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**| RESEARCH ARTICLE**

## **The Negative Effects of Maternal Postpartum Depression on Infant Directed Speech (IDS) and Infant Cognitive Ability**

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**| ABSTRACT**

The language used by caregivers plays an essential role in the development of an infant's language and cognitive ability. This refers to both the quality and the quantity of language used by the caregiver. In cases where the primary caregiver is a mother who is suffering from maternal postpartum depression, the quality and quantity of speech and language used to suffer greatly. This article examines how maternal postpartum depression negatively affects a mother's use of Infant Directed Speech (IDS) and how this results in delayed language learning in infants. It first seeks to define the linguistic and emotional aspects of IDS in order to place maternal depression in its context. It then examines how children are negatively impacted by this and briefly looks at gender influences and possible solutions for this problem. This study makes use of and combines the results of previous research conducted on varying aspects of the effects of maternal postpartum depression on IDS and infant cognitive ability. The studies used tracked the cognitive developments of infants ranging from 2 months to 4 years of age; They each collected data from infants who had depressed and non-depressed mothers. In all cases, the results showed that maternal postpartum depression negatively affects IDS and infant cognitive ability.

**| KEYWORDS**

Infant Directed Speech (IDS), Maternal Postpartum Depression, Delayed Language Learning, Adult Directed Speech (ADS), Infant Cognitive Ability (ICA)

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### **1. Introduction**

Infant Directed Speech (IDS, Baby Talk, Child-Directed Speech, or Motherese) refers to a nonstandard form of speech used by adults in talking to toddlers and infants. Numerous studies have proven that IDS aids infants in picking up a language at an earlier age, helps infants to recognize phonetic boundaries and other syntactic features, and nurtures a greater bond between child and caregiver which creates an ideal environment for an infant's cognitive and emotional growth (Cogill et al., 1993; Naoi et al., 2011). This emotional bond, created between caregivers and infants, appears to be a key component in the success of IDS. From this arises the question of how post-partum depression affects IDS and a child's learning capabilities. Researchers who have sought the answer to this question have found that infants who hear IDS spoken from mothers suffering from post-partum depression have been shown to consistently score lower in terms of cognitive development when compared to other children. In order to ascertain the truth of this claim, this paper examines how maternal postpartum depression negatively affects a mother's use of IDS and how this results in delayed language learning in infants. It first seeks to define the linguistic and emotional aspects of IDS in order to place maternal depression in its context. It then examines how children are negatively impacted by this and briefly looks at gender influences and possible solutions for this problem.

## 2. The Issue

Infant Directed Speech is a unique form of communication that is found in a number of languages worldwide (American English, French, German, Japanese, etc.), that many parents and caregivers resort to when communicating with their children (Inoue et al., 2011, p. 62). It involves and differs from Adult Directed Speech (ADS) in **three acoustic components**: F0 (IDS has a higher pitch), F0 range (it has a larger pitch range), and tempo (it has a longer phoneme duration) (Inoue et al., 2011, p. 62). IDS is considered to be a simpler language form where utterances are shorter and involve more repetition when compared to ADS (Murray et al., 1993, p. 1085). It also tends to focus on the child's experience and therefore contains more interrogative and imperative sentences rather than declarative sentences (Murray et al., 1993, p. 1085). Thus, IDS incorporates "systematic and identifiable modifications not only to prosody but also to syntax, semantics, and pragmatics" (Singh et al., 2002, p. 366). Although IDS refers to any speech involving these characteristics that are spoken by an adult to an infant, the focus of this research will be specifically on mothers, as babies have been shown to "as early as the first month of life" have a preference for "mothers' speech rather than other females' speech" (Singh et al., 2002 p. 365-366). However, because IDS is inherently a positive and upbeat form of communication and relies on and creates strong emotional bonds between mother and child, this study seeks to closely examine the effects that a mother suffering from post-partum depression will have on her child's cognitive abilities.

