrast, the use of medication and provision of office-based support and education lead to significant improvement in maternal positive parenting described with such factors as increased enjoyment in caring for one's child, more developmentally appropriate interactions, and increased responsiveness (Goodman et al., 2008). Finally, similarly to the effects on maternal depression, the control group women who had not received Keys to Caregiving had more significant change in maternal interaction behaviour than did the women who did receive the intervention (Letourneau et al., 2011).

Summary

Promoting early childhood development is a growing priority for clinicians, policy-makers, and researchers expedited by the explosion in neurobiological evidence and multidisciplinary social and behavioural research declaring that early life experiences and environment interact with a child's biology to shape their brain's architecture and influence their future health and success (CDCHU, 2009; Shonkoff & Phillips, 2000). The synthesis of evidence presented in this integrative review reflects the noteworthy efforts and major

investment of time and resources by researchers and others to understand the relationship between postpartum maternal mood and child outcomes, and to examine interventions to enhance social-emotional development outcomes for children of mothers with PPD and postpartum maternal depression. Their work builds on the correlations between these maternal states and child outcomes identified by others, specifically the social-emotional outcomes of attachment security, emotional regulation, infant affect, infant and toddler behaviour, and internalizing and externalizing problems, as well as the associated effects of PPD on mother-child interactions.

Overall, there is emerging evidence that some promotion, prevention, and treatment interventions help to improve child and maternal outcomes in the context of PPD and postpartum maternal depression. When interventions did mediate child outcomes, they were predominantly the ones that involved the mother-child relationship within the microsystem. For instance, attachment security was significantly improved following the dyadic interventions of the hybrid home visiting approach (van Doesum et al., 2008) and the treatment modalities of Watch, Wait, and Wonder, and Parent-Infant Psychotherapy (Cohen et al., 1999; Cohen et al., 2002). The latter infant mental health interventions also significantly improved toddler emotional regulation.

Significant improvements in infants' responses to their mothers' resulted from five divergent approaches. Both dyadic and maternal mental health interventions offered either in the office or home contributed to significant enhancement in the infants' attention and responsiveness to their mothers. Mother-Infant Therapy Group and Interpersonal Therapy (Clark et al., 2003), Keys to Caregiving (Letourneau et al., 2011), and Early Connections (Paris et al., 2011) significantly enhanced the infants' attention and responsiveness to their mothers. As well,

the medication and undefined education and support offered to mothers in Goodman et al. (2008) lead to significant improvements in the quality of the infants' play with their mothers.

In contrast to infant interactive behaviours, only two interventions had significant effects on infant and toddler behaviour problems. This included the home-based, education and dyadic program, Infant Net (Baggett et al., 2010), and the home-based, non-directive supportive counselling component of Murray et al. (2003); however, the effects on toddler behaviour did not persist (Murray et al., 2003).

Five general strategies had a significant effect on the quality of maternal-infant interactions, although in one case the effect was not long lasting. In two studies, facets of maternal interactive behaviours were significantly improved by combinations of interventions offered in the home; for instance, dyadic strategies and maternal education (Baggett et al., 2010; van Doesum et al., 2008). In another case, home-based maternal mental health care stimulated significant but short-term improvements in maternal interactive behaviour with their four-month-olds (Murray et al., 2003). In contrast, the two, office-based, dyadic infant mental health modalities had a significant effect on reducing maternal intrusiveness with their toddlers (Cohen et al., 1999; Cohen et al., 2002).

Although each of the studies identified maternal depression as an independent variable, just over a third of them reported significant improvements in maternal depression ratings. The interventions that provoked those results were those that directly addressed maternal mental health with either psychotherapy (Clark et al., 2003; Cooper et al., 2003; Forman et al., 2007) or medication (Goodman et al., 2008) or included women who were receiving concurrent antidepressant medication (Paris et al., 2011). Of note, there was no significant difference in the improvements in maternal depression ratings between the women in the Interpersonal Therapy

group and those in the Mother-Infant Therapy Group (Clark et al., 2003). Further, even when women were receiving unspecified, concurrent treatment for PPD along with the hybrid, home-visiting intervention, their mood improvements did not reach significance, and while they showed short-term improvements in maternal sensitivity (van Doesum et al., 2008), this did not last for all the women in the study (Kersten-Alvarez et al., 2010).

Finally, the emerging evidence resulting from this integrative review can be considered against the claims that maternal mental heath treatment of PPD may not be sufficient to mitigate its' effects on child outcomes (Forman et al., 2007; Murray et al., 2003). Only two studies indicated both significant improvements in maternal depression ratings and infant interactive behaviours, a component of social-emotional development (Clark et al., 2003; Goodman et al., 2008). In each of these studies, some or all of the women received maternal mental health care and about half were involved in a dyadic approach. However, the follow-up period of the children was much shorter than the 18 months and five-year follow-ups conducted by Forman et al. (2007) and Murray et al. (2003) and the children were much younger with a mean age ranging from six to fifteen months compared to 24 and 60 months, respectively. This means it is not possible to know from these small studies what the relationship is between these short-term improvements in infant interactions and maternal depression and future, social-emotional development outcomes. Therefore, while this evidence may be insufficient to counter the claims of Forman et al. (2007) and Murray et al. (2003), it does suggest the need for more longitudinal studies of this population with a variety of interventions.

There are several limitations to the emerging evidence discussed here. In two of the prevention studies, the researchers did not account for the potential confounding variable of concurrent maternal mental health care provided to the women in their studies (Paris et al., 2011;

van Doesum et al., 2008). In the latter study, the women received undefined maternal mental health treatment while in the former one, over 50% of the women were on antidepressants at the beginning of the study and the researchers neither tracked this variable nor accounted for it in their analysis.

Another factor to consider is the age of the infants at the end of treatment and the final assessment. Only four studies included follow-up assessments ranging from six months (Cohen et al., 2002) to one year (O'Higgins et al., 2008), 18 months (Forman et al., 2007; Murray et al., 2003) to five years (Kersten-Alvarez et al., 2010; Murray et al., 2003). The remaining studies measured child and maternal outcomes post treatment when the children were between three to fifteen months. This is important because infant and toddler growth and development are very rapid making it challenging to rely on a pre and post intervention assessment of infant social-emotional development (Egger & Angold, 2006) to detect significant changes and to predict future development.

Further, while Watch, Wait, and Wonder and Parent-Infant Psychotherapy achieved significant effects when compared to each other, a waitlist control group or a group of children with earlier onset infant mental health problems may have strengthened the findings. As well, in relation to the purpose of this review, an unspecified number of women in Cohen et al. (2002) were experiencing maternal depressive symptoms at the time of intervention and when their children were between 10 to 30 months, thus, the benefit to infants and mothers exposed to PPD is unconfirmed. Further, some of the studies did not describe their interventions with enough detail to understand its' components, for example, Goodman et al. (2008). Finally, while Forman et al. (2007) did not attribute positive effects of Interpersonal Therapy on mother-child

interactions, Clark et al. (2003) did, although the latter sample of women receiving Interpersonal Therapy was extremely small and the infants accompanied the mothers to the therapy sessions.

On the other hand, the researchers identified this emerging evidence following short-term interventions. Every intervention was less than 20 weeks or less, except Ammaniti et al. (2006) whose intervention was over a year but did not achieve significant effects. This aligns with the premise that brief interventions may be sufficient to improve child outcomes (Cohen et al., 2002), something that reflects rapid brain development in the early years.

To conclude, there is emerging evidence to suggest specific interventions that influence the microsystem by strengthening the dyadic relationship and enhancing maternal knowledge and skills may promote and improve the social-emotional development of infants and toddlers of mothers with PPD and postpartum depressive symptoms. This emerging evidence adds supports to the assertion that maternal mental health care may be insufficient to mediate the effects of PPD on child social-emotional development. It also supports the recommendations that maternal-child approaches be a component of the care for women with PPD and their families (Forman et al., 2007; Murray et al., 2003; Poobalan et al., 2007; CCDHU, 2009). Moreover, it suggests parental education and skill development may be a helpful component of effective interventions. However, while the primary focus of this emerging evidence is on aspects of children's microsystems, these findings do not preclude the need to explore the many variables in their ecologies, which could have either a confounding or moderating effect on the social-emotional development of young children.

While being mindful of the limitations in the evidence noted earlier, the following table displays a summary of the emerging evidence categorized by promotion, prevention, and treatment.

Table 6

Summary of Emerging Evidence

	Intervention	Statistically Significant Effects
Promotion	Home-based, Infant Net (Baggett et al., 2010)	Mother-child interactions (infant and mother) Infant behaviour
Prevention	Home-based, non-directive supportive counselling, Cognitive Behavioural Therapy, Brief Psychodynamic Therapy (Murray et al., 2003)	Mother-child interactions[1] (infant and mother) Emotional regulation[1] Toddler behaviour Maternal sensitivity[1] Maternal depressive symptoms
	Home-based, hybrid home-visiting program (van Doesum et al., 2008; Kersten-Alvarez et al., 2010)	Mother-child interactions[1] (infant and mother) Attachment security Internalizing and externalizing problems[2] Maternal sensitivity[1]
	Home-based, Early Connections (Paris et al., 2011)	Mother-child interactions (infant) Infant Affect Maternal depressive symptoms
	Office-based Mother-Infant Therapy Group, Interpersonal Therapy (Clark et al., 2003)	Mother-child interactions (infant)
	Office-based Mother-Infant Therapy Group (Clark et al., 2008)	Maternal depressive symptoms
	Office-based Interpersonal Therapy (Forman et al., 2007)	Maternal depressive symptoms
	Medication and office-based Support and education (Goodman et al., 2008)	Mother-child interactions (infant and mother) Maternal depressive symptoms
Treatment	Office-based Watch, Wait & Wonder > Parent-Infant	Mother-child interactions (infant) Attachment security

Psychotherapy (Cohen et al., 1999) Office-based Watch, Wait & Wonder = Parent-Infant Psychotherapy (Cohen et al., 2002)	Emotional regulation Maternal sensitivity

[1] Non-significant differences at five-year follow-up assessment
[2] One sub-sample showed significant differences at five-year follow-up assessment

Limitations

There are several methodological limitations to this exactant synthesis of current knowledge derived from selected primary sources of literature on child social-emotional development and PPD. The first has to do with the selection criteria. When reviewing the association between PPD and child social-emotional outcomes, by only selecting studies with sample sizes of 100 or more, I may have eliminated some quality studies with a lower but adequate sample size. When reviewing the studies on the effects of interventions on child outcomes, I did not eliminate those studies that did not use a RCT design, thus I may have reduced the validity of my synthesis. As well, when selecting the experimental studies, I did not set a minimum sample size and I included samples with women experiencing a range of postpartum depressive risk and symptoms. This means the conclusions I made regarding the outcomes of the interventions is not limited to those dyads exposed to PPD only.

