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Early Literacy of Kindergartners with Hearing Impairment: The Role of Mother-Child Collaborative Writing

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Abstract

The study assessed the value of maternal writing mediation in predicting children's early literacy. Thirty kindergartners with hearing impairment (HI) and their mothers participated. Mothers were videotaped at home while helping their children write words, and the children's early literacy was assessed in the kindergarten. Maternal writing mediation was analyzed in terms of its cognitive and emotional aspects. Results showed that beyond the child's age, his/her degree of hearing loss, the cognitive aspects of maternal writing mediation predicted word writing (11%), word recognition (34%), and letter knowledge (35%). Beyond the background measures, the emotional aspects of the mediation predicted word recognition (12%), letter knowledge (14%), and general knowledge (9%). Discussion focused on writing interactions as a context of early literacy development among kindergartners with HI.

Early Literacy of Kindergartners with Hearing Impairment: The Role of Mother-Child Collaborative Writing

The study examined the context of early literacy development among kindergartners with hearing impairment (HI), focusing on the role of mother-child collaborative writing. Success in acquiring literacy skills offers one of the central keys to scholastic achievement. Yet for many children with HI, reading and writing pose great difficulty (e.g., Howell & Luckner, 2003; Musselman, 2000), and progress in the literacy domain is extremely slow (Harris & Beech, 1998; Kyle & Harris, 2005; Marschark & Harris, 1996).

Studies of reading acquisition in children with HI have reported that their language skills, phonological awareness, and language comprehension in kindergarten predicted reading progress in first grade (Colin, Magnan, Ecalle, & Leybaert**,** 2004; Harris & Beech, 1998). The evidence regarding continuity in literacy achievements invites research to tease apart possible sources of these differences in early literacy among young children with HI.

Reading tasks require the same acquisition of skills, whether a child is hearing or deaf (Luetke-Stahlman & Nielsen, 2003). Research on hearing children that has examined the issue of continuity in the transition from kindergarten to school has emphasized the role of alphabetic skills and phonological awareness in kindergarten as chief predictors of decoding accuracy, reading fluency, and reading comprehension at the beginning of school (e.g., Badian, 2001; Ehri, Nunes, Willows, Yaghoub-Zadeh, & Shanahan, 2001; Stern & Goswami, 2000). Compared with the wide volume of studies on hearing children's early literacy development, only a few investigators have described the development of early literacy in young children with HI (Williams, 2004). Nevertheless, some data have indicated that beyond the language delay, which is a hallmark of hearing loss (Musselman, 2000), kindergartners with HI lag behind in alphabetic

skills like letter naming, word identification, and word writing (e.g., Mayer, 2007; Most, Aram, & Andorn, 2006) as well as in phonological awareness (e.g., Allman, 2002, Colin et al., 2004) relative to their hearing peers.

Williams (2004) reviewed the literature on early literacy in children with HI and concluded that their literacy development comprises a naturally emerging process that can parallel that of hearing children, given supportive literacy environments. However, researchers have asserted that children with HI experience less exposure than hearing children to such adult-child literacy-related interactions prior to entering school (Luetke-Stahlman, 1999; Marschark, 1993; Williams, 1994).

Observations in homes of young hearing children revealed that children are engaged in writing interactions with their parents. They pretend to write in their parents' presence; watch their parents write and ask them about what they wrote; write invitations or notes together; and so on (e.g., Baker, Fernandez-Fein, Scher, & Williams, 1998; Bissex, 1980; Harste, Woodward, & Burke, 1984). Some studies found that parent-child writing interactions are productive in predicting early literacy and later literacy achievements. DeBaryshe, Buell, and Binder (1996) observed 30 kindergartners writing a letter to someone, both alone and with their mother's assistance. They found associations between maternal scaffolding behaviors during the writing interaction and their children's writing skills and understanding of writing conventions. Aram and Levin (2001) videotaped 40 mothers and their kindergartners at home while performing writing tasks. Analysis of the interactions revealed that the quality of maternal writing mediation predicted kindergartners' early literacy (word writing, word recognition, and phonological awareness) even after controlling for sociocultural measures (SES, maternal literacy, home literacy environment). A follow-up study (Aram & Levin, 2004) assessing the participants 2½

years later found that the earlier measure of maternal writing mediation in kindergarten predicted these second-graders' spelling, reading comprehension, and language beyond SES and their early literacy measures assessed in kindergarten. In the same manner, Sénéchal, LeFevre, Thomas, and Daley (1998) found that the amount of parent-child writing interactions was related to kindergartners' (N = 110) early literacy (concepts about book reading, alphabet knowledge, early reading, and invented spelling) and predicted their word reading achievements at the end of first grade (N = 47).

To the best of our knowledge, no study has yet explored the relations between parent-child writing interactions and early literacy among young children with HI. There are, though, a few descriptive studies that have examined the early writing experiences of young children with HI at home with their parents. Ruiz (1995) followed her own deaf daughter's early writing development. She analyzed Elena's drawing and writing papers created in the home from ages 3 to 7 years. Elena experienced writing frequently at home and Ruiz found that many of Elena's hypotheses about English orthography were similar to those of hearing children. For example, Elena's name was her first known word or "stable string." Also, like hearing children, she demonstrated her understanding that there should be correspondence between the size of the referent and the written word, and she presented smaller objects with fewer letters than a larger object. Williams (1994) followed three profoundly deaf children (ages 3.11 to 5.10) for six months, within their kindergarten classrooms and in their homes. She documented the early literacy activities in each context. Williams indicated that the children were immersed in literacy activities both in their homes (supported by their parents) and at school (supported by their teachers). They engaged in drawing and writing activities on a regular basis. Her results indicated that the children learned to use written language as a primary form of communication.