## 3. Evidence

Cogill et al.'s research on the "Impact of Maternal Postnatal Depression on Cognitive Development of Young Children" was conducted in 1986 and is, therefore, one of the earlier works on this subject. The researchers conducted a study on ninety-four women and their first-born children until the age of four. Thus, they were able to accurately track cognitive setbacks throughout infancy and into later years to ascertain whether or not there truly exists a negative effect on language development in children of women suffering from postpartum depression. In order to assess cognitive ability, the study made use of the McCarthy scales of children's abilities. The study found that "the children's performance on the McCarthy scales was significantly reduced by about 10 points in association with maternal depression only in the first year of their lives" (1986, p. 1166). The results of this study also led the researchers to believe that the "impact of maternal depression on cognitive development is long-term rather than transitory" (1986, p. 1166).

This long-term impact can be understood in the context of Naoi et al.'s (2011) research outlined in their article "Cerebral Responses to Infant-Directed Speech and the Effect of Talker Familiarity," which analyses the effect that IDS has on an infant's cerebral response. This paper looks at the neural substrates underlying IDS functions and examines cerebral hemodynamic responses to IDS in 48 infants aged four to thirteen months in Japanese-speaking families (2011, p. 1735). Their research found that there were increased activations in left and right temporal areas when infants heard IDS compared to ADS, whether it was from familiar or unfamiliar voices, with the greatest increase in activity occurring when the IDS was heard from the infants' own mothers (2011, p. 1735). Because this study compares data between IDS and ADS as well as by using both familiar and non-familiar voices in each speech style, the study is able to achieve a well-balanced conclusion. This study concludes that infants have a greater cerebral response when hearing speech directed to them in an IDS fashion from their own mothers. This further emphasizes the importance that IDS has on an infant's learning process.

Differentiating between IDS and ADS was also a goal of Singh et al.'s study "Infants' Listening Preferences: Baby Talk or Happy Talk?" (2002). This study takes into consideration previous research done on IDS and language learning in infants and seeks to challenge the conclusions many studies have shown in the past. However, rather than focusing on the context of IDS or "baby talk" (BT), this study seeks to prove that the preference for BT in infants is not due to speech register or simple acoustic properties of BT but, instead, it is because of the "relative positive affect of the speech directed towards infants" (2002, p. 366). Thus it breaks IDS down into its emotional context, which in itself, necessitates a relevance to the effect depression might have on infants. The study was conducted using the voice of a single female who read passages in a sad, happy, and neutral tone in both BT and ADS (2002, p. 370-371). The results found that happy speech was preferred by most infants regardless of the register that was used (2002, p. 386). Thus, "when faced with speech spoken in contrastive registers, infants' preferences are guided primarily by the degree of positive affect contained in the speech" (2002, p. 387).

Inoue et al.'s study, "Discrimination between mothers' infant- and adult-directed speech using hidden Markov models," echoes the thoughts outlined above as it looks at data obtained from three different experiments to ascertain whether infants preferred listening to IDS or ADS by using a mel-frequency cepstral coefficient and hidden Markov model-based speech discrimination algorithm (2011, p. 62). This study accounts for the effect depression has on a mother's use of IDS and how this, in turn, affects the child as it recognizes that IDS is a method of expressing emotions and developing and strengthening the bond between mothers and infants (2011, p. 62). Researchers found that the greater exaggeration of phonetic units in the mother's speech is associated with greater learning in infants... [therefore,] maternal mental health is likely to affect the infant's directedness of speech. [This is because] depressed mothers vocalize less frequently with speech content that is less infant focused and more negative than healthy controls. Exposure to this form of IDS is linked to poorer learning and cognitive functioning of infants of depressed

mothers.” (2011, p. 62). This result leads to the idea that IDS is not solely based on sounds and linguistic features; rather, one of the important characteristics and the reason for its success and impact on children’s cognitive abilities is that it is a speech form that consists of mental, emotional, and physical features.

By viewing IDS through this more complex lens, the effects of postpartum depression on the learning abilities of infants become clearer. Murray et al.’s work, “The Impact of Postnatal Depression and Associated Adversity on Early Mother-Infant Interactions and Later Infant Outcomes” (1996), examines how depression affects a variety of facets relating to communication, such as “rate of speech, voice quality, eye-to-eye contact, and emotional expressiveness and responsiveness” and how these results combine to influence the mother-infant relationship (p. 2512). More importantly, it examines whether depression is the sole cause of this affect or whether the surrounding personal and social environments of the mother have an effect on this as well. The study begins by observing mothers interacting with their children face to face at the age of two months and then charts the cognitive abilities of infants at 18 months of age (1996, p. 2514). The results indicate that the social situations surrounding the mothers greatly contribute to the lower scale of development in infants of depressed mothers (1996, p. 2524).