Second, the selection criteria for the experimental studies excluded some interventions that may play a role in promoting child social-emotional development and preventing problems in this area of development, some of which I mentioned in the introduction. In some studies, the samples included women who experienced depression beyond postpartum, for example, Cicchetti, Toth & Rogosch (1999) who examined the effects of toddler-parent psychotherapy on mothers with major depression and their toddlers. In other cases, the attrition rates exceeded

20%, a factor that could increase the risk for bias (Polit & Beck, 2008). For this reason, I excluded an earlier, quasi-experimental study using Keys to Caregiving (Jung, Short, Letourneau & Andrews, 2007), two studies examining the effects of Infant Massage (Onozawa et al., 2001; Glover, Onozawa & Hodgkinson, 2002), and a residential early intervention program for women with multiple physical and mental health problems and socioeconomic issues, and their infants (Rowe & Fisher, 2010). I excluded studies that did not include child social-emotional outcomes but that could have benefit, for example, a new intervention entitled *Mellow Babies* that provides a group approach to mothers with PPD and their infants (Puckering, McIntosh, Hickey & Longford, 2010). Finally, after reviewing a study on the *Nurse-Family Partnership* ([NFP], Olds et al., 2004), and two reviews of NFP (Olds, 2006; Schwartz et al., 2011), it appears the women in the samples may have experienced antenatal or postpartum depression or postpartum depressive symptoms but the details of this information were not clear.

Third, the small number of experimental studies, especially those striving to either promote infant social-emotional development or treat infant mental problems in this population, and the small sample sizes, limit the external validity of the study findings and the generalizability of this synthesis.

Fourth, the literature on the relationship between PPD and child social-emotional development is primarily correlational. This means their findings are provisional since correlational designs are limited in their ability to establish causal relationships, vulnerable to inaccurate interpretations, and susceptible to selection bias (Polit & Beck, 2008). Nonetheless, they are useful when trying to describe or understand relationships between variables, especially when strengthened by a prospective design (Polit & Beck, 2008) as were the majority of the studies reviewed here.

Fifth, I am unable to account for the effects of a variety of differing contextual factors within the samples' ecology. Of the fourteen studies examined in the integrative review, only three were conducted in Canada (Cohen et al., 1999; Cohen et al., 2002; Letourneau et al., 2011) and the remaining experimental studies were conducted in either the USA, Britain, Italy, or Netherlands (see Appendix D). As well, four out of seven studies that explored the association between PPD and child social-emotional development outcomes took place in Britain, while the others were conducted in the USA (Forman et al., 2007; Wu et al., 2011) and Germany (Moehler et al., 2007). There are significant differences between the countries and communities in which the studies took place. In other words, differences between such factors as the health care systems, economic situations, and cultures within these countries further limit the generalizability of the studies and adds to the complexity when considering the feasibility of piloting any of the aforementioned interventions in BC.

Finally, a second person did not validate the selection, evaluation, and analysis processes of this synthesis, thus limiting the validity of my conclusions.

Part Four: Relevance and Recommendations

Part Four concludes this report. It includes a discussion on the relevance of this review to nursing; offers recommendations for research, practice, and policy; describes knowledge exchange opportunities, and provides the conclusion.

Relevance to Nursing

The findings of this integrative review have relevance for nurses involved in infant, early childhood, and maternal mental health care and early childhood service. This includes nurses providing direct care as well as those offering nursing leadership, providing nursing education, developing health and social policy, or conducting research.

When caring for women, and their infants and families during the perinatal and postpartum period, nurses can help to improve child social-emotional outcomes by implementing strategies to promote this development and prevent these problems from occurring. Nurses can empower women and families with education on the potential risk PPD poses to them and their infants and with information on how to address this challenge should it occur. Nurses must promote effective screening for PPD, an essential first step to mediating maternal and child outcomes, and conduct screening, when appropriate. As well, nurses can support the investigation of promotional strategies such as the home-based, Infant Net program, and advise women about it, or become involved in developing, implementing, or evaluating such approaches. Nurses can support families to make informed decisions about interventions and strategies to prevent social-emotional challenges in infants of mothers with PPD or postpartum depressive symptoms by helping them understand the need for such care and which interventions have the most promising outcomes. This means nurse researachers must examine the effectiveness of interventions for this population and either advocate for or conduct the evaluation of new interventions prior to large-scale implementation, as Letourneau et al. (2011) remind.

While the evidence is still emerging, eventually it may be robust enough that a nurse could assess a mother with PPD and her infant, and help the woman and her family select interventions most likely to support their particular challenges (Cohen et al., 2002). Since even postpartum maternal depressive symptoms may be linked to negative child outcomes, nurses must attend to the needs of women and their infants even when the depressive symptoms are mild and women do not experience full remission post treatment (Goodman et al., 2008).

Nurse educators can help ensure other nurses and health care professionals understand the significance of early childhood social-emotional development and the potential effects PPD may have one it. They can enhance nursing curriculum as needed to provide sufficient detail on the aspect of child development and maternal-child mental health.

Finally, nurses must advocate for comprehensive maternal mental health care for women with PPD or postpartum depressive symptoms as well as for approaches that support child development, paternal mental health, and family well-being. In order to promote the social-emotional development of infants in this context and prevent problems from developing, threefold interventions that address maternal mental health, enhance mother-child interactions, and support infant development must be available to the this population of women, infants, and their families (Clark et al., 2008; Forman et al., 2007; Murray et al., 2003; Paris et al., 2011).

Recommendations

It is clear from this review and other ones (CDCHU, 2009; Tronick & Reck, 2009) that women with PPD and postpartum depressive symptoms, their infants, and families require much more than maternal mental health care to ensure the best possible outcomes for mother, child, and family. Ensuring this population receives the education, support, and care they need requires integrating the evidence on the association between PPD and child outcomes into the foundation of perinatal, maternal, and infant mental health care. Once embedded, strategies to promote maternal-child mental health for those exposed to PPD are more likely to become an integral component of the mental health care system, something that does not yet exist in BC. However, it takes a "whole system change implicating the individual and organization" (Kitson et al., 2008) to implement evidence and foster systemic change. To present the recommendations, I will use the Promoting Action in Research Implementation in Health Services (PARiHS)

framework, with its pillars of evidence, context, and facilitation, developed by nurses and other clinicians, to promote quality care and promote successful implementation of evidence into practice (Kitson et al.).

Evidence. A critical component of the PARiHS framework is research evidence. However, this form of evidence alone will not ensure the knowledge is implemented into practice. Equally important is clinical, practice, and tacit knowledge along with patient, client, and family evidence or values and preference, and the evidence elicited from stakeholders and professional networks (Rycroft-Malone et al., 2004).

There is sufficient research evidence linking PPD to negative child sequelae to identify it as a public health issue, and adequate, long-term evidence that treating maternal depression alone may not fully mitigate its effects on child outcomes (CDCHU, 2009; Forman et al., 2007; Murray et al., 2003). In other words, the evidence warrants practice change. While emerging evidence suggests some promising practices (see Table 4), additional research is needed to determine the most effective interventions to offer each woman and her family and to support individual choice. In order to increase the external validity of the emerging evidence identified in this review, future research must replicate the findings using large-scale, RCT designs that include long-term follow-up, larger sample sizes with broader racial, ethnic, cultural, and other forms of diversity (Baggett et al., 2010; Cohen et al., 1999; Clark et al., 2008). As well, more Canadian research is needed to identify the strategies that best reflect our exo and macrosystems.

Empirical studies on this population should include child social-emotional development outcome measures, which are strengthened by objectivity and precision. Gathering data on child outcomes from teachers or other caregivers will enhance objectivity while adding biophysiological measures to the design of longitudinal and experimental studies, as done by

Letourneau et al. (2011), will help to increase the validity of the findings. Biophysiological measures will also help to help clarify the mechanism by which maternal depression affects child development and mental health (Goodman et al., 2010). Biophysiological instruments, such as those that measure brain wave activity, vagal tone, and neuroendocrine stress level, tend to be more sensitive than psychosocial instruments, thus increasing the precision of the measurement (Polit & Beck, 2008). The use of biophysiological measures draws on earlier work by Field (as cited by Moehler et al., 2007) that substantiates the biophysiological differences between infants of mothers with PPD and those of nondepressed mothers.

More research is needed to identify a continuum of promotion, prevention, and treatment interventions. Research focused on promotion and prevention strategies, such as those that use internet applications are necessary because it could be a means to increasing access to evidence-based programs (Baggett et al., 2010) as well as being an acceptable medium to parents of young children. Interventions need to be developed and evaluated that specifically address the influence of postpartum depressive symptoms and PPD on maternal-child interactions (Goodman et al., 2008; Kersten-Alvarez, 2010). Whenever possible, research involving women with PPD and postpartum depressive symptoms should ensure maternal and child outcomes are collected. Strategies are required to increase the recruitment and retention of this population of women in research in order to reduce the attrition rates in studies. Additional research on interventions such as Infant Massage, Nurse-Family Partnership, and residential options that involve women with PPD and collect child social-emotional development outcomes will help to ascertain their relevance to this population. Investigations to determine the appropriate use of peer support will help to determine the best role for them, especially considering that Letourneau et al. (2010) and Murray et al. (2003) elicited conflicting results. Studies comparing the effectiveness of

medication and psychotherapy would also be helpful, considering women tend to prefer the latter treatment. Further, research is required to determine other approaches to mitigate the effects of PPD such as those that involve fathers (Letourneau et al., 2009) or extended family members, and address infant affect (Tronick & Reck, 2009). More qualitative studies should be done to explore mothers and fathers' experiences of the interventions. For instance, using mixed methodologies would be one way of learning more about the lived experiences of families involved in strategies to promote maternal-child mental health. Reliable prevention strategies to reduce the incidence of PPD are needed (Clark et al., 2008; Paris et al., 2011). Finally, research is needed to examine the relationship between improving contextual or environmental factors within children's ecologies, such as income, employment, child care, social support, and quality of family relationship, and the potential impact on child social-emotional development.

Context and Facilitation. Context refers to the environment or location where change is intended. It involves a complex interaction between culture, leadership, and evaluation, and is akin to the macrosystem of the bio-ecological theory. The current mental health care system needs to continue shifting its beliefs, values, and practices from a context set in neoliberal ideologies and individualized modalities (Teghtsoonian, 2009), and a discourse of resource scarcity, funding silos, and knowledge gaps (Nelson & Mann, 2010). It needs to expand to include two- and multi-generational approaches for infants of mothers with PPD and postpartum depressive symptoms. This shift will foster effective cross-sector collaboration between the child and adult mental health systems of care and promote implementation of maternal-child mental health care (CDCHU, 2009) including some of the interventions with emerging evidence discussed earlier. This will require transformative leadership to stimulate and promote cultural, practice, and policy changes.

