

An Exploration of Maternal Sensitivity and Mind-Mindedness in Mothers of Deaf Children

Ben Dantzer

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Department of Psychology

King's University College at Western University

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Thesis Advisor: Dr. Cathy Chovaz

It is estimated that over 5% of the world's population is affected by hearing loss with approximately 32 million of these individuals being children (World Health Organization, 2013). Helen Keller, a prominent deaf author, lecturer, and political activist described the implications of deafness in the following manner; "Blindness cuts one off from things yet deafness cuts one off from people." (Keller, 1933, p.68). Helen Keller's description of deafness and its capacity to disconnect an individual from others has profound implications related to child development. Deaf children are faced with the challenge of growing up in a hearing culture that is dominated by spoken language. Over 90% of deaf children are born and raised by hearing parents who have limited experience and knowledge about hearing loss (Moore, 2001). This communication barrier between the deaf child and their hearing caregiver can have significant implications for the child-caregiver relationship (Lederberg & Mobley, 1990). With this in mind, the present investigation explores the potential differences and similarities between hearing mothers of hearing infants and hearing mothers of deaf infants - with a particular focus on the constructs of maternal sensitivity (Ainsworth, Blehar, Waters, & Wall, 1978) and maternal mind-mindedness (Meins, 1997).

### *Maternal Sensitivity in Mothers of Deaf Children*

Maternal sensitivity is defined as a mother's ability to perceive a signal from her infant, interpret it properly, and respond promptly and appropriately (Ainsworth et al., 1978). Maternal sensitivity is strongly predictive of attachment security - an infant's feeling of safety in the presence of the attachment figure (De Wolff & van Ijzendoorn, 1997; McElwain & Booth-

LaForce, 2006; Ainsworth et al., 1978). Attachment security is typically assessed in infancy using the Strange Situation Procedure (SSP; Ainsworth et al., 1978). In the SSP, a mother and her child undergo eight episodes including two separations and reunions. While coding the SSP, researchers focus primarily on the behaviour demonstrated by each infant upon reunion with their caregiver. Infant behaviour generally falls into one of three categories - secure, insecure-avoidant, and insecure-ambivalent. Children who are distressed upon separation and approach their caregivers upon reunion, and then return to play are assessed as being securely attached. Conversely, children who are ambivalent or avoidant towards their caregivers during reunion episodes do not view their caregivers as a source of comfort and are assessed as being insecurely attached.

As previously stated, the variation in children's attachment is thought to be influenced by maternal sensitivity. Specifically, caregivers who consistently respond to their infants' needs foster the creation of a securely attached infant i.e., an infant that is confident that his or her caregiver will meet their needs and respond to them when they are in need of care. Conversely, caregivers who only respond to their infants' needs on an intermittent basis, or respond with rejection, foster an insecurely attached infant, i.e., an infant that is uncertain about his or her caregiver's willingness to respond when the infant is feeling insecure (Ainsworth et al., 1978). Ainsworth (1978) was the first to notice that individual differences in attachment security of infants were associated with differences in maternal sensitivity. In her original Baltimore study, Ainsworth found that maternal sensitivity positively correlated with higher levels of securely attached infants at 12 months, with a large effect size ( $r = .78$ ; Ainsworth et al., 1978).

This positive correlation between maternal sensitivity and attachment security has been largely replicated, however a recent meta-analysis found a more modest effect size ( $r = .24$ ; De Wolff & Van Ijzendoorn, 1997). The results of Ainsworth's study suggest that sensitive and appropriate caregiving fosters the development of a secure attachment between a child and their caregiver.

