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# Contributions of Mother-Child Storybook Telling and Joint Writing to Literacy Development in Kindergartners with Hearing Loss

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ABSTRACT

***Purpose***. The study investigated mother-child storybook telling and joint writing as predictors of early literacy among kindergartners with hearing loss (HL). ***Method***. Participants were 30 Israeli kindergartners with HL and their mothers. Early literacy assessments tapped children's alphabetic skills (word writing, word recognition, and letter knowledge) and linguistic skills (phonological awareness, general knowledge, and receptive vocabulary). Each mother told her child the story of a wordless book and helped her child write words. Both interactions underwent videotaping and analysis. ***Results***. Our major findings showed that maternal storybook telling correlated with linguistic skills, whereas maternal writing mediation correlated with basic alphabetic skills. A series of 3-step hierarchical regression analyses revealed that beyond children's age, children's degree of HL, and joint writing, storybook telling predicted children's phonological awareness (22%), general knowledge (28%), and receptive vocabulary (18%). Beyond children's age, children's degree of HL, and storybook telling, joint writing predicted word writing (15%), word recognition (31%), and letter knowledge (36%). ***Implications***. Recommendations focused on encouraging parent and teacher awareness about the differential contributions of storybook telling and writing mediation to early literacy. We also advocated enhancing parents' skills for promoting children's literacy.

Key words: children with hearing loss; early literacy; storybook telling; writing interactions; parental mediation

# Contributions of Mother-Child Storybook Telling and Joint Writing to Literacy Development in Kindergartners with Hearing Loss

This study investigated the characteristics of mother-child literacy meditation - storybook telling and joint word writing - for kindergartners with hearing loss. Mediated learning is experienced when the environment is mediated to the child by a person who takes an active role in making components of the environment compatible with the child's conceptions. Effective mediation occurs when the parent provides guidance according to his/her child's competence and gradually withdraws the support and lets the child perform more independently (Feuerstein, 1980). Mothers interact daily with their young children, and these interactions contain elements of teaching that may provide a basis for later outcomes including school successes and failures (e.g., Kelly, Morisset, Barnard, & Hmmond, 1996). Parental literacy mediation, which introduces children to written language in their home environment, constitutes a central factor in the development of early literacy (Hiebert & Adams, 1987; Rogoff, 1990). Children share with their parents a variety of literacy-related activities that may enhance the children's literacy skills. Family conversations, reading environmental print, storybook reading, joint writing, playing with letters, and watching educational television programs all comprise a part of young children's everyday experiences and, together, support children's literacy development.

Hearing loss and language delay do not prevent deaf children from participating in literacy activities and learning early literacy concepts (Rottenberg & Searfoss, 1992; Williams, 1994, 2004). Williams (1994) followed three profoundly deaf children (ages 3.11 to 5.10 years) and documented that the children were immersed in literacy activities in their homes. Parents read to their children (or with them) almost daily, and the children engaged in drawing and writing activities on a regular basis. However, only a handful of studies exist regarding early literacy among deaf children in general, and only a small portion of

these deal with family literacy (Williams, 2004). This paucity of studies is in striking contrast to the well-developed body of research regarding family literacy of hearing children, which even contains entire books on the subject (for example, see Wasik, 2004). In the present study, we investigated the home literacy experiences of children with hearing loss, focusing on mother-child storybook telling and writing interactions. We explored the relations between these two major parent-child literacy interactions and the kindergartners' early literacy skills, comparing the unique contribution of each interaction to the alphabetic and linguistic aspects of early literacy.