It will take committed leadership to forge policies to support healthy child social-emotional development in the context of PPD and to involve families and stakeholders in the change process. Recommended policies involve early identification of infant social-emotional development problems, and education to those working with young children and their families about the significance of this development to future health and well-being (Nelson & Mann, 2010). Additional policies include those to support improving access to "two-generation interventions" (CDCHU, 2009, p. 9), and continuing investment in research to replicate and expand the range of interventions to support these infants, mothers, and families (CDCHU, 2009).

Furthermore, leaders and policy-makers must consider the feasibility of these recommendations to improve maternal, child, and family outcomes in the context of PPD. This will include considering the best available evidence when choosing a course of action, and determining the associated logistics of human and financial resources, training and supervision, family acceptability, and political will. Finally, once a plan of change is devised, strong and effective facilitation will be needed to implement the practice changes.

Knowledge Exchange

I will take action to facilitate knowledge exchange regarding the results of this integrative analysis. First, I will share the Power Point presentation I develop for my defense with the Child and Youth Mental Health Policy team that I lead. I will discuss the possibilities of sharing this presentation with others working in the provincial office of MCFD, such as the Child Welfare Policy and the Early Years Policy teams. I will consider the best route for sharing this review with the Infant Early Childhood Mental Health clinicians of MCFD. I may have an opportunity to share this work more broadly in a forum on maternal-child mental health that I will be co-

organizing later this year. Finally, I will look for other opportunities to share this information formally and informally.

Conclusion

This review of the literature on PPD and infant and early childhood social-emotional development continues to support what other scholars and researchers have said: PPD, including postpartum depressive symptoms, poses a risk to child development that maternal mental health care may not mitigate, except in the short-term. Further, after examining interventions that promote social-emotional development of infants and young children of mothers with PPD or postpartum depressive symptoms, prevent social-emotional developmental problems for this population, and treat them when they occur; I came to a similar conclusion to Poobalan et al. (2007). The emerging evidence indicates that some of these interventions may have short-term benefit to the mother-child relationship, maternal mental health, and child development. However, while this emerging evidence identifies interventions to influence the microsystem of child and family, such as those that strengthen the dyadic relationship, enhance maternal knowledge and skills while addressing maternal mental health, there is much more to learn about the complex social-emotional development of children in the context of families experiencing PPD. In the meantime, maternal-child approaches must become a component of the care for women with PPD and their families along with parental education and skill development. In closing, since half of intervention studies I examined were published after 2007 and the review by Poobalan et al. (2007), I expect to see continued emerging evidence in this field of study and anticipate what a replication of this review will reveal five years from now.

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Appendix A: Glossary

Attachment

Attachment theory provides the theoretical foundation for infant mental health. As well, much of the empirical and theoretical literature on infant social emotional development relies on this theory: See for example, Dollberg et al. (2010), Feldman (2010), and Kochanska (2001). The originator of this theory, John Bowlby, considered attachment a primary infant need and insisted early life infant-parent relationships were critical to survival and social-emotional and cognitive development, all of which have implications for future health and well-being (Weatherston, 2001). This theory purports that the quality of repeated, early relationship experiences shape brain development and internal working models, which influence life functioning across the lifespan (Feldman, 2010) and are foundational to social-emotional development (Mennen & O'Keefe, 2005). Attachment behaviours have a biological basis and are activated when an infant perceives danger. In these situations, an infant will search for safety by moving towards their mother or other attachment figure (Cohen et al., 1999).

Weatherston (2001) writes that Bowlby believed infants play an important and active role in the attachment relationship. That is, the infant provides cues to which the parent may respond. When a parent's response to their infant is attuned, sensitive, and synchronous, the infant learns to trust their needs will be met and secure attachment is formed. Conversely, when a parent respond asynchronously, inconsistently, unpredictably, or intrusively, the infant does not develop trust in their parent and the attachment relationship is more likely to be insecure.

There are four attachment styles including secure, insecure-anxious/ambivalent, insecure-anxious/avoidant, and insecure-disorganized (Mennen & O'Keefe, 2005). Secure attachment affords children greater likelihood for interpersonal success and increased confidence in new situations (Weatherston, 2001). Conversely, children with an anxious/ambivalent attachment

style have had inconsistent experiences with their parents, thus they may be either angry or clingy towards their parents when in distress. Parenting experiences typified by rejection or control may precede the development of an anxious/avoidant attachment style, which manifests in children being distant or withdrawn from their parents when in distress. Finally, when parents behave in ways that elicit fear in their infants, a disorganized attachment style may develop. These children display a disorganized response to their parents when in distress, that is they alternate between moving towards, moving away from, and avoiding their parents. Attachment styles tend to be relatively stable once formed (Weatherston, 2001); however, interventions that improve maternal sensitivity may help to shift insecure attachment to a secure one (Bakermans-Kranenburg, van Ijzendoorn & Juffer, 2003).

Some attachment styles are associated with children's mental health problems (Mennen & O'Keefe, 2005). Children with insecure attachment styles may have more difficulty understanding and regulating their emotions, which could contribute to either externalizing or internalizing problems (Kidwell et al., 2010). The meta-analysis on attachment styles and child behaviour by Fearon, Bakermans-Kranenburg, Lapsley, van Ijzendoorn & Roisman (2010) indicates there is robust evidence to support an association between attachment styles and children's externalizing behaviours amongst clinical and non-clinical populations of children. This is of interest considering there is a higher risk for insecure infant-mother attachment relationships for infants of mothers with PPD (Murray, 1992; Martins & Gaffan, 2000).

Efficacy

In terms of experimental research, *efficacy* refers to a type of study whereby the researcher rigidly controls the conditions and prioritizes the internal validity of the study in order to determine the effectiveness of an intervention in a controlled context. For example, the

researcher will use a small, tightly controlled sample and other strategies while striving to demonstrate the independent variable caused the outcome; in other words, that the change or effect is not spurious. Once the efficacy of an intervention has been established by efficacy studies, researchers will go on to examine the intervention in a less controlled and real world environment and with larger samples (Polit & Beck, 2008).

Emotional Regulation and Dysregulation

While young infants have some capacity to modulate their emotions by using gaze aversion and tactile stimulation (Kopp, 2002), *emotional regulation* during this life stage is primarily a dyadic activity. During early childhood, and with appropriate caregiver scaffolding, young children gradually develop emotional regulation (Kopp). "The infant-caregiver relationship provides the context for the socialization of emotion regulation" (Cole et al, 1994, p. 93) and the younger the child, the more reliant they are on their caregivers to help manage their distress. Emotional regulation, the continuous processing of individual emotional responses in relation to the context, evolves gradually and involves the ability to modulate strong emotions such as sadness, anger, excitement, and fear in a way that is appropriate to the context. Conversely, *emotional dysregulation* may develop when an infant or young child's emotional regulation resources exceed their need, such as when a child is unable to coordinate their emotional interactions with their caregivers or adequately communicate their needs, has heightened reactions to stimulation, or when caregivers are misattuned to their child's needs (Cole et al., 1994; Kopp, 2002). If these patterns become chronic, they predispose the child to future mental health problems (Cole et al., 1994) such as externalizing and internalizing behavioural challenges, and reduce the quality of childhood peer relationships. Finally, emotional regulation is a component of emotional competence, the other aspect being emotion

understanding. For young children, this latter task involves recognizing their emotions and that of others and developing a vocabulary for expressing their feelings (Kidwell et al., 2010).

Externalizing Problems

Externalizing problems refers to behavioural challenges comprised of symptoms of the externalizing disorders Attention Deficit Hyperactivity Disorder, oppositional-defiant disorder, and conduct disorder (Hautmann et al., 2009). These problems are more common in children with disinhibited temperaments whose parents use a punitive or inconsistent parenting style. These parenting practices are more likely in families afflicted by parental depression or significant parent stress (Bayer et al., 2011). As well, there is a significant association between insecure attachment styles and children's externalizing problems (Fearon et al., 2010). Finally, there are many factors, including biology and life experiences, in addition to parenting and attachment styles, that contribute to the development of these challenges (NSCDC, 2008).

Internalizing Problems

Internalizing problems represents "a range of difficulties characterized by personal emotional distress, encompassing the spectrum of emotional symptoms of anxiety and depression" (Bayer et al., 2011, p. 50). Internalizing and externalizing problems affect about 15% of young children, from 18 months to five years old (Egger & Angold, 2006). Children have a greater risk for developing internalizing disorders when they have inhibited temperaments and when their parents use an overprotective or harsh parenting style as well as when their family struggles with depression, anxiety, or stress (Baker et al., 2011). As noted earlier, parenting styles and family stressors are a component of the factors that precede the development of mental health problems.

Maternal Sensitivity and Responsiveness

Maternal sensitivity, a construct that has received considerable longitudinal attention, is a relatively stable behaviour (Feldman, 2010). The literature often either discusses maternal sensitivity with r*esponsiveness* or uses these terms interchangeably, although responsiveness is also a component of maternal sensitivity reflecting the mother's active response to her infant's cues (Shin et al., 2008). Maternal sensitivity refers to the mother's capacity to respond in an attuned and contingent manner to her infant's ever-changing signals and cues (Dollberg et al., 2010; Leerkes, Blankson & O'Brien, 2009). Maternal sensitivity involves the "expression of positive affect, constant gaze, warm vocalizations, and affectionate contact" (Feldman, 2010, p. 174) between mother and infant, the synchronization of these behaviours to the infant's cues (Feldman et al., 2009), and the maternal efforts to regulate or soothe a distressed infant (Leerkes et al., 2009). Tronick & Beeghly (2010) caution us that these behaviours may vary culturally.

Maternal sensitivity to a child's need for safety or comfort plays an integral role in children's social emotional development (Leerkes, 2010), and the infant-parent attachment relationship, and is a major part of mother-child interactions (Shin et al., 2008). The quality of maternal sensitivity in response to infant distress is more predictive of secure attachment, positive social competence, and emotional regulation than maternal sensitivity to infant nondistress (Feldman, 2010; Leerkes et al., 2009). Furthermore, Murray & Cooper (1996; 1997) suggest maternal sensitivity may have more affect on child social-emotional development outcomes than PPD per se.

Several factors influence maternal sensitivity. Offering a positive influence are the sufficient social support, mother-fetus bonding, and high maternal self-esteem. Conversely,

maternal depression, stress, and anxiety may negatively influence maternal sensitivity (Feldman & Eidelman, 2009; Shin et al., 2008) and contribute to maternal intrusiveness.

Maternal Intrusiveness.

In contrast to maternal sensitivity, *maternal intrusiveness* involves misattuned maternal behaviours focused on the mother's agenda (Feldman, 2010) and insensitive responses to infant distress (Leerkes et al., 2009). It is associated with social-emotional behavioural problems (Cabrera et al., 2007; Dollberg et al., 2010; Leerkes et al., 2009). In the context of PPD, it is correlated to lower social engagement, emotional dysregulation, and increased cortisol reactivity in nine-month-old infants (Feldman et al., 2009) and sad or angry affect in infants (Tronick & Reck, 2009).