The present study concerns the association between maternal sensitivity and child deafness. Some studies provide evidence for the fact that hearing mothers of deaf children might have lower levels of maternal sensitivity compared to hearing mothers of hearing children. Vernon and Andrews (1990) have described a response in hearing parents of deaf children similar to Kubler-Ross's (1969) model of grief. After diagnosis, they appear to progress through the stages of denial, anger, bargaining and depression, and will eventually achieve an acceptance of their child's diagnosis. This post-diagnosis stress may negatively impact maternal sensitivity and the quality of attachment between a deaf child and their caregiver. Lederberg and Prezbindowski (2000) have also provided evidence to suggest that hearing mothers of deaf children might be less sensitive. They found that certain mothers do not alter their means of communication during laboratory observations of dyadic interactions and will comfort their deaf child by voice, a behaviour that would be considered insensitive within the Ainsworth definition. Additionally, hearing mothers tend to be controlling during their interactions with their deaf child (Lederberg & Prezbindowski, 2000). Some researchers have also provided more direct evidence to suggest that hearing mothers of deaf children might display less sensitivity compared to mothers of hearing children. Meadow-Orlans and Steinberg (1993) compared 20 hearing mothers of hearing children to 20 hearing mothers of deaf children. All children were 18 months old and researchers

rated videotapes of mother-child free play situations based on dimensions of maternal sensitivity and how a mother interacted with her child. Compared to mothers of hearing children, mothers of deaf children were less sensitive and more intrusive during their interactions with their infants (Meadow-Orlans et al., 1993). In summary, a multitude of studies have discovered intergroup differences in mother child interactions which suggests that maternal sensitivity might be lower in mothers of deaf children.

Nevertheless, some findings have been more ambiguous regarding the association between child deafness and maternal sensitivity. In one of the largest studies to date, Lederberg and Mobley (1990) conducted a study comparing 41 dyads of hearing mothers and their deaf children to 41 dyads of hearing mothers with hearing children. All children were aged 18 to 22 months. Although no significant differences were found regarding attachment, the results did indicate intergroup differences in communication. Specifically, deaf children were more likely to end an interaction because they could not hear or see their caregiver trying to initiate communication; and hearing mother-deaf child dyads spent significantly less time communicating with one another compared to their hearing group counterparts (Lederberg & Mobley, 1990). Nevertheless, despite these differences in communication, no intergroup differences were found regarding maternal sensitivity. The results of the Lederberg and Mobley (1990) study combined with the study conducted by Meadow-Orlans and Steinberg (1993) demonstrate the existence of conflicting evidence regarding maternal sensitivity of hearing mothers and their deaf children.

Given the ambiguity in the literature, the current study is an attempt at disambiguating the association between maternal sensitivity in hearing mothers and child deafness. Unlike other studies, the present investigation uses the Maternal Behaviour Q-Sort (MBQS; Pederson, Moran, Sitko, Campbell, Ghesquire & Acton, 1990). Using the MBQS to assess sensitivity, trained coders observe how similar a mothers demonstrated behaviour is to the 90 items on the MBQS. Once the dyadic interaction has been completed, coders will have produced 90 ratings of the mothers behaviour, sorting them into piles most and least like the mothers demonstrated behaviour. A mothers sensitivity score is expressed as a correlation between the sort descriptive of her behaviour and the sort of a prototypically sensitive mother. Maternal sensitivity scores derived from the MBQS show robust relations with attachment security at 12 months ( $r = .60$ ; Pederson et al., 1990; Pederson & Moran, 1996; Pederson, Gleason, Moran & Bento, 1998). Application of the MBQS may therefore improve the chances of finding intergroup differences regarding maternal sensitivity if they exist.

#### *Mind-Mindedness in Mother's of Deaf Children*

Mind-mindedness is defined as the ability of a mother to view her child as an individual with a mind rather than a physical entity with needs to be met (Meins, 1997). Mind-mindedness is similar to the construct of Reflective Function (Fonagy & Target, 1997) defined as the ability to think about experiences in terms of mental state constructs (emotions, thoughts, needs, etc.). Meins, Fernyhough, Fradley, and Tuckey (2001) found that appropriate mind-related comments were the only parental characteristic out of the five characteristics presumed to measure mind-mindedness that significantly correlated with attachment security. Appropriate mind-related

comments were defined as a mother's ability to accurately reflect her child's mental states and feelings and these reflections were contingent with the child's actions. Meins and her colleagues concluded that maternal mind-mindedness might play a role in determining the quality of an attachment relationship between a child and their caregiver. With this in mind, the present study compares the mind-mindedness of mothers of deaf children to that of mothers of hearing children.