*Storybook Reading Among Hearing Children*

Studies of parent-child literacy-related activities with hearing children have focused on storybook reading as a context that promotes literacy (e.g., Bus, van IJzendoorn, & Pellegrini, 1995; Scarborough & Dobrich, 1994; Sénéchal, 1997; van Kleeck & Stahl, 2003). Evidence indicates that the frequency of storybook reading predicts a variety of early literacy aspects, both linguistic (i.e., vocabulary, language complexity, narrative skills, familiarity with print concepts, phonological awareness) and alphabetic (i.e., letter knowledge, early writing, word recognition) (Aram & Levin, 2002; Bus et al., 1995; Frijters, Barron, & Brunello, 2000; Sénéchal, LeFevre, Thomas, & Daley, 1998; Sonnenschein & Munsterman, 2002; Sulzby, 1985; Whitehurst & Lonigan, 1998; Zevenbergen & Whitehurst, 2003). As to the nature of storybook reading, conversations with the child during shared reading and rich interactions that include questions yield a more developed vocabulary (Sénéchal, 1997; Whitehurst et al., 1994), promote the child's reading comprehension, and expand the child's knowledge regarding written language (DeBruin-Parecki, 1999). Researchers have proposed that discussions during book reading that go beyond the immediate situation and that provoke processes such as inference

making and hypothesis testing stimulate the development of language skills (Snow, 1999) as well as print skills (Reese, 1995).

*Storybook Reading Among Children with Hearing Loss*

Hearing parents of deaf children experience difficulties when attempting to read a book to their child because of the sensory mismatch between them and their children (Padden & Humphries, 1988; Wilcox & Corwin, 1990). For example, parents encounter the challenge of helping their child sit in a position that will allow the child to see both the parent's face and the book. Despite these unique obstacles, studies of family literacy and early literacy development among children with hearing loss have followed the trends of research on hearing children, with particular focus on storybook reading (Akamatsu & Andrews, 1993; Andrews & Mason, 1986; Andrews & Taylor, 1987; Conway, 1985; Ewoldt, 1985, 1990; Maxwell, 1984; Rottenberg , 2001; Rottenberg & Searfoss, 1992; Williams, 1994).

These studies of deaf children, mainly comprising case studies, have proven that experience with storybook reading contributes to early literacy (Akamatsu & Andrews, 1993; Andrews & Gonzales, 1992) and renders a lasting effect on literacy achievements (Ewoldt, 1990; Rottenberg, 2001). Researchers have asserted that mere reading aloud is likely not the best way to improve deaf children’s literacy (Fung, Wing-Yin Chow, & McBride-Chang, 2005). Additional parental explanations to accompany the picture book reading were reported to be effective in promoting the vocabulary of young hard-of-hearing children (Van der Lam & Timmerman, 1995). Moreover, deaf children can learn about written language when the parent offers questions and prompts that help the child become active during repeated storybook reading interactions (Rottenberg, 2001). Some evidence suggests that interactive storybook reading supports deaf children’s comprehension skills,

interest and engagement with books, confidence as emergent readers, storytelling ability, as well as word recognition skills (Williams, 2004).

Few programs have been initiated to support and teach parents of deaf children to use these interactive methods of storybook reading. Ezell, Justice, and Parsons (2000) conducted a 5-week group and individual parent training program in guided reading for four parents and their deaf preschoolers with communication problems. Results indicated that this parent-child reading program positively influenced children's receptive and expressive alphabetic vocabulary. Fung et al. (2005) initiated an 8-week intervention that taught Whitehurst et al.'s (1988) dialogic reading technique to nine parents of hard of hearing Chinese children (kindergartners to second graders). Prompting questions were attached to each page of the Chinese storybooks used, and recall prompts were given at the end of each book. Their results showed that the dialogic reading intervention promoted the children's receptive vocabulary, after controlling for their ages and degree of HL. Unlike the aforementioned programs that used oral communication, a different program, the Shared Reading Project (Schleper, 1995), was designed to teach hearing parents how to read to their deaf children using American Sign Language. This program was based on principles derived from research on how deaf adults read books to deaf children. Deaf parents in the U.S. use ASL to read to their children (e.g., Lartz & Lestina, 1995), who found stories told in ASL more engaging than stories told in English (Schick & Gale, 1995). In the Shared Reading Project, deaf tutors served as models and coaches to help hearing parents learn the skills needed to share books with their young deaf and hard of hearing children. Delk and Weidekamp (2001) reported positive results regarding parents who learned to use the shared reading principles.