This holistic view of IDS is further examined in Kaplan et al.’s “Maternal Sensitivity and the Learning- Promoting Effects of Depressed and Nondepressed Mothers’ Infant Directed Speech” (2009). In this particular study, researchers test their hypothesis that maternal sensitivity is the aspect of mother-infant interaction that is the key link between depressed mothers’ IDS and poor infant learning (2009, p. 144). The results of their study show that there is little correlation between the actual voiced aspect of a mother’s IDS and the infant’s learning ability. Rather, it is the mother’s ratings of sensitivity and hostility that have a greater affect on how a child reacts to his mother’s IDS. The study made use of a conditioned attention paradigm (2009, p. 144), and thus their results show that the problem with cognitive development is in the stimulus and not in the infant (2009, p. 145). This is because the depressed mothers were “lower in sensitivity, responsiveness, and contingency relative to non-depressed controls” (2009, p. 155); as a result, infants of depressed mothers were less responsive to their mothers (2009, p. 156). Through their research, Kaplan et al. discovered that infants who are exposed to a depressed mother’s IDS have a reduced ability to benefit from IDS speech as time passes (2009, p. 157).

Herrera et al.’s study, “Maternal Touch and Maternal Child Directed Speech: Effects of Depressed Mood in the Postnatal Period” (2004), combines a mother’s touch with the mother’s speech in determining whether or not there is a significant difference between mother-infant interactions and the effect it would have on a child’s development when the mother is suffering from postpartum depression. The study makes use of an equal number of mothers suffering from mild depression and those without and observes their interactions with their children during pleasurable play at periods 6 months old and 10 months old. The conclusions found that postnatal depression influences the “affective and informative content of the maternal speech” (2004, p. 29). This study attempts to account for the possible discrepancy in research, which suggests that “maternal touch can compensate for the lack of verbal and facial emotional communication by depressed mothers with their infants” (2004, p. 30). The results indicate that although depressed mothers touched their children more often as they grew older, this was detrimental to the child’s language development. Depressed mothers, in this case, would use touch to “control, restrain and direct their infant’s actions, as well as to attract their attention” instead of using words to do so (2004, p. 36). The content of the mother’s speech was also noteworthy. Normal development and mother-infant interactions showed a “shift from talk about their infants’ internal states and feelings to talk about their activities and external environment over the child’s first year of life” (2004, p. 30). However, depressed mothers failed to do this and continued to use emotional speech, neglecting to increase the amount of information-salient speech needed (2004, p. 37). Thus, depressed mothers negatively impact their children’s cognitive development in a number of ways.

Because of the adverse effect of a mother’s depression, many researchers have also attempted to observe how gender affects IDS and infant learning. This occurs in two ways: first, by the gender of the child, and second, by the gender of other adult caregivers using IDS. Murray et al.’s study, “Depressed Mothers’ Speech to Their Infants And Its Relation to Infant Gender and Cognitive Development” (1993), observes three groups of mothers: mothers who are depressed in the postpartum period, mothers who have had at least one episode of depression in the past, and the control group (1993, p. 1085). It takes into consideration the infant’s gender and whether or not this plays any role in the mother-infant relationship and its resulting influence on the infant’s cognitive ability. The results of this study found that mothers who had depression interacted more negatively with their male infants, and as a result, these male infants scored lower on cognitive tests (1993, p. 1096). On the other hand, many studies have shown that infants of depressed mothers respond very well to male caregivers who use IDS (Kaplan et al., 2009, 2010). Kaplan et al.’s research in “A Privileged Status for Male Infant-Directed Speech in Infants of Depressed Mothers? Role of Father Involvement” (2010) specifically tackles a possible solution for the children of mothers who are dealing with postpartum depression. This study observes how male infant-directed speech becomes more significant and helpful in alleviating the negative effects of IDS in depressed mothers. The results of their study find that infants of married depressed mothers do, in fact, benefit from male IDS and show a greater response to it when compared to infants of married nondepressed mothers (2010, p. 168).