There are two foreseeable reasons why mothers of deaf children might exhibit qualitatively different levels of mind-mindedness. First, there is an established link between maternal mind-related comments and children's understanding of the mind and mind-related concepts (Meins, Fernyhough, Wainwright, Das Gupta, Fradley & Tuckey, 2002). When a mother attributes mental states to her child, she exposes the child to mind-related language which can increase the child's understanding of Theory of Mind (TOM; Meins et al., 2002). Children with an understanding of TOM possess the ability to attribute mental states, beliefs, and desires to themselves and to others. Deafness which may cut an individual off from spoken language, may impact a child's exposure to mental concepts by his or her caregiver - if spoken word is the primary means of communication. Unfortunately, this may be the case as deaf children with hearing parents have demonstrated slight delays in their TOM understanding compared to hearing children (Peterson & Siegel, 2000). The established connection between a child's exposure to mind-related concepts and their later TOM understanding (Meins et al., 2002) - combined with the finding that deaf children with hearing parents are delayed in their TOM understanding (Peterson & Siegel, 2000) - is suggestive that hearing parents of deaf children may

exhibit less of a propensity to think and talk about their child's mind. Moeller and Schick (2006) provided support for this assertion when they compared the interactions of 28 hearing mothers and their deaf children to 26 hearing mothers and their hearing children. They assessed the frequency of mental state discussions and explanations among hearing mothers with their deaf children. Each mother-child dyad was observed during three scenarios designed to elicit mind-related comments. The three scenarios involved observing the dyads during free play, watching a movie, and going through a family photo album together. Observers documented the total number of mind-related comments a mother made towards her child, which provided them with a measure of maternal mind-mindedness. Mothers of deaf children produced significantly fewer mind-related comments than did mothers of hearing children (Moeller & Schick, 2006). This suggests that mothers of deaf children engage their children in mental state discussions less frequently than do hearing mothers of hearing children. This also suggests that they may be less likely to think about the mind of their child or to engage in mind-mindedness.

The second reason that mothers of deaf children might be less mind-minded is that interpreting the thoughts, feelings, and emotions of a deaf child may be more difficult compared to the interpretation of a hearing child's mind. The previously demonstrated lack of communication between hearing mothers and their deaf children may limit a mother's exposure to her child and his or her feelings (Lederberg & Mobley, 1990). Also, as the child ages and presumably learns sign language, the mother must also learn sign language in order to communicate with her child. Unfortunately, the majority of hearing parents do not learn sign language and the few parents that do lack the fluency to communicate with their children about



abstract mental concepts (Moeller & Luetke-Stahlman, 1990; Moores, 2001). This deficit in communication may make inferring the thoughts of a deaf child more difficult than that of a hearing child.

In summary, mothers of deaf children might exhibit less of a propensity to think about the minds of their children for two reasons. First, the established connection between a child's exposure to mental concepts and their later TOM understanding (Meins et al., 2002) combined with the discovery that deaf children with hearing parents are delayed in their TOM understanding (Peterson & Siegel, 2000) suggests that mothers of deaf children might exhibit less of a propensity to think about the mind of their child. Second, the biological incongruity between a hearing mother and her deaf child creates a communication barrier that can impede a mother's exposure to her child's thoughts and feelings, hindering her ability to think about her child's mind (Lederberg & Mobley, 1990; Moores, 2001). Therefore, the purpose of the present study is to explore the impact of child deafness on a mother's ability to view her child as a mental entity with feelings, thoughts, and emotions. It is hypothesized that mothers of deaf children will exhibit less of a propensity to think about their child's mind compared to mothers of hearing children. A mother's propensity to think about the mind of her child was expressed as a proportion of the total number of comments made during interviews. A mother's overall score for mind-mindedness is therefore her ratio of mental-to-total comments made about her child.

In summary, the present study is an exploration of the potential differences and similarities between hearing mothers of hearing children and hearing mothers of deaf children.

Two research questions were addressed in the present study: First, do mothers of deaf children differ from mothers of hearing children in their sensitivity to child signals? Second, do mothers of deaf children exhibit less of a propensity to think about their child's mind?