*Writing Interactions with Hearing Children*

With regard to writing activities, observations in homes of hearing children have revealed that children pretend to write, invent spellings, and question their parents on what they write, and that parents utilize opportunities to explain the spelling of words (e.g., Baker, Fernandez-Fein, Scher, & Williams, 1998; Bissex, 1980; Gundlach, McLane, Stott, & McNamee, 1985; Hall, 2000). Some studies found that writing interactions are predictive of early literacy and later literacy achievements. DeBaryshe, Buell, and Binder (1996) found that while writing a letter to a relative with their kindergartners, mothers guided their children and led them to a higher level of writing compared to the children's independent writing level. Aram and Levin (2001) videotaped mothers and their children at home while performing two writing tasks – writing words and names. They also tapped the children's literacy level in the kindergartens (early writing and recognition, phonological awareness, and orthographic awareness). Their main finding indicated that the level of maternal writing mediation predicted kindergartners' literacy skills even after controlling for socio-cultural measures (SES, maternal literacy, and the richness of the literacy environment). A follow-up study (Aram & Levin, 2004) assessed the participants 2½ years later and found that the earlier maternal writing mediation in kindergarten predicted the second graders' current spelling, reading comprehension, and language, beyond SES and beyond the early literacy measures assessed previously in kindergarten.

*Writing Interactions with Children with Hearing Loss*

Although a small number of descriptive studies have examined emergent writing development among young deaf children, to the best of our knowledge, no study has yet explored the relations between early parent-child writing interactions and literacy development in the population of children with hearing loss. All these studies demonstrated that young deaf children can and do use emergent writing when given authentic opportunities to do so (Williams, 2004). Yet, only one of these studies took place in the

child's home. Ruiz (1995) investigated her own deaf daughter's writings created in their home from ages 3 to 7 years. Ruiz found that many of Elena's hypotheses about English orthography resembled those of hearing children. For example, Elena's name was her first known word, and she used the letters in her name to generate spellings for unknown words. Elena also demonstrated the use of other hypotheses not observed among hearing children. For instance, she connected the shape of the hand when signing a word with its initial letter.

*The Differential Benefits of Different Literacy Activities*

Few studies have investigated the relative contribution of different parent-child literacy activities at home to hearing kindergartners' early literacy. Sénéchal et al. (1998) examined the effects of storybook reading compared to parental reports of teaching reading and writing on kindergartners' literacy. Storybook reading was found to predict oral language, whereas parental teaching of writing predicted written language skills. Likewise, Evans, Shaw, and Bell (2000) examined the relationship between the home environments and language and literacy development among kindergartners. They reported that shared book reading at home made no contribution to the prediction of letter name and letter sound knowledge, while home activities involving letters predicted significant amounts of variance. Aram and Levin (2002) compared maternal mediation in joint writing with storybook reading, in relation to early literacy among low SES kindergartners. The results showed that maternal writing mediation explained added variance of various alphabetic skills, beyond home environment measures and storybook reading. Storybook reading explained added variance in verbal ability, beyond home environment and maternal writing mediation.

*The Present Study*

It is undisputed that children with hearing loss have poor reading skills (Paul, 1998; Traxler, 2000), nonetheless, studies have reported that deaf and hard of hearing children more quickly acquire reading efficiency if they enter first grade with good phonological skills and alphabetic knowledge (Colin, Magnan, Ecalle, & Leybaert**,** 2004). Therefore, we attribute great importance to the exploration of early literacy interactions at home, to identify their differential productivity in predicting specific early literacy skills.

The present study examined the following questions: What are the characteristics of mother-child storybook telling and word writing interactions among kindergartners with hearing loss? Does the nature of maternal mediation in storybook telling and in joint writing predict the child's early literacy skills (both alphabetic and linguistic), beyond background measures (the child's age and degree of hearing loss)? Do storybook telling and writing interactions explain the same variance in kindergartners' alphabetic and linguistic skills, or does each of them add uniquely to the prediction?