When they faced difficulties expressing themselves, they used drawing and writing to communicate with both peers and adults. Studies that followed the writing development of children with HI in educational settings demonstrated that their movement through developmental steps in spelling paralleled that of hearing students (Mayer & Moskos, 1998; Williams, 2004).

The aim of the current study is to examine the unique contribution of the mother's writing mediation nature to her child's early literacy skills while controlling [MAYBE – while exercising control suited to the child's …] for the child's age and degree of hearing loss. The nature of joint writing as a challenging literacy task reflects cognitive and emotional mediation characteristics. The cognitive ones (e.g., teaching the child how to retrieve a letter by name) contain a proximity to the basic skills of letter knowledge and grapheme-phoneme mapping (Aram, 2002), while the emotional ones (e.g., creating a warm atmosphere) are more communicational in their nature and are also prevalent in other parent-child task-oriented interactions (e.g., Gonzalez, 1996). As to children's early literacy skills, studies of parent-child literacy interactions have typically associated the quantity and the quality of the interactions with a variety of language and alphabetic skills measurements (for a review, see Scarborough & Dobrich, 1994). In the present study, it was expected that maternal mediation measures would be related to all children's early literacy skills (alphabetic skills and language measures). Furthermore, it was expected that, cognitive aspects of the mediation would contribute to the basic alphabetic skills measures while emotional ones would contribute to all the early literacy measures (alphabetic skill and language measures), over and above the contribution of the child's age and degree of hearing loss. המשפט, איך שהוא היה, היה מאוד מגושם ולא ברור – אני מקוה שהשינוי לא שינה את מה שרציתן להגיד.

Method

Participants

The sample included 30 kindergartners with prelingual HI (14 boys and 16 girls) and their mothers with normal hearing. They were recruited from the Tel Aviv branch of the MICHA Society for Deaf Children, a national early intervention agency that provides educational and rehabilitation services to young children (ages 0-7 years) with HI and to their families. Ages of the children in this study ranged from 62 to 84 months (M = 72; SD = 7.6). The sample included all the children with HI who, at the time of the study, were living in central Israel (comprising about 41% of the total Israeli population) and who met the following criteria: The child with HI was about to start first grade in the following school year, had hearing parents, and had no other developmental, physical, behavioral, or emotional problems except for the hearing loss. Children's degree of hearing loss was determined on the basis of the pure tone average of 500, 1000, 2000 Hz in the better ear. One child (3.3%) had hearing loss below 40 dBHL, 13 children (43.3%) had hearing loss between 40 and 70 dBHL, 4 children (13.3%) had hearing loss between 70 and 90 dBHL, and 12 children (40%) were profoundly deaf (over 90 dBHL). All the children used sensory aids: 19 children (63.3%) used hearing aids, and 11 children (36.7%) used cochlear implants. Regarding mode of communication, 23 children used spoken language and 7 used simultaneous communication (spoken language and signs). The age of onset for therapy was between 19 and 38 months. Families came from middle socioeconomic strata. The mothers' education ranged from 10 to 20 years (M = 14.30 years; SD = 2.51). 40% of the mothers had at least a bachelor’s degree, which is around the average of their Israeli cohorts, where 45% were university or college graduates (The Israel Statistical Annual, 2006).

Measures

Parents completed a demographic questionnaire including data on child's birth, child's degree of hearing loss, type of sensory aid, mode of communication, presence of other difficulties, and parents' hearing status and education. Mothers were videotaped guiding their children at home in a writing task. Children's early literacy was assessed in the children's kindergartens.

Mother-Child Writing Mediation Measures

The mother and the child were presented with four cards, each of which displayed identifying drawings for two nouns (e.g., 'cucumber – carrot'). The sequence of the card presentation was random. Four blank cards were given to the child, who was then asked to write the name of each object pair pictured on a separate card. The mother was asked to help her child and no additional instructions were given. If a mother asked for the examiner's instructions or clarifications, such as "Can I do it this way?" the reply was: "You can do whatever you think is right, in whatever way you feel is appropriate." The videotapes were transcribed and analyzed according to the cognitive, emotional and physical contact measures of the interaction developed by Aram (2002) and Aram and Levin (2001, 2004). .

Cognitive Measures

Grapho-phonemic mediation. This scale reflected the degree to which the mother communicated the steps in the process of word encoding, encouraged the child to carry out those steps, and provided scaffolding. The earlier the step in the grapho-phonemic process that the mother mediated to her child, the higher was the score on *grapho-phonemic mediation*. The encoding of each letter was assessed on a 6-point scale: (1) mother refers to the word as a whole; (2) mother utters the sequence of sounds that create the word; (3) mother segments the word into its letters; (4) mother retrieves a phonological unit and immediately dictates the required letter

name; (5) mother retrieves a phonological unit and encourages the child to link it with a letter name; and (6) mother encourages the child to retrieve a phonological unit and to link it with a letter name. The averaged scores across the 30 letters yielded the *grapho-phonemic mediation* score. Reliability across the letters: Cronbach $\alpha =$ was .98.