Appendix B: Audit Trail

Topic	Decision	Rationale
Selection Criteria		
Selection criteria for primary studies on the association between postpartum depression and infant social emotional development (Note: The selection criteria noted in the next row also pertained to this search.)	Choose studies with minimum sample sizes of 100 and with a longitudinal design.	While one of the objectives of this project is to review the evidence on infant and early childhood social-emotional development in the context of PPD, "the negative impact of PPD on the mother-infant relationship and infant development more generally has been well-documented" (Nylen, Moran, Franklin & O'Hara, 2006, p. 327). As well, since the number of correlational studies on this topic is large, I needed selection criteria that would contribute to locating the most rigorous studies without giving me a large volume of studies. Moreover, many of the studies examining the relationship between the independent variable, PPD, and the dependent variable, child social-emotional development were conducted longitudinally, and while a strength, this design increases the risk for attrition. Therefore, after considering one of the ways to increase the rigor of quantitative studies is to have as sufficient a sample size as possible, preferably determined ahead of time by power analysis (Polit & Beck, 2008), I decided to select studies with a modest sample size of a minimum of 100 participants. Finally, while researchers also strengthen correlational designs using sampling strategies such as statistical control, matching, or blocking, and pre and post measurements (Polit & Beck, 2008), I considered these design factors when evaluating the selected studies on PPD and child social-emotional development. Background: Correlational studies are "weak in their ability to reveal causal relationships" (Polit & Beck, 2008, p. 276) due to their lack of randomization and risk for selection bias. This means it is harder to presuppose that the two groups the researcher is comparing were similar before the advent of the independent variable and then to assume the independent variable contributed significantly to the group differences. As well, correlational study findings must be considered tentative. Researchers can strengthen a correlational design by including their theoretical basis; and using a sampling design such as homogeneity, blocking, matching or analysis of co-variance; reducing selection bias by using pre

		and posttests; and using a longitudinal design to reduce the percentage of attrition. Nonetheless, correlational studies are useful when experimentation is not applicable and helpful for collecting large amounts of data on a problem and "developing an evidence base for a causal connection" (Polit & Beck, 2008, p. 278). Finally, correlational studies have realistic appeal (Polit & Beck). Polit & Beck advise that quantitative studies should use the largest sample possible in order to increase their chance of being as representative of the population as possible. They also advise on the risk for attrition related to longitudinal studies and recommend the study must begin with as sufficient sample size as possible, in order to retain an adequate number of participants. Also, a larger sample size is needed to adequately test the hypothesis when using psychosocial measures, which tend to be less precise than biophysiological ones. In summary, the larger the sample size, the stronger the power or statistical conclusion validity may be. Nonetheless, sample size of 100 participants may still be modest (Halligan, Murray, Martins & Cooper, 2007).
Selection criteria for primary studies on interventions to promote infant social emotional development in the context of PPD, prevent social-emotional development problems in this population, and treat these problems when they occur.	Sample: Women who had experienced PPD or maternal depressive symptoms during the first year postpartum, as determined by the use of an instrument with recognized reliability and validity	Onset of PPD: Much of the research related to PPD does not limit the time of onset to the first four weeks and generally includes women who experienced depression during the first year postpartum (Nylen et al. 2006). Polit & Beck (2008) report that the use of reliable and accurate measurement tools help to increase the precision quality of the study, which helps to strengthen the statistical conclusion validity. This in turn, enhances the rigor of the study and increases the validity of the study findings (i.e. the relationship between the independent variable and dependent variable).
	Dependent variables including infant, toddler, or early childhood social emotional development	Some of studies focus on either the association between PPD and infant, toddler, or early childhood cognitive development or on the effects intervention have on the cognitive development of infants, toddlers, or young children in the context of PPD, both of which are out of scope for this project.
	Scan the dimensions of the measurement instruments used to analyse mother-child interactions for	It is challenging to measure the dimensions of social-emotional problems during infancy accurately because infants are developing so quickly, it is challenging to integrate multiple data sources, limited availability of guidelines on levels of child

	dimensions of child social-emotional development.	developmental impairment, and the difficulty assessing child development in the context of relationships and culture. Further, there is strong consensus amongst clinicians and researchers that the social-emotional and behavioural development and related problems or delays must be assessed within the context of their caregiving relationships (Carter, Briggs-Gowan & Davis, 2004). Finally, many studies on the topic of interest for this project adhere to this principle of examining infant and toddler social-emotional development by observing and analysing mother-infant interactions.
	Post-intervention measurement of the dependent variable; defined as the child social-emotional development during their first two years of life	This criterion was necessary to establish a correlation between either PPD or maternal depressive symptoms during the first year postpartum or to determine a relationship between an intervention and the dependent variable.
	Longitudinal design	This design allows for the measurement of outcomes over time. While this design incurs an attrition risk, for this topic, it is important to identify the stability of child outcomes i.e. those noted in a cross-section design may not reflect stable characteristics (Polit & Beck, 2008).
	Attrition rate less than 20%	Attrition is important because the participants that drop out of the study may be different in characteristics from those who remain in the study. This can limit generalizability of the study findings and increase the biases of the findings if the drop out participants differs significantly from those remaining. Attrition rates >20% are concerning because they increases the likelihood of bias (Polit & Beck, 2008).
	Pre and post-intervention measurements, where appropriate, for example, to measure PPD or maternal depressive symptoms	The use of pre test and post study or post-intervention data collections helps to reduce selection bias and increase internal validity, which strengthens the rigor of correlational and experimental studies (Polit & Beck, 2008).
	Peer-reviewed journals	A peer-reviewed journal implies that the articles in the journal have been reviewed by qualified peers for quality of evidence presented and revised to meet the peer-reviewers' recommendations (Polit & Beck,

		2008).
Age of children in studies	Studies were included that had at least one measurement of social-emotional development in the first two years of the children's lives.	I wanted to include the correlational studies with longitudinal design that extended data collection to school age children (see longitudinal design above)
Preventions Studies	Included studies that provided either a maternal or mother-child intervention that did not identify the infants as experiencing social-emotional development problems	In order to differentiate between the studies providing promotion, prevention, or treatment interventions, I considered the information provided on the social-emotional development of the infants. If there was no indication that they were experiencing problems before the intervention, I categorized the study as prevention.
Evaluation of Empirical Studies		
Assessment Tool	Use the Quality Assessment Tool for Quantitative Studies (n.d.) developed by the Effective Public Health Practice Project and the accompanying dictionary.	I had originally considered drawing up evaluation criteria based on Polit & Beck (2008) but after discovering this assessment tool in the Children's Health Policy Quarterly journal and reviewing the website where it is housed, I decided to use a tool with more rigor than I could create. Its website describes it utility for evaluating quantitiative studies ("Quality Assessment Tool", n.d.).

Appendix C: Example of a Completed Literature Review Protocol

(Adapted from Polit & Beck, 2008)

Date: August 14/11
Citation: Murray, Cooper, Wilson & Romaniuk, 2003, Controlled trial of the short and long term effect of psychological treatment of post-partum depression. 2. Impact on the mother-child relationship and child outcomes. *British Journal of Psychiatry, 182,* 420-427.
Study Type: Quantitative: Yes Qualitative __ Mixed Method__
Location/Setting: Britain
VARIABLES
Independent Variables/Intervention: Interventions – Cognitive Behavioural Therapy (CBT), non-directive supportive counselling, Brief psychodynamic psychotherapy
Dependent Variables: Infant outcomes
Theory: Not stated
DESIGN TYPE Experimental Yes, RCT Quasi-experimental__ Non-experimental:
Description of Intervention: Routine primary care, or One of three interventions: Non-directive supportive counselling CBT Brief psychodynamic psychotherapy
Comparison Group: 52 women with confirmed PPD and other sample characteristics received routine primary care
Cross-sectional__ Longitudinal/Prospective: Yes Number of data collection points: Before treatment, immediately after treatment (4.5 months PP), 18 months and 5 years
SAMPLE: Size:322 women → 193 randomized; 48 counselling, 43 CBT, 50 psychotherapy, 52 control; Attrition 10% Sampling method: Purposive **Characteristics:** Confirmed to have PPD**,** primaparous, singletons, full term, healthy infants; English as first language; control group had higher social adversity
DATA SOURCES
Self-report: Checklist devised for study re: M-I relationship, @ 18 months, Behavioural Screening Questionnaire interview; 5 years –maternal reports Rutter A & Teacher Reports – Pre-school Behavioural Checklist; McCarthy Scales of Children's Abilities (cognitive) **Observational:** M-C interactions videotapes **Biophysical__ Other:** Strange Situation/Attachment; Bayley Scales of Infant Development
Data Quality: R&V given
STATISTICAL TESTS: Bivariate: T-Test__ ANOVA__ Chi-square__ Pearson's *r*: Yes Other: Krushal-Wallis one way analysis by ranks_
Multivariate: Multiple regression__ MANOVA__ Logistic regression: Yes Other:
FINDINGS/EFFECT SIZES/THEMES: Controlled for social adversity and other covariates.

Before treatment, about 50% of women reported moderate to marked difficulties with their infants' behaviour. After treatment, of the women who had originally reported difficulties, just under half of the control and the same of those who had received CBT and supportive counselling, continued to report difficulties; while more women in the brief psychodynamic group continued to struggle with their infant; Analysis (4.5 months PP)– no treatment effects after controlling for social adversity, baseline EPDS. Before treatment, 60-74% of women reported moderate to marked relationship challenges; After treatment, the control group women had much less relationship challenges; all three treatments significantly reduced the risk for reporting a moderate or marked relationship problem even after controlled for social adversity. Mother-Child interactions - Maternal sensitivity measured at 2 & 4.5 months; Maternal sensitivity increased for all three groups Control group women had higher levels maternal sensitivity than women in CBT or psychodynamic No treatment effects found for CBT or psychodynamic therapy; At 18 months: BSQ higher for control group; No significant differences between groups for attachment security; and No significant difference between groups for cognitive development. At Five years: No difference for teacher reports, maternal reports, or cognitive tests. No specialist therapist effects found. Summary: Treatment lead to "short-term benefits to mother-child relationships" (p. 425) at 4.5 months & 18 months but these effects did not persist Non-directive counselling produced improved maternal sensitivity in mothers with social adversity; also noted decreased maternal reports of infant emotional & behavioural problems based on maternal report No significant benefit to treatment regarding infant behaviour at 4.5 months or attachment compared to control and no benefit to infant and child emotional and behavioural adjustment and cognitive development at home and at school at 5 years when compared to control group.
Recommendations: Extend the length of intervention
Strengths: Community sample Controlled for extraneous variables Long-term follow up of children that included teacher reports
Weaknesses: Lack of non-depressed control group
Include: Yes