## **Method**

### *Participants*

The participants in the current study were taken from two previously approved studies exploring the interactions between both hearing mothers with hearing children and hearing mothers with deaf children. Hearing mothers of deaf children (*the deaf group*) were recruited through two organizations - The London Centre of the Deaf and the Royal View Deaf Church, located in London, Ontario. These organizations provided mothers with information about the study and contact information for receiving further details. Upon receiving further information, if mothers were still interested in participating in the study, they signed a consent to participate form at the beginning of an initial home visit. Hearing mothers of hearing children (*the hearing group*) were recruited during their postpartum hospital stays at St. Josephs Hospital in London, Ontario. If mothers expressed interest in the study they supplied their contact information, indicating a desire for further information. If mothers were still interested in the study after receiving further information, they also signed a consent form at the beginning of an initial home visit.

After recruitment, the size of the hearing sample was much larger than that of the deaf sample. Unbalanced sample sizes increase the likelihood of a Type 1 Error if sample variances are unequal across groups. As such, participants in the hearing group were randomly selected

from the larger sample of previously recruited participants in order to balance the hearing and deaf group sizes.

In summary, then, participants in the present study consist of 16 mothers, ( $n = 8$ ) of whom are in the deaf group, and ( $n = 8$ ) of whom are in the hearing group, respectively. Within the deaf group, mothers had an average age of ( $M = 30.6$ ) years old, with a range of (22-34) years. The average length of maternal educational attainment in the deaf group was ( $M = 13.5$ ) years with a range of (12-16) years of education. In the deaf group, there were (6) male children and (2) female children. The average age of these children, while being assessed using both the MBQS and WMCI was 23 months of age. The average age of mothers in the hearing group was ( $M = 28.9$ ) years old, with a range of (23-39) years. The average length of maternal educational attainment in the hearing group was ( $M = 14.1$ ) years with a range of (12-17) years of education. In the hearing group, there were (4) male children and (4) female children. Hearing children were 3 months of age on average during maternal interviews using the WMCI and were on average 21 months of age during the implementation of the MBQS.

### *Materials*

#### *Maternal Behaviour Q-Sort (MBQS; Pederson et al., 1990)*

Maternal sensitivity was assessed using the MBQS during two-hour home observations. As previously stated, maternal sensitivity is defined as a mother's ability to perceive a signal from her infant, interpret it properly, and respond promptly and appropriately (Ainsworth et al., 1978). Sensitivity scores from the MBQS have shown robust relations with attachment security

at 12 months ( $r = .60$ ), demonstrating some concurrent and external validity of the measure (Pederson et al., 1998). The MBQS has also been demonstrated to have strong inter-observer reliability ( $r = .95$ ; Chaimongkol, Nujjaree, Flick, & Louise, 2006:  $r = .94$ ; Tarabulsy, Provost, Bordeleau, Trudel-Fitzgerald, Moran, Pederson, Trabelsi, Lemelin, & Pierce, 2009).

The MBQS measures sensitivity by correlating a quantification of mother's interaction with her child with a quantification of a prototypically sensitive interaction. During coding, a mother's interactions are described with 90 items that are characteristic of both sensitive and insensitive mothers. These 90 items include many facets of maternal behaviour including child care, maternal affect, attentiveness, interaction style, and communication. While implementing the MBQS, trained coders observe mother-child interactions and take extensive notes. After observation, coding proceeds in several steps. First, the 90 MBQS items are sorted into three piles of 30 cards each - cards that are descriptive of the mother, cards that refer to behaviours not observed, and cards that are not descriptive of the mother, respectively. Second, the three piles are then sorted into three sub-piles of ten cards, each varying according to how similar the behaviours are to the observed behaviour of the mother. When sorting is completed, each pile corresponds with a score from one (least like the mother) to nine (most like the mother), essentially producing 90 ratings of a mother's behaviour on a nine-point scale. Each observed score on a particular MBQS item is then paired with the score that a prototypically sensitive mother would receive on the same item. The paired scores are then correlated, yielding a sensitivity score. Generally, a correlation or sensitivity score of .5 or higher would be indicative of maternal sensitivity. Conversely, a correlation below .5 would be indicative of insensitivity.

Inter-rater reliability was produced by correlating both raters observations of maternal sensitivity, yielding a correlation of  $r(14) = .81$ .