Printing mediation assessed the autonomy allowed or encouraged by the mother in the printing of each letter on a 5-point scale: (1) mother writes the letter on her own; (2) mother writes the letter holding the child's hand; (3) mother writes and child copies the letter; (4) mother scaffolds the child in writing the letter; (5) child writes the letter independently, encouraged by mother. The average score across the 30 letters yielded the *printing mediation* score. Higher score indicated more autonomy encouraged by the mother in printing the letters. Reliability across the letters: Cronbach $\alpha =$ was .98.

Degree of precision demanded assessed the amount of precision the mother demanded from the child in shaping the letters for each word on a 5-point scale: (0) no demand at all; (1) low demand, that is, the mother hardly refers to the outcome; (2) medium demand, that is, the mother tries to make the child produce the proper letter in the proper position, but if the child has difficulties she compromises and accepts a less conventional product; (3) higher demand, that is, the mother requires corrections; (4) the mother demands words that are written absolutely formally. The average score across the 8 words served as the *demand of precision* score. Reliability across words: Cronbach α = .83.

Task perception assessed how the mother perceived her role as a mediator. Task perception was rated as “separate” (score = 1) if the mother viewed the task as her own, and thus was very dominant in the interaction and left little space for the child to contribute. It was rated as “interactive” (score = 2) if the mother mediating strategy involved the child, if the mother

asked questions and left space for the child to contribute. Maternal *task perception* was assessed during the writing of each word and the average across the 8 words served as the *task perception* score. Reliability across words: Cronbach α = .96.

Reference to orthography included maternal references to two aspects of Hebrew orthography: morpho-phonology and medial/final letters. Maternal mediation on morpho-phonology was scored for each word that allowed reference to the number-gender structure, which is highly salient in Hebrew morphology. Maternal mediation on medial/final letters was scored on each word that required a final letter form. Five of the Hebrew letters have two written forms, medial and final, the latter used only in the last position of a word. The same 3-point scale was used for morpho-phonology and for medial/final letters: (0) no reference; (1) reference without explanation; and (2) reference with explanation. The mean score across those words that allowed reference to orthography rules served as the *reference to orthography* score. Reliability across words: Cronbach α = .68

Emotional Measures

Atmosphere during the writing mediation of each word was assessed on a 3-point scale as follows: (1) negative ambience between the mother and the child; (2) neutral ambiance, where the observer received the impression that mother and child felt that there was a task to be done, and it would be done; or (3) warm atmosphere, where mother and child were enjoying their dyadic activity. The average across the 8 words served as the *atmosphere* measure. Reliability across words: Cronbach α = .81.

Cooperation of the child during the writing of each word was assessed on a 3-point scale as follows: (1) child shows anger and dislike; (2) child is obedient, or (3) child is enthusiastic to

write with the mother. The average across the 8 words served as the *cooperation* measure. Reliability across words: Cronbach $\alpha = .80$.

Conduct-related comments during the interaction (e.g., "“Sit still,” “Stop it”) were counted.

Physical Contact

Each physical contact between the mother and the child was counted along the interaction, and the sum of the contacts served as the *Physical contact* measure.

Children's Early Literacy Measures

In the present study, five tests were administered to evaluate the level of children‘s early literacy: word writing, word recognition, letter knowledge, phonological awareness, and general knowledge. These measures related to both alphabetic and oral language skills and are prevalent in the worldwide (e.g., Sénéchal & LeFevre, 2002) and the Israeli (e.g., Shatil, Share & Levin, 2000) literature for tapping early literacy that predicts later literacy achievements in school.

Word writing. The children were asked to write down four pairs of words. These words were different than the words that they had written at home with the help of their mothers. The words were presented orally, accompanied by four cards, each of which displayed illustrations of two nouns. The four pairs of words fell into two groups: in one group, the longer sounding word in each pair denoted a smaller referent (e.g., ‘elephant – ant’ pronounced in Hebrew *pil nemala*; written PIL-NMLH); in the second, the two words in each pair differed in their phonological length but did not differ clearly in the size of their referents (‘pen – pencil’ pronounced in Hebrew *et – iparon*; written ET - IPRON). Each written word was scored on a 14-point scale adapted from Levin, Share, and Shatil (1996), ranging from pseudo letters through random letters, basic consonantal spellings, partial consonantal spellings, to formal writing. Figure 1

presents examples of the children's writing products on a range of levels. The mean score across the eight words served as the *word writing* score (reliability across words: Cronbach α = .96).

Insert Figure 1 about here

Word recognition. Recognition of the same four pairs of words (described above) was assessed by asking the child to match two oral words illustrated by drawings to two printed words, presented on cards, and to explain his/her recognition ("Why do you think that this word is X and this word is Y?"). Word recognition was assessed for each pair on a 4-point scale: (1) pre-alphabetic explanation (e.g.," Because I know," "I guessed"); (2) rudimentary incorrect alphabetic explanation - The explanation refers to characteristics relevant to writing by noting letter names or phonological length, but applying them erroneously (e.g., the child pointed to the letter P in the word 'elephant' PIL and said: "This is the word 'ant' NMLH because you need the letter G in the word NMLH"); (3) partial alphabetic - providing a correct letter name, but deriving the conclusion that it should be a word that actually is not spelled with that letter (e.g., the child pointed to the letter P in the word 'elephant' PIL and said: "This is the word 'ant' NMLH because you need the letter P in the word NMLH"); (4) correct alphabetic explanation - naming a letter correctly and deriving the correct conclusion as to the written word (e.g., the child pointed to the letter P in the word 'elephant' PIL and said: "This is the word PIL because you need the letter P in the word PIL"). The mean score across the eight words served as the *word recognition* score. Reliability across the words: Cronbach $\alpha =$ was .92.