Appendix D: Evaluation Matrix - Interventions for Infants and Young Children of Mothers with PPD that Promote Social-emotional Development, Prevent Social-emotional Development Problems, and Treat Social-emotional Problems

Citation and Country	Research Type, Methodology, Independent Variable (IV), and Dependent Variable (DV) [1] Component of Assessment	Sampling Method and Sample [2]Age of child at onset of intervention	Data Collection and Data Analysis [3]Number of assessment points [4]Number of types of instruments	Strengths, Limitations, and Rigor
Promotion				
Ammaniti et al. (2006). A prevention and promotion intervention program in the field of mother-infant relationship. *Infant Mental Health Journal*, *27*(1), 70-90. (Italy)	Experimental, randomized controlled trial (RCT); longitudinal IV: Home visiting (HV) program provided from 8 months pregnancy until child one year old ,weekly and then bi-weekly basis DV: Quality of mother-infant interaction (infant self-regulation)[1], maternal depression, and infant attachment security Control group: Waitlist only, no support offered	Sampling Method: Purposive Sample: *N* = 110 Dyads Three groups of mother-infant dyads including: *n* = 36 women at risk for depressive symptoms and one or no psychosocial risk factors; *n* = 34 women with psychosocial risk factors and reported low depressive symptoms; and *n* = 33 women with low levels of depression and one or more psychosocial risk factors. Each one of the three groups randomized to either HV or control	Data Collection: Longitudinal (3)[3] Pre and post maternal and child outcome measures; Multiple measurements including interview (3)[4], and videotape observations of mother-child interactions (3)[4]; Reliability and validity given for interview instruments; Used widely recognized instrument to assess attachment security; Self-report instrument used to assess maternal depressive symptoms; Developed list of psychosocial risk factors for the study; Developed coding system to evaluate maternal and infant interactions during three sets of observations and established	Strengths: Depressive scores monitored four times during postpartum year; Child outcomes measured at three, six, and 12 months; and Subsamples established to differentiate between depressive risk and depressive symptoms Limitations: Wide range depressive symptoms amongst women, 6% had PPD; Did not include the attachment security styles of control group; Attrition17.2%; however, HV was being introduced in Italy at the time, thus

Citation and Country	Research Type, Methodology, Independent Variable (IV), and Dependent Variable (DV) [1] Component of Assessment	Sampling Method and Sample [2]Age of child at onset of intervention	Data Collection and Data Analysis [3]Number of assessment points [4]Number of types of instruments	Strengths, Limitations, and Rigor
		Child Age:[2] Birth	interrater reliability for it. Data Analysis: Used descriptive analysis to determine distribution of maternal attachment patterns during pregnancy and maternal representation at three months postpartum; used a univariate analysis of variance (ANOVA) at this time to determine effects of HV for all three subsamples; and same approach used for analysis at six and 12 months.	may have been cultural resistance to intervention in the home; Risk for self-selection bias (many women declined to participate thus, those who joined may have been "good enough" parents; and Sample over-represented by secure attachment styles; and HV not described. Rigor: Moderate
Baggett et al. (2010). Technologies for expanding the reach of evidence-based interventions: Preliminary results for promoting	Experimental, RCT, pilot IV: Home based, Parenting Program (PP) using *Infant Net*, a 10-week, internet-based adaptation of *Play and Learning Strategies (PALS)*, using computer, internet, and telephone	Sampling Method: Purposive Sample: *N*=38 Dyads All mother had high prevalence depressive symptoms [31% significant symptoms, 6% referred for treatment], were low income, and majority Caucasian, 28% college	Data Collection: Longitudinal (2)[3] Pre and post maternal and child outcome measures; Used a reliable and valid coding scale to analyse video-recordings of mother-child interactions made by the mother; Maternal depression determined by reliable and valid self-report instrument; Parent satisfaction completed	Strengths: This study is an initial effort to evaluate an innovative, pilot PP using technology to increase delivery of PALS, an evidence-based intervention. Limitations: Pilot study; Small sample may have

Citation and Country	Research Type, Methodology, Independent Variable (IV), and Dependent Variable (DV) [1] Component of Assessment	Sampling Method and Sample [2]Age of child at onset of intervention	Data Collection and Data Analysis [3]Number of assessment points [4]Number of types of instruments	Strengths, Limitations, and Rigor
social-emotional development in early childhood. *Topics in Early Childhood Special Education, 29*(4), 226-238.(USA)	coaching DV: Maternal engagement, sensitivity, and depressive symptoms, and infant social outcomes (warmth, attention - arousal, behavioural regulation)[1] Control: Both the IV and control groups received computers and internet access provided for six months. The control received a list of websites on parenting.	degrees); and healthy infants; *n* = 19 control. Child Age: [2] Mean age 4 months (range 3-8 months).	following each session; and Electronic tracking of parent usage of Infant Net. Data Analysis: Repeated measures of ANOVA were used to analyse infant and maternal behaviour and maternal depression in relation to intervention and time.	contributed to lack of statistical significance; Relatively homogenous sample; and Limited infant and maternal outcomes obtained. Rigor: Moderate
Prevention				
Clark, R., Tluczek, A. & Brown, R. (2008). A mother-infant therapy group	Experimental, RCT, pilot study, used permeated block randomization IV: Office based, 12-week, group and	Sampling Method: Purposive Sample: *N* = 32 Dyads All women referred for treatment of PPD; *n* = 18 women, severe to	Data Collection: Longitudinal (2)[3] Pre and post maternal and child outcome measures; Multiple measures including maternal self report (2)[4], videotaped observations(2)[4], and	Strengths: Reliability and validity given for all instruments; Pilot study findings suggest RCT warranted; and

Citation and Country	Research Type, Methodology, Independent Variable (IV), and Dependent Variable (DV) [1] Component of Assessment	Sampling Method and Sample [2]Age of child at onset of intervention	Data Collection and Data Analysis [3]Number of assessment points [4]Number of types of instruments	Strengths, Limitations, and Rigor
model for postpartum depression. *Infant Mental Health Journal*, *29*(5). 514-536. (USA)	dyadic, Mother-Infant Therapy Group (M-ITG) DV: Maternal depressive symptoms, parenting stress levels, quality of maternal-child interactions (includes infant affect, social skills, communication, and emotional regulation)[1], and infant cognitive development	moderate PPD, mean age 28.06 years; and n = 14 women, severe to moderate PPD in waitlist control group, mean age 34.46 (Significant age difference between two groups); Waitlist group offered M-ITG later. Child Age:[2] Mean 7.86 months (SD 6.75); Control mean 11.71 months (SD 7.35)	researcher (1)[4]; PPD determined by clinical interview; and All instruments has stated reliability and validity; Child Outcomes obtained pre and post M-ITG Data Analysis: Used ANOVA to determine the effects of M-ITG on maternal and mother-child outcomes, maternal and child age were covariates.	Excellent description of M-ITG. Limitations: Small sample size; Dyads sequentially assigned to M-ITG or waitlist control instead of being randomly assigned; Requires many highly trained therapists ; and No long-term follow-up of outcomes, however, an RCT comparing M-IGT to Interpersonal Therapy is underway. Rigor: Strong
Clark, R., Wenzel, R. & Tluczek, A. (2003). Psychotherapy for postpartum depression: A preliminary report.	Experimental, RCT, pilot study, used permeated block randomization to compare IV to control IV: M-ITG and Interpersonal Therapy (IPT) to waitlist control (WLC) (12	Sampling Method: Purposive Sample: *N* = 39 Dyads All the women had depressive scores in clinical range and healthy babies; majority well educated, married or co-habitating, and	Data Collection: Longitudinal (2)[3] Pre and post maternal and child outcome measures; Multiple measures including maternal report (2)[4], videotape observations (2)[4], and researcher (1)[4]; PPD diagnosed using rating scale conducted by researcher on the	Strengths: Comparison of individual maternal mental health treatment for PPD to a program that offers maternal, infant, and dyadic therapy in group format; and Excellent descriptions M-

Citation and Country	Research Type, Methodology, Independent Variable (IV), and Dependent Variable (DV) [1] Component of Assessment	Sampling Method and Sample [2]Age of child at onset of intervention	Data Collection and Data Analysis [3]Number of assessment points [4]Number of types of instruments	Strengths, Limitations, and Rigor
American Journal of Orthopsychiatry, 73(4), 441-454. (USA)	weeks) DV: Maternal depressive symptoms, quality of maternal-child interactions (child affect, social skills, interest, emotional regulation, impulsivity)[1], and child cognitive development Control: Waitlist, offered M-ITG later	Caucasian. *n* = 13 M-ITG *n* = 15 IPT *n* = 11 WLC Child Age:[2] *M* = 8.9 months, range 1-24 months	phone; and All instruments has stated reliability and validity. Data Analysis: Used one-way analysis of variance to determine group differences in relation to maternal and child age, income, education, gender, marital status, and race; and used co-variates in analyses of covariance (ANCOVAs) to examine group differences in relation to maternal depression, parenting stress, and maternal-child interactions.	ITG and IPT. Limitation: Small sample; No long term follow-up assessments; and Costly due to large number of professionals required. Rigor: Strong
Forman et al. (2007). Effective treatment for postpartum depression is not sufficient to improve the developing mother-child relationship.	Experimental; phase one RCT, phase two-correlational IV: Office based, Interpersonal Therapy (IPT), 12 weeks. DV: Maternal depression, parenting, infant emotionality, infant attachment, and child social-emotional	Sampling Method: Purposive Sample: *N*=120 Dyads Women with PPD and their healthy infants; *n* =81 prior history of depression, *n* = 10 antenatal depression, *n* = 10 onset PPD by one month postpartum; *N* = 56 Comparison	Data Collection: Longitudinal (3)[3] Pre, post, and follow-up maternal and child outcome measures; PPD confirmed by clinical interview and maternal self-report; Multiple methods including maternal self-reports (4)[4], interview (1)[4], videotaped observations of mother-child interactions (4)[4], and researcher testing;	Strengths: RCT used a community sample; Asked women to stop antidepressant medications during IV to rule out confounding variable; and Ruled out maternal bias for reports obtained at 24 months