Our study offers several unique contributions to the literature. First, this study quantitatively analyzes the storybook telling and writing interactions of 30 dyads of hearing mothers and their kindergartners with hearing loss, providing a relatively large sample that is unified in terms of children's educational level. Second, the videotaping methodology of both the storytelling and the writing interactions within the family surroundings (rather than utilizing parental reports or assessing interactions in a laboratory) allows for a deep analysis of the characteristics of the interactions. Third, the current assessment of various early literacy skills, both linguistic and alphabetic, furnishes diverse data on the early literacy of kindergartners with hearing loss.

## METHOD

### Participants

The sample included 30 kindergartners with prelingual-onset hearing loss (14 boys and 16 girls) and their hearing mothers. They were recruited from the Tel Aviv branch of MICHA, the non-profit Israeli Society for Deaf and Hard of Hearing young children. The MICHA afterschool center provides auditory testing and communication therapy to children as well as parental support to families. In MICHA, parents receive information (lectures and literature on the impact of hearing loss on child development), guidance (e.g., in handling the hearing aids via an audiologist), and emotional support (either in groups or individually). Parents do not receive systematic literacy mediation training. The sample included all children with hearing loss who, at the time of the study, were living in central Israel and who fulfilled the following criteria: were studying in kindergarten and were about to start first grade in the following school year, had hearing parents, and had no other major diagnosed problems except for their hearing loss. The ages of the children in this study ranged from 62 to 84 months ($M$ = 72; $SD$ = 7.6), comprising a wider age range than the national standard for hearing kindergartners (60 to 72 months). This wide age range resulted from the fact that some of our participants remained in kindergarten for a second year. The policy in Israel is slightly flexible regarding the age of entrance to first grade. If parents want to retain their children longer in kindergarten and the kindergarten teacher agrees that the child will benefit from extra time in kindergarten, the authorities support the decision of retaining the child for another year. This is especially true for children in special education.

The children's degree of hearing loss was determined by the pure tone average in the child's better ear (i.e., the average of the hearing thresholds at 500, 1000, and 2000 Hertz). In our sample, 1 child (3.33%) had a mild hearing loss below 40 dBHL, 13 children (43.33%) had a moderate hearing loss between 40 to 70 dB HL, 4 children (13.33%) had a severe hearing loss between 70 to 90 dBHL, and 12 children (40%) were profoundly deaf

(over 90 dBHL). The children's degree of hearing loss ranged from 30 to 108 dBHL ($M$ = 74, $SD$ = 26). All the children used sensory aids: 19 children (63.3%) used hearing aids, and 11 children (36.7%) used cochlear implants. All the children had bilateral hearing loss with various patterns, and each one was aided optimally. Their aided thresholds were between 20 to 40 dB HL. The mean age at identification of the children's hearing loss was 29 months ($SD$ = 20).

The mean of the children's language delay in months, assessed using the Reynell Developmental Language Scales (1985), was 21 months ($SD$ = 18). A comparison between the children who were attending their first and only year of kindergarten and those who were attending their second year of kindergarten revealed no differences in their degree of hearing loss ($t$ = -.58, $p$ > .05). These two age groups did differ, however, in their language delay ($t$ = -2.39, $p$ < .05). The younger children showed less average delay in months ($M$ = 12.62) than the older group ($M$ = 28.01), possibly indicating a reason for retaining these older children in kindergarten for an extra year. It is reasonable to assume that the older children had more exposure to literacy activities than their younger peers; therefore, our data analyses controlled for age as well as for hearing loss. These two variables are among the main controlled variables in studies of the development of children with hearing loss (e.g., Fung, et al., 2005; Pipp-Siegel, Sedey, VanLeeuwen, & Yoshinaga-Itano, 2003).