Letter knowledge. Children were asked to name 12 printed letters, each presented on a separate card in large print. Within the Hebrew alphabet's 22 letters, the 12 that were chosen for the present study were among the easiest to recognize for children in the 3 to 5 year age range

(Levin, Patel, Margalit, & Barad, 2002). The sum of the correctly named letters served as the *letter knowledge* score (reliability across the letters: Cronbach $\alpha =$ was .91).

Phonological awareness assessed children's ability to recognize word's initial and final syllable or phonemes. It was developed for the purpose of the current study. Its structure resembles that of the phonological awareness Individual Growth and Development Indicator from Get it Got it Go! (Center for Early Education and Development, 2005). Children were asked to look at a card that included one target stimulus and three sample pictures. All four pictures were named by the examiner. Then the child was asked to point to the one sample picture that began or ended with the same syllable/phoneme as the target. The test included 20 stimulus words: 5 alliterations, 5 initial phonemes, 5 rhyming, and 5 last phonemes. For the 5 alliteration stimulus words, the child was asked to point to the one sample picture (e.g., *kapit*, spoon) that began with the same syllable as the target (e.g., *kadur*, ball). For the 5 initial phoneme stimulus words, the child was asked to point to the one sample picture (e.g., *tinok*, baby) that began with the same phoneme as the target (e.g., *tapuach*, apple). For the 5 rhyming stimulus words, the child was asked to point to the one sample picture (e.g., *beitsa*, egg)) that ended with the same syllable as the target (e.g., *hultsa*, shirt). For the 5 last phoneme stimulus words, the child was asked to point to the one sample picture (e.g., *naal*, shoe) that ended with the same phoneme as the target (e.g., *degel*, flag). The 80 words for the test were chosen in consultation with four teachers of children with HI. The sample words on each card did not include words that were either lexically or phonologically close to the target word. The sum of the child's correct responses served as the phonological awareness measure (Cronbach $\alpha = .73$).

General knowledge. We used the general knowledge subscale of the Wechsler Preschool and Primary Scale of Intelligence (WPPSI) adapted to Hebrew (Liblich, 1979). According to

standardized procedures, each item could be scored 0 (wrong answer) or 1 (correct answer), yielding a maximal score of 23. The sum of correct responses served as the *general knowledge* score.

Procedure

Data collection took place in February and lasted for about 1½ months. Three examiners (MA students majoring in counseling and education of deaf children) collected the data both in kindergartens and homes. Videotaped data on maternal writing mediation were collected during the afternoon in a quiet room in the children's homes . Only the mother, the child and the examiner were present in the room at the time of the videotaping. The duration of the mother-child interaction ranged from 4:48 to 29:42 minutes (M = 12:32, SD = 5:70).

The examiners underwent training in analyzing and coding the videos in a seminar for graduate students by the first author. Inter-judge reliability of the three raters, computed for scoring all the mediation measures for 4 randomly selected children each (2 boys and 2 girls) showed a highly significant Kappa of .92. Then, each interaction was coded independently by two of these examiners, who discussed any discrepancy until reaching agreement. The three examiners assessed the children's early literacy individually in a quiet room in the kindergartens during two sessions of about 20 minutes each. The child's literacy was assessed approximately a week prior to the time he/she was videotaped writing with his/her mother at home. The assessments took place in the morning, and either the teacher or the kindergarten's speech therapist was present during the assessment to ensure that the child understood the examiner's instructions. The literacy assessment tasks were divided into two sessions of fixed sequence sets to ease the load on the children. One of the session included: word writing of two word pairs; either the final sound or initial sound part of the phonological awareness task; the general

knowledge subscale of the WPPSI; and word recognition of two word pairs; the other session included: word writing of two word pairs; either the final sound or initial sound part of the phonological awareness task;, letter knowledge, and word recognition of two word pairs. Half of the sample group completed set one during the first session and set two during the second session, and the other half of the sample group completed the sets in the reverse order..

Results

The aim of the research was to explore the unique contribution of writing interaction beyond background measures. In order to explore these relations, the correlations between both the interaction and the background measures and the children's literacy measures were calculated. Following this, two-step hierarchical regression analyses were administered. During the first step, the background measures were entered and their contribution to the children's literacy was assessed. During the second step, the interaction measures were entered and their contribution to the children's literacy beyond that of the background measures was assessed.

The results are presented in three parts. The first part presents the descriptive statistics (range, mean and standard deviation) for all the writing mediation and early literacy measures. The second part presents the correlations between the writing mediation and the background measures with the child’s early literacy measures. The third part presents the results of the two-steps hierarchical regression analyses (described above).