Citation and Country	Research Type, Methodology, Independent Variable (IV), and Dependent Variable (DV) [1] Component of Assessment	Sampling Method and Sample [2]Age of child at onset of intervention	Data Collection and Data Analysis [3]Number of assessment points [4]Number of types of instruments	Strengths, Limitations, and Rigor
Development and Psychopathology, 17, 585-602. (USA)	and behavioural outcomes Control: Offered IPT after the IV had completed the intervention	women without PPD or other psychiatric disorders and their infants, from same community sample; Majority were married or cohabitating, Caucasian, well educated, and employed. Phase two: *N* =108 *n* = 35 mothers who had recovered from PPD post intervention, *n* = 32, mothers who had not recovered from PPD post IPT, and *n* = 41, mothers who had not experienced PPD Child Age:[2] Six months old	Adequate description of instruments but reliability and validity stated for analysis of observations of parenting responsiveness and infant emotionality measures only, although used widely recognized instruments; Coders blind to sample groups during videotape analysis; Attachment styles determined by maternal self-report. Data Analysis: Multiple analysis of variance (MANOVA) conducted for analysis of data from both phases of the study as well repeated measures of analyses of variance (ANOVA) for all DVs and confounded for extraneous and confounding variables.	Limitations: Attrition for RCT was 11%, however, it varied for correlational phase, i.e. 90% participated in telephone interview on attachment security but 67% returned maternal reports on behaviour and temperament; and Reliability and validity stated for one instrument. Rigor: Moderate
Goodman, S. H., Broth, M. R., Hall, C. M. & Stowe,	Quasi-experimental, non-equivalent control group design IV: Open trial	Sampling Method: Sample: Dyads *n* = 19 Women with PPD	Data Collection (3)[3]: PPD confirmed by clinical interview and rating scale; Raters blind to treatment status of	Strengths: Reliability and validity given for all instruments

Citation and Country	Research Type, Methodology, Independent Variable (IV), and Dependent Variable (DV) [1] Component of Assessment	Sampling Method and Sample [2]Age of child at onset of intervention	Data Collection and Data Analysis [3]Number of assessment points [4]Number of types of instruments	Strengths, Limitations, and Rigor
Z. N. (2008). Treatment of postpartum depression in mothers: Secondary benefits to the infants. Infant Mental Health Journal, 29(5), 492-513. (USA)	antidepressant medication combined with education and support DV: Maternal depressive symptoms, stress, and efficacy beliefs; quality of mother-infant interactions (infant affect, quality of play, communication, attention)[1]	*n* = 25 Nondepressed mothers, control All the women had healthy babies; majority well educated, married or co-habitating, and Caucasian. Child Age: 1-6 months, (*M* = 3.5 months, *SD* = 1.67)	dyads and mothers during observations; Multiple measurements including interview (1)[4], maternal report (3)[4], and videotape observation of mother-child interactions (3)[4]; Reliability and validity given for instruments Data Analysis: Used descriptive analysis to calculate correlations between variables; used stepwise regression analysis to analyse the contribution of maternal depression to the variables; used repeated measures of ANOVA to analyse the variables and the effects of time	Limitations: Small sample size; Non-randomization; No waitlist or no treatment group limits the extent to which improvements can be attributed to the IV; and only collected on infant outcome measure Rigor: Strong
Letourneau et al. (2011). Effect of home-based peer support on maternal-infant	RCT IV: Home-based, 12 week, peer support program for mothers with PPD and their infants DV: Maternal	Sampling Method: Purposive Sample: *N* = 60 Dyads All women had depressive scores in the clinical range and healthy infants < 9	Data Collection: Longitudinal (3)[3] Pre, during, and post maternal and child outcome measures; Maternal depressive ratings determined by widely recognized rating scales but reliability and validity of instruments not given;	Strengths: Used power analysis to determine sample size and instruments with stated reliability and validity; and obtained biophysiological data.

Citation and Country	Research Type, Methodology, Independent Variable (IV), and Dependent Variable (DV) [1] Component of Assessment	Sampling Method and Sample [2]Age of child at onset of intervention	Data Collection and Data Analysis [3]Number of assessment points [4]Number of types of instruments	Strengths, Limitations, and Rigor
interactions among women with postpartum depression: A randomized controlled trial. *International Journal of Mental Health Nursing, 20*, 345-357. (Canada: Alta, New Brunswick)	depressive symptoms and perception of social support, quality of maternal-child interactions, infant social and cognitive development, and daily cortisol levels of infant and mother Control: Received two weeks of peer support after waiting 12 weeks	months old; *n* = 27 treatment; and *n* = 33 control group; significant group differences for infant gender and medication Child Age:[2] Mean 5 months	All other instruments has stated reliability and validity; and Multiple measures including maternal report (3)[4], researcher testing (1)[4], mother-child observations (1)[4], and biophysiological (1)[4] instruments; Data Analysis: Used *t* tests or other non-parametric measure to determine group differences; used repeated two-way ANOVA to analyse outcomes; and the former test was used when examining univariate differences in the statistically-significant multivariate analysis; also used Mauchly's test of sphericity, Levene's test of equality of variance, and Box's test of equality as appropriate; exploratory analysis conducted in relation to depression ratings, medication use, and adversity; and partial eta-squared used to determine effect sizes	Limitations: Methodological limitations related to effect sizes; Study recruitment over three years limited control over group differences. Rigor: Moderate

Citation and Country	Research Type, Methodology, Independent Variable (IV), and Dependent Variable (DV) [1] Component of Assessment	Sampling Method and Sample [2]Age of child at onset of intervention	Data Collection and Data Analysis [3]Number of assessment points [4]Number of types of instruments	Strengths, Limitations, and Rigor
Kersten-Alvarez, L. E., Hosman, C. M. H., Riksen-Walraven, J. M., van Doesum, K. T. M. & Hoefnagels, C. (2010). Long-term effects of a home-visiting intervention for depressed mothers and their infants. *Journal of Child Psychology and Psychiatry, 51*(10), 1160-1170.	Fourth follow-up assessment of RCT conducted by van Doesum, Riksen-Walraven, Hosman & Hoefnagels (2008) (see below)	Sampling Method: Purposive Sample: *N* = 58 Dyads *n* = 29 women and their children who had completed the HV; and *n* = 29 who had not. See van Doesum et al. (2008)	Data Collection: Researchers were blind to the groups during in home, follow-up assessment when children five years old; Multiple measures including maternal report (3)[4], videotape observations (2)[4], and researcher testing (4)[4], and teacher report (2)[4]; and All instruments have stated reliability and validity Data Analysis: Determined effect size using power analysis; and used three steps to analyse data including one-way ANOVA and chi-square tests to determine comparability of two groups and identified variables in secondary analysis, then, used General Linear Model (GLM) univariate analyses of covariance with the outcome measures and analysed them using multivariate analyses, and finally,	Strengths: Used multiple methods of assessment including teacher report, the majority of which had stated reliability and validity; Attrition rate 14%; and Power analysis used to give effect size Limitations: Small sample thus not able to detect effect size; Differential attrition may have biased long-term outcomes; and Maternal mental health not re-evaluated during follow-up. Rigor: Strong

Citation and Country	Research Type, Methodology, Independent Variable (IV), and Dependent Variable (DV) [1] Component of Assessment	Sampling Method and Sample [2]Age of child at onset of intervention	Data Collection and Data Analysis [3]Number of assessment points [4]Number of types of instruments	Strengths, Limitations, and Rigor
(Netherlands)			the latter test was used to analyse the group differences and to determine the main effects	
Murray, L., Cooper, P. J., Wilson, A. & Romaniuk, H. (2003). Controlled trial of the short- and long-term effect of psychological treatment of post partum depression: 2. Impact on the mother-child relationship and child outcomes. *British Journal of Psychiatry,*	Experimental, RCT IV: Home-based, 8-18 week, adult therapy; Women randomized to one of the following: Non-directive supportive counselling; cognitive behavioural therapy; brief psychodynamic psychotherapy; or routine primary care support. DV: quality of maternal-child interactions and child cognitive, emotional, and behavioural development, and attachment security Control: routine primary care support	Sampling Method: Purposive Sample: *N* = 138 Dyads All women with PPD and their healthy infants; *N* = 52 Control, women with PPD and their healthy infants, received routine primary care. Sample characteristics included a range of high social disadvantage of 10-35%, majority were married or cohabitating, and about 25% had secondary education. Child Age:[2] 3.5 months	Data Collection: Longitudinal (3)[3] Pre, post, and follow-up maternal and child outcome measures; PPD confirmed by clinical interview; Multiple methods including interview (2)[4], maternal (1)[4], and teacher reports (1)[4], observation (1)[4], and researcher testing (3)[4]; Checklist developed for this study to examine maternal experiences of infant behaviour and mother-child relationship; Coding tool (see Murray et al. (1996) and observations rated by coders blind to the information on mother and child; Maternal and teacher tools used for five-year child outcomes had stated reliability; and Attachment assessment used a reliable and valid observer tool.	Strengths: Community sample; Used more than intervention; and Long-term follow-up on children outcomes that included maternal and teacher reports Limitations: Did not include a non-depressed control group; Must refer to Part One of the study report by Cooper, Murray, Wilson & Romaniuk, 2003) to fully understand the overall study; and Researchers did not discuss their limitations. Rigor: Moderate

Citation and Country	Research Type, Methodology, Independent Variable (IV), and Dependent Variable (DV) [1] Component of Assessment	Sampling Method and Sample [2]Age of child at onset of intervention	Data Collection and Data Analysis [3]Number of assessment points [4]Number of types of instruments	Strengths, Limitations, and Rigor
182, 420-427. (Britain)			Data Analysis: Generalised linear models were used to examine mother-child relationship and child outcomes; and further analysis using Kruskal-Wallis one way analysis by ranks, and then Hodges-Lehman estimator to determine between group differences; Additional similar models were used to determine effects of maternal age and education, child gender, and initial depression ratings on outcomes; and Linear regression used to examine maternal sensitivity.	
O'Higgins, M., St. James Roberts, I. & Glover, V. (2008). Postnatal depression and mother and infant	RCT using prospective, block controlled randomized design IV: Office-based, six group sessions of Infant Massage (IM) DV: Maternal depression, maternal	Sampling Method: Purposive <u>Sample:</u> *N* = 96 All women with depression ratings in the clinical range at four weeks postpartum and their healthy infants; *n* = 31 IM;	Data Collection: Longitudinal (3)[3] Pre, post, and one year follow-up maternal and child outcome measures Maternal depressive ratings determined by widely recognized rating scales but reliability and validity of instruments not given; Multiple measures including	Strengths: Included one-year follow-up assessments Limitations: Limited information provided on intervention; and Did not provide reliability and validity of