The children were mainstreamed in the general education system in their neighborhoods. In Israel, kindergartens are part of the early education system, and first grades are part of the elementary education system. Diverse types of exposure to letters and writing materials begin in kindergarten, and formal instruction in reading and writing begins on entry to first grade (Share & Levin, 1999). Kindergartens are equipped with children's books and, in line with the national objective to promote children's language skills, kindergarten teachers read books aloud to children and play games that include rhyming or

alliteration within the regular curriculum, mainly during the large group circle. In the kindergarten, children also have free access to games that include letters as well as to literacy materials like papers, crayons, and pencils. Note that the MICHA center provided all the children with twice-weekly speech and language therapy (45 minutes each) in the afternoons but not with literacy training.

As to the families, the parents of 27 children (90%) were married, and the parents of 3 children (10%) were divorced. Mean parental age was 35.13 years (*SD* = 5.72) for mothers and 39.21 years (*SD* = 7.51) for fathers. The average number of children per family was 2.47 (*SD* = 0.94). The families all had a mid-level socioeconomic status in Israel: Mean parental educational level was 14.30 years (*SD* = 2.51) for the mothers and 14.28 years (*SD* = 3.24) for the fathers. According to Roe's (1956) classification, 34.5% of the fathers and 20% of the mothers had professional and managerial occupations; 13.8% of the fathers and 40% of the mothers had semiprofessional occupations; 51.7% of the fathers and 26.7% of the mothers had skilled occupations, and only four mothers (13.3%) had semiskilled occupations. In their families, 12 children (27.9%) were first-born children, 10 (23.3%) were second- or third-born, and 8 (18.6%) were the youngest. All the children were oral and used spoken language as the mode of communication between them and their parents.

## Measures

### *Mother-Child Literacy Interactions*

#### *Mother-Child Storybook Telling Measures*

Videotapes of mothers telling their children a story served as the basis for measuring maternal storybook telling. We selected the wordless picture book "*When the Night Came Into the Room*" written and illustrated by Leshem-Piliy (1999), which depicts the adventures of imaginary creatures that leave a girl's drawing when she falls asleep. This

book is not familiar to Israeli readers, and we assumed that the mothers and children would encounter it for the first time during the study, thus eliminating possible effects of familiarity. We opted for a wordless book because it is less restricting and therefore encourages richer interactions compared to regular storybooks that contain text (Leshem-Piliy, 2000). For the storybook telling interaction, the mother received the book and was given a few minutes to study the book before the interaction with her child. When ready, she was told to tell the story to her child. Instructions were: "Tell the story in your regular, everyday way." We transcribed the videotapes, and their analyses yielded three measures: *interactive reading*, *dialogic reading cycles*, and usage of *Wh questions*.

*Interactive reading*. For the purpose of this study, we translated DeBruin-Parecki's (1999) Adult/Child Interactive Reading Inventory to Hebrew using a back-and-forth translation process. The inventory estimated the level of interactivity between the mother and the child while telling the story. We removed 4 items from the original inventory referring to enhancing attention to text, which were irrelevant in this wordless book situation. We evaluated a total of 8 interactive behaviors: (1) Parent poses and solicits questions about the books' content; child responds to questions about book. (2) Parent points to pictures and assists child in identification and understanding; child responds to parent's cues and identifies pictures. (3) Parent relates book content to personal experiences; child attempts to relate book content to personal experiences. (4) Parent pauses to answer questions child poses; child poses questions about the story. (5) Parent identifies visual cues related to story reading like repeated pictures; child responds to parent and identifies visual cues related to the story. (6) Parent solicits predictions; child is able to guess what will happen next. (7) Parent asks that child recall information from the story; the child recalls information from the story. (8) Parent elaborates on child's ideas; child offers ideas about story. We tested this 8-item Hebrew version in a pilot study on