Table 1 presents the descriptive statistics of maternal writing mediation. Mothers usually dictated the letter names (*grapho-phonemic mediation*, $M = 3.38$) and helped the children in retrieving the letter shape (*printing mediation*, $M = 3.80$). On average, mothers expected a proper outcome, but when the children had difficulties they accepted a less conventional product (*demand for precision*, $M = 2.76$). On average, mothers’ *task perception* was less of a dyadic

nature (*M* = 1.40), and they only partly referred to the Hebrew orthography (*M* = 1.56). The high mean scores on *atmosphere* (*M* = 2.68) and *cooperation* (*M* = 2.79) indicated the typically positive tone between the mothers and children throughout the interactions.

Table 1 also presents the statistics for the early literacy measures. On *word writing*, the mean score of 8.09 reflected the frequent use of random letters and basic consonantal representation when trying to write a word. In *word recognition*, the mean score of 2.33 showed that the children used rudimentary alphabetic explanations to a large degree when trying to read words. In *letter knowledge*, the mean score of 7.47 was low, considering that fact that only the easier 12 out of 22 Hebrew letters were used. In *phonological awareness*, the mean of 9.70 showed that the children in the sample mostly referred to syllables rather than phonemes. On *general knowledge*, the mean score was 10.67 lower than the Israeli norm (16) for the age of 72 months (Liblich, 1979).

Insert Table 1 about here

Table 2 presents the correlations between the maternal writing mediation and the background measures with the children's early literacy measures. The cognitive mediation measures correlated positively and significantly with *word writing, word recognition,* and *letter knowledge* (with the exception of *reference to orthography* and *word writing*). The emotional mediation measures correlated significantly with the early literacy measures, though less consistently. Neither the cognitive nor the emotional mediation measures correlated with *phonological awareness*, and the emotional measures did not correlate with *word writing.* The correlations between *physical contact* as well as *conduct-related comments* and the literacy measures were significant and negative. Interestingly, only the emotional mediation measures (with the exception of *cooperation*) correlated significantly with *general knowledge*.

With regard to the child's background measures, children's ages correlated positively with all children's early literacy (except for phonological awareness) and the children's levels of hearing loss correlated negatively with their level of general knowledge.

Insert Table 2 about here

To examine the link between maternal mediation (cognitive and emotional) and children's early literacy beyond the effect of background measures, hierarchical regression analyses were conducted. in order to reduce the model, the mediation measures were combined into two factors: The "*cognitive mediation*" factor was calculated as the mean *Z* score of *grapho-phonemic mediation, printing mediation, demand for precision, task perception,* and *reference to orthography* (reliability of $\alpha = .83$). The "*emotional mediation*" factor was calculated as the mean *Z* score of *atmosphere, cooperation,* and *conduct-related comments* (reversed) (reliability of $\alpha = .84$). Then, separate fixed-order hierarchical regression analyses were conducted with *child's age,* and *child's degree of hearing loss* in the first step and, alternatively, with *cognitive mediation* or *emotional mediation* in the second step (see Table 3). The criterion variables were each of the early literacy measures.

Insert Table 3 about here

The background measures (step1) contributed significant amounts of variance to the following early literacy measures: *word writing* (26%), *word recognition* (19%), *letter knowledge* (24%), and *general knowledge* (24%). After partialling out the background measures, maternal *cognitive mediation* (step 2a) added significant amounts of variance to *word writing* (11%), *word recognition* (34%), and *letter knowledge* (35%) and a marginally significant amount of variance to *general knowledge* (6%). After partialling out the background measures, maternal *emotional mediation* (step 2b) added significant amounts of variance to *word recognition* (12%)

and *letter knowledge* (14%) and a marginally significant amount of variance to *general knowledge* (9%).

Discussion

There is an extensive body of research that connects parent-child literacy interactions to early literacy among hearing children and acknowledges the importance of these early experiences to children's later literacy development (e.g., Wasik & Herrmann, 2004). Yet studies regarding these issues among children with HI are rather sparse (Williams, 2004). The present study addressed this deficit by exploring the contribution of maternal writing mediation to the early literacy of kindergartners with HI. Mothers were videotaped while helping their children with HI write words at home, and the children's' literacy was assessed in their kindergartens. Findings indicated that both the cognitive and the emotional facets of maternal writing mediation predicted children's early literacy even beyond the child's age and his/her degree of hearing loss.

The results of the present study suggest that mother-child writing interactions may comprise an early literacy context with potential to enhance early literacy in general and alphabetic skills in particular among children with HI. The relationships between the cognitive aspects of maternal mediation and children's literacy beyond the child's age and his/her degree of hearing loss are reasonable. The cognitive aspects of writing mediation reflect the mother's guidance of her child through the process of encoding the word. They mirror the ways in which the mother helps her child be an active participator in the process of segmenting the word, mapping a segment to a letter name, retrieving the letter's shape, and printing it. The results of the present study are consistent with previous studies among hearing children, which showed significant relations between maternal writing mediation and children's alphabetic skills (e.g., Aram, 2007; Sénéchal et al., 1998).