Citation and Country	Research Type, Methodology, Independent Variable (IV), and Dependent Variable (DV) [1] Component of Assessment	Sampling Method and Sample [2]Age of child at onset of intervention	Data Collection and Data Analysis [3]Number of assessment points [4]Number of types of instruments	Strengths, Limitations, and Rigor
outcomes after infant massage. *Journal of Affective Disorders, 109*, 189-192. (Britain)	sensitivity, and mother-child interactions (including infant fussiness – difficult, performance during interaction)[1] Control: Offered weekly, one-hour support group and practical information	*n* = 31 support group; and *n* = 34 control non-depressed women and their infants. The majority were married or co-habitating, Caucasian, and well educated. Child Age:[2] Nine to twelve weeks old	maternal reports (3)[4], videotaped observations (1)[4]; Observations rated by coders blind to the information on groups. Data Analysis: Use ANOVA with post hoc Bonferroni tests to compare group differences, as well as descriptive statistics to examine maternal depressive scores within the groups.	instruments. Rigor: Moderate
Paris, R., Bolton, R. E. & Spielman, E. (2011). Evaluation a home-based dyadic intervention: Changes in postpartum depression, maternal perceptions, and mother-	Quasi-experimental, pilot, within-subject design IV: Home-visiting, 12-16 weeks of mother-infant intervention using Early Connections (EC) program, short-termed, dyadic therapy DV: Maternal depressive symptoms, parenting stress and self-esteem, and	Sampling Method: Purposive Sample: *N* = 25 Dyads Mother-infant dyads referred to EC for PPD, parenting difficulties, and/ or isolation; majority married, Caucasian, well educated; 54.2% on psychotropic medication for depression; and 2/3 had depression history. Child Age:[2]	Data Collection: Longitudinal (3)[3] Pre, post, and three month follow-up maternal and child outcome measures; The presence of PPD not described, sample derived from women referred for treatment of PPD; Multiple measures including maternal report (4)[4], and videotape observations (1)[4]; Reliability and or validity given for all instruments; Child Outcomes measured at	Strengths: Short-term intervention Limitations: Small sample limited possibility of correlational analysis; No control or comparison group; No longitudinal follow-up; Multivariate analysis not done; and Over half the participants were on antidepressants

Citation and Country	Research Type, Methodology, Independent Variable (IV), and Dependent Variable (DV) [1] Component of Assessment	Sampling Method and Sample [2]Age of child at onset of intervention	Data Collection and Data Analysis [3]Number of assessment points [4]Number of types of instruments	Strengths, Limitations, and Rigor
infant interactions. *Infant Mental Health Journal*, *32*(3), 319-338. (USA)	quality of maternal-child interactions (including positive and negative affect, initiation and involvement)[1]	Mean 17 weeks old, range 1-63 weeks old.	Data Analysis: Used SPPS Version 16.0 to analyse all data, however, did not conduct multivariate analyses to determine correlations "given the small sample size" (p. 326); used univariate analyses to examine demographics, depressive ratings, and intervention length; then Bivariate analyses conducted to determine pre and post intervention differences in relations to maternal mood, stress, self-esteem, distress, and mother-child interactions; finally analysed data for partial correlations in relation to infant age and maternal mood and perceived interaction change	at start of treatment and this variable was not tracked, thus cannot determine what the relationship between the intervention and improvement in maternal mood. Rigor: Strong
Van Doesum, K. T. M., Riksen-Walraven, J. M., Hosman, C. M. H. &	RCT IV: Home-visiting program, 8-10 session of dyadic intervention uses various strategies including IM	Sampling Method: Purposive Sample: *N* = 71 *n* = 35 Women with PPD, dysthymia, or depressive scores in clinical range,	Data Collection: Longitudinal (3)[3] Pre, post, and three to four months follow-up maternal and child outcome measures, post tests conducted in the home; Multiple measures including	Strengths: Child outcomes measures had stated reliability and validity; five-year follow-up study planned (See Kersten-Alvarez et

Citation and Country	Research Type, Methodology, Independent Variable (IV), and Dependent Variable (DV) [1] Component of Assessment	Sampling Method and Sample [2]Age of child at onset of intervention	Data Collection and Data Analysis [3]Number of assessment points [4]Number of types of instruments	Strengths, Limitations, and Rigor
Hoefnagels, C. (2008). A randomized controlled trial of a home-visiting intervention aimed at preventing relationship problems in depressed mothers and their infants. *Child Development, 79*(3), 547-561. (Netherlands)	DV: Maternal depressive symptoms, quality of maternal-child interactions, maternal sensitivity, child social-emotional functioning (responsiveness, expression of pleasure, and involvement)[1], and attachment security Control: Offered three, 15 minutes telephone calls from a child therapist	during infants' first year of life who were receiving concurrent treatment for their mental health problem(s) by qualified mental health professional; *n* = 36 control. Child Age:[2] Mean 5.5 months	interview (3)[4], maternal reports (3)[4], and videotape observations (2)[4]; Postpartum depressive symptoms and PPD determined by clinical interview and maternal report; All instruments have stated reliability and validity except one questionnaire. Data Analysis: Used descriptive statistics to analyse pre and post intervention outcomes and determine correlations; and used GLM to analyse repeated measures and *t* tests to compare attachment security and infant social-emotional functioning between the groups.	al. [2010]). Limitations: Attrition 16% over 2.5 years; Small sample; Mothers were not screened for other psychiatric problems; All mothers were receiving concurrent treatment for PPD therefore cannot attribute mother-child interaction improvement to HV. Rigor: Strong
Early and Treatment Intervention				
Cohen, N. J., Lojkasek, M., Muir, R., Parker, C. J., Barwick, M.	Randomized trial, between group comparison IV: Office-based, dyadic , Watch, Wait	Sampling Method: Purposive Sample*: N*=67 Dyads Children 10-30 months old, referred for mental	Data Collection: Longitudinal (2)[3] Pre and post maternal and child outcome measures; Maternal depressive ratings determined by widely recognized	Strengths: Child outcomes measures have proven reliability and validity and were scored by raters blind to

Citation and Country	Research Type, Methodology, Independent Variable (IV), and Dependent Variable (DV) [1] Component of Assessment	Sampling Method and Sample [2]Age of child at onset of intervention	Data Collection and Data Analysis [3]Number of assessment points [4]Number of types of instruments	Strengths, Limitations, and Rigor
& Brown, M. (1999). Watch, Wait, and Wonder: Testing the effectiveness of a new approach to mother-infant psychotherapy *Infant Mental Health Journal*, *20(4*), 429-451. (Canada)	& Wonder (WWW) or Psychodynamic Psychotherapy (PPT) DV: Maternal depressive symptoms, quality of maternal-child interactions – (conflict, reciprocity, sensitivity)[1] and child attachment security style, affect regulation, and cognitive development	health care, and their mothers. Presenting problems included child chronic sleeping, behavioural, or feeding problems; and or Maternal depression or challenges related to maternal bonding. Women and their children were randomized to one of two interventions: *n* = 37 WWW; and, *n* = 33 PPT. Child Age:[2] 10-30 months at onset; WWW mean 21.5 months, PPT mean 19.2 months	rating scales but reliability and validity of instruments not given; Multiple measures used including interviews, maternal reports (3)[4], videotape observation (2)[4], and researcher (1)[4]; Symptom check list developed for study, completed by mother; Used widely recognized instrument to assess attachment security; Interrater reliability provided for coding scale for mother-child interactions; Data Analysis: Used *t* tests to analyse sample characteristics, X^2 or Fisher's Exact Test used to analyse between group differences, ANOVA or MANOVA (depending on the number of measures of a variable) used to analyse therapeutic outcomes between groups, and for the anticipation of specific differences	the conditions; and Attrition 9%. Limitations: Small sample; and Absence of waitlist control group. Rigor: Strong

Citation and Country	Research Type, Methodology, Independent Variable (IV), and Dependent Variable (DV) [1] Component of Assessment	Sampling Method and Sample [2]Age of child at onset of intervention	Data Collection and Data Analysis [3]Number of assessment points [4]Number of types of instruments	Strengths, Limitations, and Rigor
			between groups, one-tailed tests were used.	
Cohen, N.J., Lojkasek, M., Muir, E., Muir, R., & Parker, C. J. (2002). Six-moth follow-up of two mother-infant psycho-therapies: Convergence of therapeutic outcomes. *Infant Mental Health Journal*, *23*(4), 361-380. (Canada)	Follow up to Cohen et al. (1999)	Sampling Method: See Cohen et al. (1999) Sample: *N* = 58 Child Age at follow-up: 16-36 months See Cohen et al. (1999)	Data Collection: Follow-up The same instruments were used in this six month follow-up to Cohen et al. (1999) Data Analysis: In addition to the analysis described for Cohen et al. (1999), *F*-values were examined for stabilization of treatment effects, and ANOVA was used to determine between group differences.	Strengths: Attrition: 13% See Cohen et al. (1999) Limitations: See Cohen et al. (1999) Rigor: Strong

Appendix E: Descriptions of Interventions

Intervention Type	Citation	Description & Focus: (TH= theoretical basis, I=Intervener, L=location, T=target, and M=methods)	Child Age and Duration
Promotion			
Home visiting program (HV)	Ammaniti et al., (2006)	Home visiting program provided from 8 months pregnancy until child one year old on a weekly and then bi-weekly basis Purpose: -Strengthen the mother's capacity to read and interpret the infant's signals and behaviour without giving advice; -Support marital interactions without providing therapy; and -General aims of HV including promoting child development, enhancing parenting practices, and fostering positive parent-child relationships. TH = Bio-ecological system and attachment I = Social workers and psychologists, trained and supervised in intervention L = Home T = Mother, mother-child M = Not described	First year of life Duration: Average 12 months
Parenting program (PP)	Baggett et al. (2010). "Brief, manualized interventions aimed at improving the capacity of parents to support their children's emotional and behavioural development" Barlow et al. (2010)	Infant Net: Internet-based, computer delivered PP offered for 10 weeks (adaptation of Play and Learning Strategies [PALS], an evidence-based program) Purpose: -Enhance maternal sensitivity; and -Promote child social-emotional development. TH = Not stated(related to adult education and responsive parenting) I = Self and Coach L = Home T = Mother, mother-child M = Infant Net: involves instruction using internet with multimedia modalities (e.g. video examples, maternal recordings of interaction with infant), self-directed learning, daily homework, questions and answers, parent satisfaction survey post every session, 90 minutes of weekly coaching, and access to an Internet bulletin board for peer and professional contact and parenting support and information.	Infants' age: mean 4 months (range 3-8 months) Duration: 10 weeks

Intervention Type	Citation	Description & Focus: (TH= theoretical basis, I=Intervener, L=location, T=target, and M=methods)	Child Age and Duration
Prevention			
Office-based, family group program: (mother, infant, mother-infant, father or partner	Clark et al. (2008)	Mother-Infant therapy group (M-ITG) is a manualized, family-centred, relational approach to treating women with moderate to severe PPD, and their infants, and partners or spouses, with three group components: adult therapy, infant development therapy, and mother-infant therapy. Goals: Relieve maternal depressive symptoms, address maternal intergenerational parenting issues, enhance maternal socialization, provide emotionally supportive and developmentally stimulating environment for infant, promote healthy mother-infant interactions, enhance marital or partner relationship, and improve maternal functioning. TH=Integration of attachment, family systems, self-psychology, psychodynamic theories with group, cognitive-behavioural, and interpersonal approaches. I=Group therapists, individual infant therapists, and dyadic therapists comprised of psychologists, psychology interns, and psychiatry residents trained in the model and supported by group supervision following each M-ITG session. T=Mother, infant, father or partner M= 6-8 families per group; 12 week program; each session divided into two parts: First 1.5 hours, mother group therapy while infants in group developmental therapy; Second 0.5 hour of group mother-infant dyadic therapy; Fathers or partners attend 2/12 sessions in their own group and then join for triadic activities in mother-infant group.	Child Age: Mean 7.86 months (SD 6.75); Control mean 11.71 months (SD 7.35) Duration: 12 weeks
Office-based, Individual adult (mother) and Family group program:	Clark et al. (2003)	M-ITG: See Clark et al. (2008) for details; WLC: Waiting for M-ITG, provided consultation support during interim I=Four group therapist for the mothers' group, four infant therapists, and four therapists to provide IP; all trained and supervised according to modality. IPT: Interpersonal Therapy (IPT) is a manualized, short-term psychotherapy for people experiencing depression that uses a biopsychosocial approach to address interpersonal issues, role transitions, grief and loss. TH=Not given	Child Age: Mean 8.9 months, range 1-24 months Duration: 12 weeks