*Working Model of the Child Interview (WMCI; Zeanah, Benoit, & Barton, 1986)*

Mind-mindedness was measured within select questions of the WMCI. The WMCI is a structured interview consisting of 19 questions that are intended to elicit information regarding a parents internal representation of their relationship to a specific child. Interviews take approximately 30-60 minutes to complete. In the present study, the WMCI was not used for its original purpose, rather the interview was utilized as a context for measuring maternal mind-mindedness. Maternal mind-mindedness scores derived from the WMCI are associated with maternal mind-minded comments during a naturalistic interaction ( $r = .39, p < .01$ ), demonstrating the appropriateness of using the WMCI for the exploration of mind-mindedness (Rosenblum, McDonough, Sameroff, & Muzik, 2008). Mothers in the hearing group were interviewed using the standard WMCI, while mothers in the deaf group were interviewed using an adapted version of the WMCI. The adapted interview is almost identical to the original version of the WMCI except that certain questions have been tailored to the unique population being interviewed. Within the two WMCI's, only two questions were coded for maternal mind-mindedness. These two questions were selected for the coding of mind-mindedness because (1) they were exactly the same for both the deaf and hearing group and (2) both questions provided an opportunity for each mother to talk about the mind of their child. The two questions deemed appropriate for the exploration of maternal mind-mindedness were: (1) What about when he/she becomes emotionally upset? Can you recall a specific example (or tell me about a time when

your child was emotionally upset [e.g., sad, frightened], and (2) Tell me about when your baby/child was ill, in terms of what happened, what you did and what you felt like?

Interviews from the hearing and deaf samples were transcribed verbatim and mind-mindedness was coded in accordance with the standard coding system (Meins, & Fernyhough, 2010). Mind-mindedness is defined as the ability of a mother to view her infant as an individual with a mind rather than a physical entity with needs to be met (Meins, 1997). The coding manual describes how mind-mindedness can be coded within interviews and defines mind-related comments as any comment that: (a) uses an explicit internal state term to comment on what the infant may be thinking, experiencing, or feeling; or (b) 'puts words into the infant's mouth with the caregiver talking on the infant's behalf (e.g. "That's a giraffe, Mummy"). Repetitions of specific mentalistic comments mentioned during interviews were not coded separately, rather each comment mentioned is coded once. Once all coding was completed, a mothers overall score for mind-mindedness was expressed as her ratio of mental-to-total comments made during her interview. Threats to reliability and validity were combatted with the implementation of a second coder for the purpose of inter-rater reliability. Inter-rater reliability was produced by correlating both raters overall categorizations of comments, yielding a correlation of  $r(14) = .70, ns$ .

### *Procedure*

Hearing mothers of hearing children were interviewed using the original WMCI when their child was three months old. Hearing mothers of deaf children were interviewed using the adapted version of the WMCI when their children were on average 23 months of age. Mothers were not told about the researcher's interest in maternal mind-mindedness and mental state talk

and were encouraged to speak freely and honestly. All interviews were audio recorded and transcribed verbatim. Interviews were then coded using the Mind-Mindedness Coding Manual, Version 2.0 (Meins & Fernyhough, 2010) and its associated procedures. Two researchers were implemented in the coding process to acquire a measure of inter-rater reliability. Next, each mother-child dyad from both groups were observed during a two hour in-home free play situation where age appropriate toys were provided by researchers. These in home observations were performed while children in the deaf group were, on average, 23 months old and 21 months old in the hearing group. Two observers were implemented during this process and extensive notes were taken during these in-home visits for coding purposes. Mothers were told that the researchers were interested in how they interacted and communicated with their child and were asked to interact with their children as normally as possible. Researchers then coded the in-home interactions using the previously described MBQS sorting procedure. Two coders were involved in this process so that inter-rater reliability could be assessed. Both coders then correlated the mothers observed behaviours with that of a prototypically sensitive mother using data software to yield a mothers overall sensitivity score.