#### 4. Discussion

The studies examined above all prove that IDS is superior to ADS in terms of its impact on a child's cognitive and developmental abilities. This is largely due to the fact that IDS is comprised of a delicate balance of linguistic, emotional, physical, and mental components. The studies above observed mother-infant interactions in both controlled settings, where infants heard pre-recorded audio while sitting in a stationary position, and uncontrolled settings, where infants interacted freely with their mothers. In both cases, infants showed higher response rates to IDS and scored higher on the learning scales used in the research methods. Whereas some of the studies (Cogill et al., 1986; Inoue et al., 2011; Naoi et al., 2011; Singh et al., 2002) focused more on the linguistic and mental aspects, other studies (Herrera et al., 2004; Kaplan et al., 2009; Murray et al., 1996) paid more attention to the emotional, physical and social aspects of IDS. Because depression is both a mental and emotional debilitation, it is imperative that all of the above views be given equal care and attention.

One area where there may have been flaws is in the measures used to assess depression in mothers. The research methods used here used a variety of different tests to ascertain levels of depression; this could potentially have skewed the results slightly so that the results have to be viewed with a more critical eye. Also potentially detrimental to the research is how mothers who began the study as normally functioning individuals but became depressed at some point during the child's infancy may not have been accounted for. In one of the studies (Murray et al., 1993), this was the case for 6 of the original mothers in the study (p. 1093). Further research could examine if mothers suffering from PPD can make use of other language learning techniques, such as baby sign language, in order to make up for the cognitive setbacks their infants may face as a result of their depression. More research is also needed on the role of a male caregiver's IDS in order to ascertain why it is more successful and also to determine if male IDS is still beneficial if he is suffering from depression as well.

#### 5. Conclusion

This study built on previous research conducted on the various effects maternal postpartum depression has on infant-directed speech (IDS) and on infant cognitive ability. The aim of the study was to show that maternal postpartum depression negatively affects speech development and the cognitive ability of infants that are exposed to it. It specifically sought to combine the previous research conducted on the subject and determine how and why this phenomenon occurs. As mentioned above, this study analyzed and combined the results of studies that focused more on the linguistic and mental aspects of the effects of maternal depression on IDS (Cogill et al., 1986; Inoue et al., 2011; Naoi et al., 2011; Singh et al., 2002) as well as studies that paid more attention to the emotional, physical and social aspects of IDS (Herrera et al., 2004; Kaplan et al., 2009; Murray et al., 1996).

The results showed that because of the multi-faceted quality of IDS, maternal postpartum depression negatively affects infant learning in many ways. Infants have been shown to benefit from happy and uplifting speech (Singh et al., 2002); therefore, when depressed mothers are less sensitive to their needs and "more negating of the infant experience" (Murray et al., 1995, p. 2512) language and other cognitive setbacks occur. IDS heard from nondepressed mothers has been shown to be greatly beneficial in facilitating language development in infants; likewise, IDS directed at infants from depressed mothers greatly hinders this development. Because the "speech of depressed mothers is focused on the mother's own experience... [and contains] spare use of explanations, suggestions, and questions" (Herrera et al., 2004, p. 30) and the mother's depressive symptoms may interfere with "intonation, and timing" (Murray et al., 1993, p. 1083) infants are unable to properly pick up the speech sounds they hear and are unable to form the necessary emotional bonds they need in order to thrive intellectually.

By combining the results from studies that focused individually on the linguistic, mental, emotional, physical, and social aspects of this issue, this study highlights the grand nature and the significant ramifications that postpartum depression can have on IDS and infant cognitive ability. No matter the focus of the various experiments this study analysed, the results conclusively showed the negative effects of postpartum depression. Yet, more research and further experimentation are required. Further research should seek to monitor whether any therapy or medication that mothers with postpartum depression are undergoing can change cognitive results or development in their infants. Exploring whether or not other modes of communication (such as baby sign language) can have a positive impact on infant development is also a worthwhile endeavor. Furthermore, more research should also be conducted on whether or not increasing the roles of other caregivers in an infant's life can change the learning and developmental outcomes of the infants involved in the study.

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