Musselman (2000) claimed that understanding the acquisition of literacy by deaf children requires consideration of a multitude of factors. In line with this suggestion, the present study draws attention from language to an additional aspect of reading acquisition, the alphabetic skills (word writing, word recognition, and letter knowledge). Alphabetic skills have been repeatedly found to predict reading and writing acquisition in school (see, for example, Adams, 1991; Aram, 2005; Muter, Hulme, Snowling, & Taylor, 1997; Shatil, et al., Levin, 2000). The intense relations between the cognitive aspects of writing mediation and children's alphabetic skills deserve acknowledgement. Parents of children with HI are encouraged to become involved in linguistic interactions with their children (Jackson & Turnbull, 2004), and the results of the present study draw attention to the benefits of joint writing interactions. Since writing interaction is not as dependent upon oral representation as is reading interaction, and consequently, is less dependent upon normal hearing functioning, it is believed that this type of interaction is especially suitable for use by parents of children with HI, and might be even be very beneficial to them.

The emotional mediation measures also contributed beyond the background measures to the children's early literacy skills, though less consistently and to a lesser degree compared to the cognitive ones. A similar trend of relations was found for hearing children (Aram, 2007). The emotional mediation characteristics may be molded by the mother's previous experiences with her child (Deater-Deckard & Petrill, 2004). These emotional aspects of the interactions hold considerable importance for children's development because they largely predict the security, confidence, and trust between the child and his/her mother (Shonkoff & Phillips, 2002). As such, these aspects of the interaction are more general and may be related to the child's development in

a more general way. Indeed, in the present study all of the emotional mediation measures (except *cooperation*) were correlated with general knowledge.

Two emotional aspects of the interaction, *conduct-related comments* and *physical contact*, showed consistent significant negative relations with the early literacy measures. The negative relations between *conduct-related comments* and literacy skills are understandable, but the negative relations between *physical contact* and the children's literacy raise questions. Physical contact is typically interpreted in the literature of parent-child interaction as supportive and affective behaviors (e.g., Hertenstein, 2002). However, it can also be perceived as either intrusive or organizing in a teaching situation. As such, intensive physical contact in a teaching context may limit the child's initiative and encourage dependency. Regarding children with HI, parents tend to touch their children frequently in order to get their attention. Maybe this common behavior was overused in a teaching interaction like joint writing and therefore was negatively correlated with the children's literacy skills.

In the present study, none of the maternal writing mediation measures explained variance in the children's *phonological awareness*. Phonological awareness is regarded as a central component in reading acquisition (e.g., Dixon, Stuart, & Masterson, 2002; Ehri et al., 2001). For hearing children, writing mediation has consistently been related to phonological awareness (e.g., Sénéchal et al., 1998). As to children with HI, some evidence suggests that they use phonological encoding even if their speech is poor (Hanson, Goodell, & Perfetti, 1991). Leybaert (1993) reported that deaf children, like hearing children, were able to pronounce pseudo words and were more accurate in reading regular than irregular words. Other researchers did not find a relation between phonological awareness and reading achievement among deaf children (Kelly, 1993; Waters & Doehring, 1990). In the present study, the children's independent word writing

(see Figure 1) revealed the hearing difficulties that they faced. Even when their writing was relatively advanced, attempting to represent some of the appropriate sounds, children exhibited phonological errors such as replacing /b/ 'ב' for /p/ 'פ'. These two sounds share the same features except for voicing and thus pose difficulty for many children with HI to discriminate between them (Kishon-Rabin et al., 2002) (see Figure 1, examples of Itay and Ma'ayan). While writing words with their children, the mothers in the present study probably used some phonological decoding – they had to segment the word into its components; yet, they relied more on the letter names than on the sounds of the segments. It seems that the mothers, who were all hearing, did not ascribe advanced phonological awareness skills to their children, and their mediation was significantly related to letter knowledge.

This study has several limitations that should be taken into consideration when interpreting its results. First, the research design's correlational nature does not allow the determination of causal relations between maternal writing mediation and the early literacy of children with HI. Future research has to investigate this issue via intervention studies that will teach parents of children with HI how to mediate writing to their children and assess the children's early literacy. Second, the sample included only 30 middle SES children and although the participants were all kindergartners from the center of Israel with HI, a bigger and more diverse sample would help in further understanding the relationship between parental writing mediation and children with HI literacy development. Third, the present study cannot determine if mothers of children with HI approach writing tasks in the same manner as mothers of hearing children. Yet, detailed reading of studies that explored maternal writing mediation with hearing kindergartners from middle SES (Aram & Bialistock, In preparation) may give the impression that the levels of conducive atmosphere and cooperation were high in both groups. Nevertheless, mothers of children with HI

tended to use lower level strategies when helping their children write (grapho-phonemic mediation) – their mean strategy was to dictate the letter name, compared to mothers of hearing children who tended to retrieve the required phonological unit and only then, dictated the required letter name. It seems that mothers of children with HI perceived themselves as teachers more than mothers of hearing children, who tended to perceive this as a joint task. One might also get the impression that mothers of children with HI were more inclined to use physical contact and they gave more reinforcements as well as criticisms to their children compared to mothers of hearing children.