## **Results**

All of the data collected from the present study were analyzed using *t*-tests. Results for maternal sensitivity and maternal mind-mindedness are presented in two sections, respectively. As previously stated, the present investigation concerned two research questions. First, do mothers of deaf children differ from mothers of hearing children in their sensitivity to infant signals? In order to answer this first research question, an independent samples *t*-test was conducted using

the correlations between a mothers demonstrated behaviour and that of a prototypically sensitive mother as the dependent variable for both the hearing and deaf group. The second research question, pertaining to maternal mind-mindedness was: (2) Do mothers of deaf children exhibit less of a propensity to think about their child's mind? Similarly, in order to answer this question, an independent samples *t*-test was conducted using the ratio of mental-to-total comments made during maternal interviews as the dependent variable between both the hearing and deaf group.

#### *Maternal Sensitivity*

No predictions were made regarding differences in maternal sensitivity between the deaf and hearing groups. An independent groups *t*-test indicated that hearing mothers of hearing children ( $M = .24$ ,  $SD = .65$ ) did not differ significantly from hearing mothers of hearing children ( $M = .63$ ,  $SD = .48$ ) in terms of sensitivity,  $t(14) = -1.35$ , *ns*, suggesting that child deafness does not facilitate insensitive caregiving in hearing mothers.

#### *Maternal Mind-Mindedness*

A primary question of the present study was whether or not child deafness would impede a hearing mothers ability to think about the mind of her child. The hearing group had a slightly higher mean mind-mindedness score - the proportion of mind-related comments to total comments - ( $M = .28$ ,  $SD = .20$ ) as compared to the deaf group ( $M = .32$ ,  $SD = .14$ ). Nevertheless, an independent means *t*-test revealed that this difference was not significant,  $t(14) = .544$ , *ns*, suggesting that child deafness does not negatively influence maternal mind-mindedness.



## Discussion

The present study was conducted as an exploration of the potential differences and similarities between hearing mothers of hearing children (*hearing group*) and hearing mothers of deaf children (*deaf group*). Specifically, the present study focused on potential intergroup differences regarding two constructs: (a) maternal sensitivity and (b) maternal mind-mindedness. Discussion of results will begin with maternal sensitivity and then proceed to a discussion of maternal mind-mindedness. The methodological limitations of the present study will then be identified, followed by a discussion of the potential implications of the current research findings.

### *Maternal Sensitivity*

The present study was an attempt at disambiguating the existing literature regarding the association between child deafness and maternal sensitivity. Some research has discovered that hearing parents of deaf children, upon hearing about their child's diagnosis, display similar behaviours to that of Kubler-Ross's (1969) model of grief when informed of their child's deafness. It has also been found that during observations of dyadic interactions, some hearing mothers of deaf children will comfort their child by voice and fail to implement another form of communication (i.e., sign language), a behaviour that would be described as insensitive (Lederberg & Prezbindowski, 2000). Direct evidence regarding differences in maternal sensitivity has been provided by an investigation by Meadow-Orlans and Steinberg (1993). In this investigation, hearing mothers of deaf children ( $n = 20$ ) were observed to be less sensitive than hearing mothers of hearing children ( $n = 20$ ). Mothers of deaf children were also found to be more controlling, and intrusive during a free play session (Meadow-Orlans et al., 1993). Thus,

some evidence suggests hearing mothers of deaf children may be less sensitive than hearing mothers of hearing children.

Conversely, some research findings have been more ambiguous regarding the association between child deafness and maternal sensitivity. Lederberg and Mobley (1990) compared 41 hearing mothers of hearing children to 41 hearing mothers of deaf children and found no significant intergroup differences regarding maternal sensitivity. Researchers did find intergroup differences regarding communication however and found that deaf children terminated interactions with their hearing mothers more often than hearing children, as a result of not being able to hear or see their caregivers. This biological incongruity inevitably resulted in hearing mother-deaf child dyads spending significantly less time communicating with one another compared to hearing dyads. These results demonstrate the ambiguity in the literature regarding the association between child deafness and maternal sensitivity.