parent–child storytelling using the same book as in the present study for 40 hearing children. The pilot yielded an internal consistency (reliability) of .79 (Cronbach $\alpha$), indicating that the items in the inventory reflect the same construct. Interactive reading scores ranged from 0.38 to 3.49 ($M$ = 1.97, $SD$ = 0.95). In accordance with DeBruin-Parecki's (1999) scoring system, we assessed the frequency of each behavior for the child and for the mother on a 5-point scale: (0) no evidence of the behavior; (1) the behavior occurred 1 time; (2) the behavior occurred 2-3 times; (3) the behavior occurred 4-6 times; (4) the behavior occurred more than 6 times. The average frequency of these 8 behaviors across the whole storybook telling interaction served as the *interactive reading* score. The internal consistency of the *interactive reading inventory* (Cronbach $\alpha$) in this study was .78. Hereafter, Cronbach $\alpha$ refers to internal consistency between items.

*Dialogic reading.* Based on Whitehurst et al. (1994), we counted the number of full 4-step dialogic reading cycles along the storytelling interaction. The cycle comprised the following steps: (1) Adult prompts child with a question, (2) child answers, (3) adult praises child's efforts, and (4) adult expands the child's verbalizations. Frequent use of full dialogic reading cycles enriches the storytelling interactions (Arnold, Lonigan, Whitehurst, & Epstein, 1994). The total number of 4-step dialogic cycles served as the *dialogic reading* score.

*Wh questions*. We calculated the percentage of mothers' Wh questions such as why, what, who, where, and when from the total number of questions asked during the interaction. We specifically referred to Wh questions for two reasons: First, abstract language input is important for children's literacy development and is often evoked by Wh questions in storybook reading contexts (van Kleeck & Vander Woude, 2003). Second, Wh questions are recommended when communicating with children who have hearing loss (Most & Frank, 1994). Children with hearing loss can more easily perceive questions

beginning with a Wh word, which informs the communicative purpose of the utterance, compared to other types of questions. The perception of yes/no questions, in contrast, depends on the sentence's intonation contour, which might not be fully audible to these children.

*Mother-Child Joint Writing Mediation Measures*

Videotapes of mothers guiding their children in a writing activity served as the basis for measuring maternal writing mediation. The dyad received four 23 x 17 cm. cards, each of which displayed identifying drawings (9 x 9 cm.) of two nouns. The experimenter asked the child to write each object pair on a separate blank card (17 x10 cm.). The mother was asked to help her child, and no further instructions were given. If a mother asked for the experimenter'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 four pairs of words were chosen by four teachers of the children in the current sample. The words indicated nouns that are semantically familiar to Israeli kindergartners but do not appear in their environmental print. Moreover, these are not words that kindergartners write spontaneously without grapho-phonemic mapping, like their own name, their friends' names, or words like "mom" or "dad" (Levin & Aram, 2004). The teachers agreed that the kindergartners could not write these words independently and would require their mother's' support at varying levels. The eight words included the gamut of Hebrew letters: medial and final letters and vowel letters.

The words were presented in pairs and are listed here as they are pronounced (in single quotes), written (in capital English letters), and translated (in parentheses). The first set of paired words, '*tsipor*ɛn – *jad'* ZIPORN – YD (fingernail – hand) and '*mɛlafɛfon – gɛzɛr*' MLPPON – GZR (cucumber – carrot), did not share common letters, and one word sounded longer than the other. The second set of paired words, '*mapa – sapa*' MPH – SPH

(tablecloth – sofa) and '*zakɛn – zkɛna'* ZKN – ZKNH (old-man – old-woman), shared some common letters as well as the same phonological length. These pairs enabled mothers to relate to different aspects of Hebrew orthography. Note that the English capital letters above represent the letters that children were asked to write: 30 letters altogether.

We transcribed the videotapes, and their analyses yielded four measures of maternal writing mediation: *grapho-phonemic mediation*, *printing mediation*, *degree of precision demanded*, and *task perception*.