Intervention Type	Citation	Description & Focus: (TH= theoretical basis, I=Intervener, L=location, T=target, and M=methods)	Child Age and Duration
(mother, infant, mother-infant, father or partner)		T=Mother M= IPT- 12 weeks of one hour sessions/week, infant accompanied mother to therapy session	
Office-based, individual adult therapy	Forman et al. (2007)	Interpersonal Therapy (IPT) is a manualized, short-term psychotherapy for people experiencing depression that uses a biopsychosocial approach to address interpersonal issues, role transitions, grief and loss. TH=Not described I=Therapist trained in IPT T=Mother M=Weekly, individualized IPT for twelve weeks. Mothers asked to not take psychotropic medication or engage in any other psychosocial support.	Child Age: Six months old at treatment onset Duration: 12 weeks
Office-based	Goodman et al. (2008)	Open trial antidepressant medication accompanied by education and support TH = Not given I=Psychiatrist T=Mother M=In office visits	Child Age: 1-6 months at treatment onset Duration: 12 weeks
Home-visiting program, mother-infant	Letourneau et al. (2011)	*Keys to Caregiving* is a home-based peer support to improve maternal-child interactions of mothers with depressive symptoms provided over 12 weeks. TH=Not stated I=Women who had recovered from PPD for at least two years were screened for eligibility, trained, and provided peer debriefing. T=Mother, mother-infant M=Manualized program utilizing informational, emotional, affirmative, and practical support and information including Keys to Caregiving (promotes parents' understanding of their infants' behaviours with the intention of enhancing the mother-child relationship. Control group: Waited 12 weeks then received two weeks of peer support.	Child Age: Mean 5 months at treatment onset. Duration: 12 weeks
Home	Kersten-	See van Doesum et al. (2008) for original study details.	

Intervention Type	Citation	Description & Focus: (TH= theoretical basis, I=Intervener, L=location, T=target, and M=methods)	Child Age and Duration
visiting program; mother-infant	Alvarez et al. (2010)		
Home-visiting, psycho-therapy or counselling	Murray et al. (2003)	Women were randomized to one of the following interventions: Non-directive supportive counselling: an opportunity for women to explore any issues or concerns; Cognitive behavioural therapy: intended to address problems identified by the woman regarding caring for her infant; Brief psychodynamic psychotherapy: explore the mother's attachment history in order to improve the mother-child relationship; and Routine primary care support for the control group. TH=Not given I=Specialist therapists and home visitors T=Mother M=Interventions provided in the home weekly from 8-18 weeks postpartum.	Child Age: 3.5 months at treatment onset Duration: 8-18 weeks
Office-based, group, Infant Massage, (IM)	O'Higgins et al. (2008)	The intention of IM is to improve infant mood, enhance mother-child interactions, and improve infant characteristics. TH=Not given I=Trained members of International Association of Infant Massage T=Mother, infant M=Each of the IM group or support group attended six sessions; IM group sessions involved noticing and following infant cues and responding accordingly with massage techniques; Support group facilitated by research team member for one hour.	Child Age: Nine to twelve weeks old at onset of study Duration: six sessions
Home-visiting, mother-	Paris et al. (2011)	Early Connections (EC) program, a home-based, short-termed, dyadic therapy that intends to decrease maternal depression and mitigate its effects on mother-child relationship, enhance maternal sensitivity, change maternal perception of	Child Age: Mean 17 weeks old, range 1-63

Intervention Type	Citation	Description & Focus: (TH= theoretical basis, I=Intervener, L=location, T=target, and M=methods)	Child Age and Duration
infant		infant, increase parenting confidence, and improve mother-child relationship (not yet manualized) TH=Attachment I=Mental Health clinicians trained in perinatal and infant – parent mental health, supported by group supervision T=Mother, mother-infant M=12-16 weekly visits, uses parent-infant interventions such as building alliance, listening, sharing observations, exploring relevant history, promoting emotional expression, and facilitating mother-infant interactions.	weeks old. Duration: 12-16 weeks
Home-visiting program, mother-infant	Van Doesum et al. (2008)	Mother-infant intervention designed to improve maternal sensitivity by using videotaped recording of mother-infant interactions, modelling, cognitive restructuring, practical childcare support, and infant massage. TH=Not discussed I= Prevention specialists that were graduate trained with graduate or postgraduate training in health education or prevention T=Mother-infant M=An analysis of an initial video-tape of mother-infant interactions assists the multidisciplinary team to develop a treatment plan that is implemented by the specialist; fathers are involved when possible, and practice of skill development is encouraged. Total 8-10, 60-90 minutes visits offered weekly to every two weeks for 3-4 months. Over three months, the control group received three, 15 minute phone calls focused on parenting from child therapists.	Child Age: Mean 5.5 months Duration: 8-10 sessions
Early and Treatment Intervention			
Office-based, Infant-led psycho-therapy	Cohen et al (1999)	WWW: Infant-led psychotherapy aimed at improving infant-mother attachment by strengthening maternal sensitivity, insight, and responsiveness, by supporting the mother to follow her child's lead and to work through her feelings related to this activity works "at the behavioural and the representational level" (p. 433) in order to enhance maternal sensitivity and address infant mental health issues	Child Age: 10-30 months at onset; WWW mean 21.5 months, PPT

Intervention Type	Citation	Description & Focus: (TH= theoretical basis, I=Intervener, L=location, T=target, and M=methods)	Child Age and Duration
compared to parent-infant psycho-therapy		TH=Attachment I=Infant Mental health therapists T=Infant, mother M=Provided weekly for one hour for a mean 13.8 weeks. First half of session – Infant led: mother on the floor with her infant observing him or her and following their lead while therapist observes; and Second half – Therapist led: therapist and mother discuss the mother's observations of her child and try to understand the child's activities. PPT: Parent-infant psychotherapy that involves the mother playing with her infant while she talks with the therapist uses "transference, repetition of the past, re-experiencing of affect, and interpretation" (p. 437). TH=Attachment I=Infant mental health therapists L=Clinic T=Infant, mother M= Weekly, one-hour sessions for a mean 14.9 sessions over 5.4 months; Therapist engages mother in dialogue while she plays with infant; may include other parent and or family members; and he sessions involving other family members were less frequent.	mean 19.2 months. Duration: WWW mean 4.6 months, and PPT mean 5.4 months.
Office-based, Infant-led psycho-therapy compared to parent-infant psycho-therapy	Cohen et al, (2002)	See above Cohen et al., 1999	

Appendix F: Elements of Interventions

Citation	Target				Location		Intervener		
	Mother	Infant	Mother-Child	Parent-Child	Home	Office	Professional	Peer	Other
Promotion									
Ammaniti et al. (2006)	✓		✓		✓		✓		
Baggett et al. (2010)	✓		✓		✓		✓		Self
Prevention									
Clark et al. (2008)	✓	✓	✓	✓		✓	✓		
Clark et al. (2003)	✓	✓	✓	✓		✓	✓		
Forman et al. (2007)	✓					✓	✓		
Goodman et al. (2008)	✓					✓	✓		
Letourneau et al. (2011)	✓		✓		✓			✓	
Kersten-Alvarez et al. (2010)* follow-up									
Murray et al. (2003)	✓				✓		✓		Health Visitor
O'Higgins et al. (2008)	✓	✓	✓			✓	✓		
Paris et al. (2011)									
Van Doesum et al. (2008)*	✓		✓		✓		✓		
Treatment									
Cohen et al. (1999)*			✓			✓	✓		
Cohen et al. (2002)* follow-up									

Appendix G: Significant Effects of Interventions on Mother and Child Outcomes

Maternal Outcome	Citation [1] = Concurrent maternal mental health care (50% on antidepressants) [2]=Effects did not persist [3]=Concurrent maternal mental health care	Intervention	Citation and Child Age [4]= Follow-up	Child Outcomes
Maternal Sensitivity	Murray et al. (2003) van Doesum et al. (2008)[2, 3] Cohen et al. (1999)	Home-based Counselling, CBT, Brief Psychodynamic Home-based, hybrid home visiting Office based, WWW, PPT		
Maternal Depressive Symptoms	Clark et al. (2008) Forman et al. (2007) Goodman et al. (2008) Paris et al. (2011)[1] Cooper et al. (2003)	Office based M-ITG Office based IPT Medication Home base, Early Connections Home-based Counselling, CBT, Brief Psychodynamic		
Quality of Maternal-child interactions	Baggett et al. (2010) Goodman et al. (2008) Murray et al. (2003)[2] van Doesum et al. (2008)[2, 3]	Home based Infant Net Medication Home-based, Counselling, CBT, Brief Psychodynamic Home-based hybrid HV	Baggett et al. (2010) 3-12 months Goodman et al. (2008) Murray et al. (2003) 24 months van Doesum et al. (2008)[2, 3] 11.5 months	Quality of child interactions with mother

		Office based WWW > PPT Office based WWW = PPT Home base, Early Connections M-ITG, IPT	Cohen et al. (1999) 25 months Cohen et al. (2002)[4] 31 months Paris et al. (2011)[1] 7.5 months Clark et al. (2003) 12 months	
		Office based WWW > PPT Office based WWW = PPT Home-based, hybrid HV	Cohen et al. (1999) 25 months Cohen et al. (2002)[4] 31 months van Doesum et al. (2008)[3] 11.5 months	Attachment Security
		WWW, PPT WWW, PPT Home-based C, CBT, BP	Cohen et al. (1999) 25 months Cohen et al. (2002) 31 months Murray et al. (2003)[2] 18 months	Emotional Regulation
		EC Home base, Early Connections	Paris et al. (2011) 7.5 months	Infant Affect
		Home-based Infant Net Home-based, Counselling, CBT, Brief Psychodynamic	Baggett et al. (2010) 3-12 months Murray et al. (2003)[2] 18 months	Infant and Toddler Behaviour
		Home-based, hybrid HV	Kersten-Alvarez et al. (2010)[4] 5 years old, subsample	Internalizing and Externalizing Problems