Thus, the goal of the present investigation was to provide additional confirmatory or disconfirmatory evidence for differences in maternal sensitivity between mothers of deaf children and mothers of hearing children. Maternal sensitivity was measured using the MBQS and maternal behaviour was assessed during two-hour in home dyadic interactions. Analyses revealed no significant intergroup differences regarding maternal sensitivity, indicating that child deafness may not promote insensitive caregiving. It seems as though some hearing mothers are able to adapt to their deaf child's needs during early development and respond to them in a sensitive manner. This maternal adaptivity has also been found in mothers of children who are neurologically and physically impaired (Vaughn, Lefever, Seifer, & Barglow, 1989; Wasserman,

Thompson, Wilimas, & Fairclough 1987). The results of the present study, coupled with these findings of maternal adaptability, suggest that mothers are more influential in determining the quality of caregiver-child relationships than are children. It seems as though child deafness does not automatically facilitate insensitive mothering, at least relative to mothers of hearing children.

It was previously discussed how researchers have discovered communicative breakdowns in hearing mother-deaf child dyads, with deaf children terminating interactions more often as a result of the biological incongruity between the dyad. In regards to child deafness, it would be fair to assume that maternal adaptability focuses around providing the child with an increase in contact and visual comfort. In fact, studies have shown that some hearing mothers of deaf children adapt to their child by increasing their exposure to visual stimuli and methods of communication (i.e., sign and body language) (Koester, 1995). This maternal adaptability may account for the nonsignificant intergroup differences found in the present study regarding maternal sensitivity. It should be cautioned however that the present study only explored maternal sensitivity in hearing mothers of deaf children who knew their child was deaf. It could be argued that this awareness gave mothers previous experience adapting to their child's deafness prior to the study, which may have increased their ability to respond sensitively to their child's needs during participation. It would seem natural to assume that results of the present study may have been different if mothers were not aware of their child's hearing impairment. Mothers who are not sensitive enough to notice their child's deafness and unresponsiveness to vocalizations would probably be identified as insensitive during dyadic interactions.

In summary, the present study found that child deafness is not associated with maternal insensitivity. It seems as though caregivers and their ability to adapt to their child's needs is the most influential aspect of maternal sensitivity and the caregiver-child relationship. Thus, evidence from the present investigation supports the idea that child deafness is not associated with decreased maternal sensitivity as compared to hearing populations.

### *Maternal Mind-Mindedness*

The present study compared the mind-mindedness of hearing mothers of deaf children to that of hearing mothers of hearing children. It was hypothesized that hearing mothers of deaf children would exhibit less of a propensity to discuss the mind of their child compared to that of hearing mothers of hearing children. As impetus for the present investigation, two previously conducted studies provided support for the idea that mothers of deaf children might exhibit less mind-mindedness. First, there is a link between maternal mind-related comments, indicative of a mother's propensity to think about the mind of her child, and children's later understanding of the mind and mentalistic topics (Meins et al., 2002). It was then suggested that the biological incongruity between hearing mothers and their deaf children may impact these children's exposure to mental concepts by their caregivers if spoken word was the primary means of communication. This suggestion was supported when deaf children of hearing parents were found to demonstrate slight delays in their TOM abilities compared to hearing children of hearing parents (Peterson & Siegel, 2000), suggesting that their mothers might be less mind-minded.

Another reason for why hearing mothers of deaf children may be less mind-minded may be the difficulty interpreting in the thoughts, feelings, and emotions of a deaf child compared to that of a hearing child. Research has demonstrated a lack of communication between hearing mothers and their deaf children which may worsen as children grow older and presumably learn sign language, a form of communication that is unfamiliar to hearing mothers (Lederberg & Mobley, 1990). Impoverished communications within the relationship may make the child's mind difficult to read, and therefore, a mother of a deaf child may exhibit lower mind-mindedness. Therefore, previous investigations seemed to suggest that mothers of deaf children would be less mind-minded.

Nevertheless, the present study's hypothesis - that mothers in the deaf group would exhibit lower levels of mind-mindedness - was not supported. Thus, evidence suggests that child deafness does not disrupt a hearing mother's ability to think about the mind of her child. If hearing mothers do not learn sign language to the extent of fluency, they will be unable to expose their deaf child to abstract and conceptual concepts such as the mind. Lack of exposure to capable and fluent conversation partners may account for the demonstrated delay in TOM abilities of deaf children, not a lack of maternal mind-mindedness. In support of this contention, evidence suggests that children need exposure to mentalistic concepts, and once exposed need to engage in rich conversations about these topics in order to make internal connections between people's feelings, thoughts, and beliefs (Dunn & Brophy, 2005). In other words, hearing mothers of deaf children may think about the mind of their children, but may be unable to expose them to mentalistic concepts via sign language.