*Grapho-phonemic mediation.* This 6-point scale (Aram & Levin, 2001, 2002) reflected how the mother scaffolded the encoding process of a spoken word to her child, who attempted to represent the word in writing. The encoding process included segmenting the word into sounds, isolating a sound, and connecting a segmented sound with a retrieved letter name. Note that the mother's encouragement of the child to perform more steps in the grapho-phonemic process would lead to a higher maternal mediation score (for the scale and examples, see appendix). To capture maximum information, we analyzed small segments: the production of each letter separately ($N$ = 30). Mother's mediation was expected to vary from letter to letter (e.g., for retrieving familiar letters such as those that appeared in the child's name, higher grapho-phonemic mediation scores would be expected). The average score across the 30 letters served as the *grapho-phonemic mediation* score (Cronbach $\alpha$ = .98).

*Printing mediation.* This measure referred to the autonomy that the mother allowed her child in graphically printing the letters (Aram & Levin, 2001). We used a 5-point scale to score the printing mediation of each letter (see appendix for the full scale). The average score across the 30 letters served as the *printing mediation* score, with a higher score indicating more autonomy allowed to the child (Cronbach $\alpha$ = .98).

*Degree of precision demanded*. This measure assessed the amount of precision that the mother demanded from the child in shaping the letters, along a 5-point scale (see appendix for the full scale and examples). We scored mother's demand for precision for each word, and the average score across the eight words served as the *demand for precision* score, with a higher score indicating higher demand for precision (Cronbach $\alpha$ = .83).

*Task perception.* We assumed that mothers' perception of the task as a mutual rather than separate one would indicate a higher level of maternal mediation. We coded maternal task perception on each word as "separate" (score = 1) if the mother showed extreme involvement that left very little space for the child to contribute (i.e., viewing the task as her own). We coded maternal task perception as "mutual" (score = 2) if the mother collaborated with her child and gave the impression that the task was a joint activity. The average across the eight words served as the *task perception* score (Cronbach $\alpha$ = .96).

### *Children's Early Literacy Measures*

Six tests evaluated the level of the children's early literacy, half focusing on alphabetic skills and half on linguistic skills.

#### *Alphabetic Skills*

The alphabet skills we assessed included *word writing, word recognition,* and *letter knowledge.*

*Word writing*. We asked the children to independently write four pairs of words presented orally and visually (by illustrations). To avoid any misunderstanding caused by the child's hearing loss, the child was presented with four cards (23 x 17 cm), each of which displayed identifying drawings of two nouns (9 x 9 cm). These word pairs differed from those written with the mothers during the videotaped interactions but were chosen based on the same ideas. To facilitate children's performance on this independent task, each pair contained words of different phonological length, assuming in accordance with Levin

and Korat (1993) that upon acquiring the alphabetic principle children would show sensitivity to the phonological length and represent longer words with more letters. The words for the independent writing task were: '*pil – nɛmala*' PIL – NMLH (elephant – ant)*;* '*soos – tolaat*' SUS – TOLAT (horse – worm); '*ɛt – iparon*' ET – AIPARON (pen – pencil); and '*dag – tsfardɛa*' DG – ZPRDA (fish – frog). The child received an A4-size sheet of paper for writing each pair. We scored each written word on a 14-point scale adapted from Levin, Share, and Shatil (1996) and Levin and Bus (2003), ranging from pseudo letters through random letters, basic consonantal spellings, partial consonantal spellings, to formal writing (see appendix for the full scale). The mean score across the eight words served as the *word writing* score (Cronbach $\alpha$ = .96).

*Word recognition.* We asked the children to recognize and explain the recognition of four pairs of printed words presented to them on four cards. The words were the same word pairs that the children had written earlier in the same session on the independent word writing task. Recognition of each pair was examined by asking the children to match two words – presented both orally and visually (illustrated by drawings) – to two printed words presented on cards, and to explain their recognition ("Why do you think that this word is X and this word is Y?"). We used only the explanation's scores because recognition itself may be subject to children's guessing. We scored the level of explanation for each pair on a 4-point scale, with higher scores indicating more correct alphabetic explanations (see appendix for the scale and examples). The mean scores for the words served as the *word recognition* score (Cronbach $\alpha$ = .92).