Children with HI are at-risk in the realm of literacy and schooling. Educators and policy-makers have to study different parent-child literacy-related interactions (e.g., joint storybook reading, joint writing, family conversations) and find ways to encourage these children. The present study emphasizes maternal writing mediation as a possible significant asset. [A POSSIBLE SIGNIFICANT ASSET FOR WHAT???] Understanding the nature of maternal writing mediation with HI children may help in planning future programs that will teach parents how to mediate writing to their children. Programs like these have helped parents of children from low socio -economic stratum significantly improve their mediation (Levin & Aram, submitted). The educational implications of this study suggest that parents should be encouraged to scaffold [DID YOU BY ANY CHANCE MEAN "SUPPORT THEIR CHILDREN" RATHER THAN 'SCAFFOLD'? A SCAFFOLD IS WHERE ONE HANGS A CRIMINAL!!!] their children with HI throughout the writing process, to be sensitive to their children's level of competence and to provide guidance accordingly. Illuminating the potential importance of collaborative writing with young children with HI may increase parents' sensitivity to sporadic

occurrences of writing interactions and may encourage them to initiate writing activities at home, thereby practicing important aspects of early literacy with their children.

References

Adams, M. J. (1991). *Beginning to read: Thinking and learning about print.* Cambridge, MA: MIT Press.

Allman, T. M. (2002). Patterns of spelling in young deaf and hard-of-hearing students. *American Annals of the Deaf, 147*, 46-64.

Aram, D. (2007). Maternal writing mediation to kindergartners: Analysis via a twins study. *Early Education and Development, 18, 71-92.*

Aram, D. (2005). Continuity in children's literacy achievements: A longitudinal perspective from kindergarten to school. *First Language, 25*, 259-289.

Aram, D. (2002). Joint writing in Hebrew of dictated words versus proper names: Analysis of low SES mother-kindergartner dyads. *Journal of Research in Childhood Education, 17*, 47-61.

Aram D., & Bialistock, T. (In preparation). Writing with young children: A comparison between paternal and maternal mediation.

Aram, D., & Levin, I. (2001). Mother-child joint writing in low SES: Sociocultural factors, maternal mediation, and emergent literacy. *Cognitive Development, 16,* 831-852.

Aram, D., & Levin, I. (2004). The role of maternal mediation of writing to kindergartners in promoting literacy achievements in school: A longitudinal perspective. *Reading and Writing: An Interdisciplinary Journal, 17*, 387-409.

Badian, N. A. (2001). Phonological and orthographic processing: Their role in reading prediction. *Annals of Dyslexia, 5*, 179-202.

Baker, L., Fernandez-Fein, S., Scher, D., & Williams, H. (1998). Home experiences related to the development of word recognition. In J. L. Metsala, & L. C. Ehri (Eds.), *Word recognition in beginning literacy* (pp. 263-288). Hillsdale, NJ: Lawrence Erlbaum.

Bissex, G. L. (1980). *GNYS AT WRK: A child learns to write and read*. Cambridge, MA: Harvard University Press.

Center for Early Education and Development. (2005). *Get it Got it Go!* Retrieved September 12, 2007, from http://ggg.umn.edu/.

Colin, S., Magnan, A., Ecalle, J., & Leybaert, J. (2004, June). *Relation between early phonological skills and later reading performances in deaf children: Effect of early exposure to cued speech*. Paper presented at the annual meeting of the Society for Scientific Studies of Reading, Amsterdam, Holland.

Deater-Deckard, K., & Petrill, S. A. (2004). Parent-child dyadic mutuality and child behavior problems: An investigation of gene-environment processes. *Journal of Child Psychology and Psychiatry, 45*, 1171-1179.

DeBaryshe, B. D, Buell, M. J., & Binder, J. C. (1996). What a parent brings to the table: Young children writing with and without parental assistance. *Journal of Literacy Research, 28,* 71-90.

Dixon, M., Stuart, M., & Masterson, J. (2002). The relationship between phonological awareness and the development of orthographic representations. *Reading and Writing: An Interdisciplinary Journal, 15*, 295-316.

Ehri, L. C., Nunes, S. R., Willows, D. M., Yaghoub-Zadeh, Z., & Shanahan, T. (2001). Phonemic awareness instruction helps children learn to read: Evidence from the National Reading Panel's meta-analysis. *Reading Research Quarterly, 36,* 250-287.

Gonzalez, M.M. (1996). Tasks and activities. A parent-child interaction analysis. *Learning and Instruction, 6*, 287-306.

Hanson, V. L., Goodell, E. W., Perfetti, C. A. (1991). Tongue-twister effects in silent reading of hearing and deaf college students. *Journal of Memory and Language, 30*, 319-330.

Harris, M., & Beech, J. (1998). Implicit phonological awareness and early reading development in prelingually deaf children. *Journal of Deaf Studies and Deaf Education, 3*, 205-216.

Harste, J. C., Woodward, V. A., & Burke, C. L. (1984). *Language, stories and literacy lessons.* Portsmouth, NH: Heinemann.

Hertenstein, M. J. (2002). Touch: Its communicative functions in infancy. *Human Development, 45*, 70-94.

Howell, J. J., & Luckner, J. L. (2003). Helping one deaf student develop content literacy skills: An action research report. *Communication Disorders Quarterly, 25*, 23-27.

Jackson, W., & Turnbull, A. (2004). Impact of deafness on family life: A review of literature. *Topics in Early Childhood Special Education, 24*, 29-34.

Kelly, L. P. (1993). Recall of English function words and inflections by skilled and average deaf readers. *American Annals of the Deaf, 138*, 288-296.

Kishon-Rabin, L., Taitelbaum, R., Muchnik, C., Gehtler, I., Kronenberg, J., & Hildesheimer, M. (2002). Development of speech perception and production in children with cochlear implants. *Annals of Otology, Rhinology, and Laryngology Supplement, 189*, 85-90.