In summary, the present study found that child deafness does not impede a mothers propensity to think about the mind of her child, relative to mothers with hearing children. Results demonstrate that maternal mind-mindedness cannot account for deaf children's decreased TOM abilities, rather the problem may be one of quality versus accessibility regarding mentalistic exposure.

#### *Limitations and Implications for Future Research*

While interpreting the results of the present study, it should be acknowledge that certain methodological limitations exist. Although researchers attempted to select a diverse group of participants, participation was voluntary, and the sample consisted of low-risk, middle-class dyads. Participating mothers may have been more sensitive and mind-minded than other populations. Differences between mothers of deaf children and mothers of hearing children may be more evident in circumstances where there are less resources and support for the dyad. Moreover, due to the difficulties of studying a unique population, the sample size of the current study was fairly small. With this in mind, the results of the current study should be interpreted with caution as results may not be generalizable to all populations and circumstances.

A second limitation of the present study involves the age of children during maternal interviews. In both groups, mothers were interviewed while their children were 3 months of age in the hearing group, and 23 months of age in the deaf group. It could be argued that mothers with older children may have more experience raising their children and thus may be more likely to produce comments about their child's mind. Meins et al. (2002) stated that maternal mind-mindedness is influenced by a mothers' ability to view her child as a '*thinking being*'. The

biological immaturity of children during maternal interviews may have influenced maternal mind-mindedness. The young children used in this study, and their limited abilities in cognition and language may have been less likely to be viewed as *thinking being's* by mothers. At such a young age, a mother's interaction with her child may be more focused on meeting her child's physical needs and ensuring his or her safety. This maternal focus on behavioral and physical dimensions rather than mental needs during the first few months of a child's life may have limited mothers' propensity to view and describe their infant in mind-related comments during interviews.

The methodological limitations of the present study reveal an opportunity for future researchers and their ability to increase the efficacy of their studies. In future studies, participants should be closely matched on certain familial variables such as number of siblings and social class. The quality of a caregiver-child relationship can be influenced by variables that exist outside of the immediate dyadic relationship. These external factors may influence the quality of a caregiver-child relationship even more so than any specific characteristics or qualities of the child. For instance, it could be argued that factors exist outside of maternal and child hearing status' that may influence a mothers propensity to think about the mind of her infant (i.e., age, gender, social class, race, education). This inherent complexity involved in familial research makes it very difficult for researchers to make statements of causality. Carefully matching controls will allow future researchers to identify whether or not child deafness influences maternal sensitivity and mind-mindedness without the influence of extraneous variables. Future researchers can also use the results of the present study in order to increase the breadth of their

statistical implications. Future research should attempt to identify some precursors of maternal mind-mindedness that may predate the birth of a child. It has been discovered that a mother's ability and propensity to describe her future child during pregnancy is associated with later mind-related comments when the child is six months old (Arnott & Meins, 2008). As previously discussed, there is a connection between maternal mind-related comments and children's later understanding of the mind and mind-related concepts (Meins et al., 2002). When a mother speaks with her child about mind-related topics, she exposes her child to mind-related language which can increase the child's Theory of Mind (TOM) understanding. Acknowledging this connection, it would be interesting to conduct a study exploring the potential link between a mother's willingness to learn sign language and her degree of mind-mindedness. Hearing mothers of deaf children who are willing and dedicated to learning sign language may be more likely to relate to their child in mind-related terms. It could be assumed that the dedication to learn another language demonstrates the desire of certain mothers to communicate with their deaf children later in life. It could be hypothesized that mothers who desire to be fluent in sign language, and work hard to accomplish this goal, wish to communicate with their children about abstract concepts such as the mind. This desire could be assessed prenatally or early in a child's life and could potentially be used as an early indication of maternal mind-mindedness. Once researchers are able to identify some of the precursors for maternal mind-mindedness and sensitivity, they can be used to identify potential 'at-risk' parents. In this sense, future research could help provide these parents with interventions designed to increase their sensitivity and mind-mindedness and



teach them about the importance of these constructs and the significance to their child's development.

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