Kyle, F. E., & Harris, M. (June, 2005). *Reading development in deaf children: The importance of speechreading and vocabulary.* Poster presented at the annual meeting of the Society for Scientific Studies of Reading, Toronto, Canada.

Levin, I., & Aram, D. (submitted). Promoting early literacy: The differential effects of parent-child joint writing and joint storybook reading interventions.

Levin, I., Both-de Vries, A., Aram, D. & Bus, A. (2005) Writing starts with own name writing: From scribbling to conventional spelling in Israeli and Dutch children. *Applied Psycholinguistics, 26,* 463-478.

Levin, I., Patel, S., Margalit, T., & Barad, N. (2002). Letter-names: Effect on letter saying, spelling and word recognition in Hebrew. *Applied Psycholinguistics, 23,* 269-300.

Levin, I., Share, D. L., & Shatil, E. (1996). A qualitative-quantitative study of preschool writing: Its development and contribution to school literacy. In M. Levy, & S. Ransdell (Eds.), *The science of writing* (pp. 271-293). Mahwah, NJ: Lawrence Erlbaum.

Leybaert, J. (1993). Reading in the deaf: The roles of phonological codes. In M. Marschark, & M. D. Clark (Eds.), *Psychological perspectives on deafness* (pp. 269-309). Hillsdale, NJ: Lawrence Erlbaum.

Liblich, A. (1979). *WPPSI – Wechsler Preschool and Primary Scale of Intelligence.* Jerusalem: The Hebrew University of Jerusalem and The Ministry of Education and Culture. (Hebrew).

Luetke-Stahlman, B. (1999). *Language across the curriculum: When students are deaf or hard-of-hearing*. Hillsboro, OR: Butte.

Luetke-Stahlman, B., & Nielsen, D. C. (2003). The contribution of phonological awareness and receptive and expressive English to the reading ability of deaf students with varying degrees of exposure to accurate English. *Journal of Deaf Studies and Deaf Education, 8,* 464-484.

Marschark, M. (1993). *Psychological development of deaf children*. New York: Oxford University Press.

Marschark, M., & Harris, M. (1996). Success and failure in learning to read: The special case of deaf children. In J. Oakhill, & C. Cornoldi (Eds.), *Children's reading comprehension disabilities: Processes and intervention* (pp. 279-300). Mahwah, NJ: Lawrence Erlbaum.

Mayer, C. (in press). What really matters in the early literacy development of deaf children? *Journal of Deaf Studies and Deaf Education.*

Mayer, C., & Moskos, E. (1998). Deaf children learning to spell. *Research in the Teaching of English, 33,* 158-180.

Most, T., Aram, D., & Andorn, T. (2006). The early literacy skills of young hearing impaired children: A comparison between two educational systems. *The Volta Review, 106,* 5-28.

Musselman, C. (2000). How do children who can't hear learn to read an alphabetic script? A review of the literature on reading and deafness. *Journal of Deaf Studies and Deaf Education, 5,* 9-31.

Muter, V., Hulme, C., Snowling, M., & Taylor, S. (1997). Segmentation, not rhyming, predicts early progress in learning to read. *Journal of Experimental Child Psychology, 65,* 370-396.

Ruiz, N. (1995). A young deaf child learns to write: Implications for literacy development. *The Reading Teacher, 49,* 206–217.

Scarborough, H. S., & Dobrich, W. (1994). On the efficiency of reading to preschoolers . *Developmental Review, 14,* 245-302.

Sénéchal, M., & LeFevre, J. (2002). Parental involvement in the development of children's reading skill: A five-year longitudinal study. *Child Development, 73,* 445-460.

Sénéchal, M., LeFevre, J., Thomas, E. M., & Daley, K. E. (1998). Differential effects of home literacy experiences on development of oral and written language. *Reading Research Quarterly, 33*, 96-116.

Shatil, E., Share, D. C., & Levin. I. (2000). On the contribution of kindergarten writing to grade one literacy: A longitudinal study in Hebrew. *Applied Psycholinguistics, 21*, 1-21.

Shonkoff, J. P., & Phillips, D. A. (2002). *From neurons to neighborhoods: The science of early childhood development*. Washington, DC: National Academy Press.

Stern, A., & Goswami, U. (2000). Phonological awareness of syllables, rhymes, and phonemes in deaf children. *Journal of Child Psychology and Psychiatry, 41*, 609-625.

Wasik, H. B., & Herrmann, S. (2004). Family literacy: History, concepts, services. In B. H. Wasik (Ed.), *Handbook of family literacy* (pp. 82-99). Mahwah, NJ: Lawrence Erlbaum.

Waters, G. S., & Doehring, D. B. (1990). Reading acquisition in congenitally deaf children who communicate orally: Insight from an analysis of component reading, language, and memory skills. In T. H. Carr, & B. A. Levy (Eds.), *Reading and its development: Component skills approaches* (pp. 323-373). San Diego, CA: Academic Press.

Williams, C. L. (1994). The language and literacy worlds of three profoundly deaf preschool children. *Reading Research Quarterly, 29*, 125-155.

Williams, C. L. (2004). Emergent literacy of deaf children. *Journal of Deaf Studies and Deaf Education, 9,* 352-365.