*Letter knowledge.* We asked the children to name 12 printed letters, each presented on a separate card in large print (200 Times New Roman). Within the 27-letter Hebrew alphabet, the 12 letters selected 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 (Cronbach $\alpha$ = .91).

*Linguistic Skills*

The linguistic skills we assessed included *phonological awareness, receptive vocabulary,* and *general knowledge.*

*Phonological awareness.* We developed a phonological awareness test for the purpose of the current study, based on Lapidot, Tubul, and Wohl's (1995/6) stimulus-distracter-target test structure. The test included ten illustrated stimulus words, each accompanied by three illustrated alternatives: two distracter words and one target word that matched the stimulus either on initial or final phoneme. In consultation with four teachers of the children in the current sample, we selected 40 nouns that appeared frequently in kindergartners' vocabulary. In choosing the distracters, we avoided words that were either lexically or phonologically close to the target word. We presented all the words as illustrations, to account for children's difficulty in dealing with auditory input. For each card, the experimenter first checked that the child could name the four objects presented visually on the card, and, if the child did not know a word, the experimenter named the object. For five of the words, we asked the child to match the stimulus word with one of the three words below it that started with the same phoneme, e.g., to match '*shεmεsh*' (sun) with '*shaon*' (clock) rather than with '*mεchonit*' (car) or '*tof*' (drum). For the other five words, we asked the child to match the stimulus word with one of the three words below it that ended with the same phoneme, e.g., to match '*naal*' (shoe) with '*pil*' (elephant) rather than with '*kapit*' (teaspoon) or '*tzipor*' (bird). The sum of the children's correct responses served as the *phonological awareness* measure (Cronbach $\alpha$ = .64).

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

The subscale contained 23 questions of increasing difficulty. For example, Question 3 was "What do we buy in a bottle?" and Question 13 was "How many toes are there on one foot?" (without looking at or counting the toes). We ceased the task after five consecutive incorrect responses. The sum of correct responses served as the *general knowledge* score.

*Receptive vocabulary.* We selected the Peabody Picture Vocabulary Test (PPVT) to examine children's receptive vocabulary. We used Solberg and Nevo's (1979) adaptation to Hebrew of the Peabody items set. For each spoken word, we asked the child to choose the appropriate illustration out of four options presented on a page. The children received up to 60 items; we ceased the task after five consecutive incorrect responses. We used the raw scores because well-established Israeli norms are not yet available for this test. The sum of correct responses served as the *receptive vocabulary* score.

## Procedure

Data collection began around February during the kindergarten year and lasted for about 1½ months for the whole group. Data were collected for each child in the kindergarten and at home over a maximum period of 10 days. In the kindergartens, we assessed the children's early literacy individually in a quiet room over two sessions. To ease the load on the children, we divided the early literacy assessment tasks into two fixed sequence sets: (1) word writing of two word pairs, either the final phoneme or initial phoneme part of the phonological awareness task, the general knowledge subscale of the WPPSI, and word recognition of two word pairs; (2) word writing of the other two word pairs, phonological awareness of the other part (final or initial phoneme), letter knowledge, PPVT, and word recognition of the other two word pairs. Half of the sample completed set one in the first session and set two in the second session, and the other half of the sample completed the sets in the reverse order. The teacher or the kindergarten's speech therapist

was present during assessment to ensure that the child understood the instructions. Children's responses during the testing procedure were either written or spoken.

Videotaped data on maternal writing mediation and storybook telling mediation were collected in each child's home during one afternoon. Half of the sample started with the storybook telling and then moved to the writing task, and the other half started with the writing task and then completed the storybook telling interaction. The mother-child interaction's duration ranged between 4:48 to 29:42 minutes ($M$ = 12:32, $SD$ = 5:70) for the writing mediation and between 4:04 to 17:34 ($M$ = 8.57, $SD$ = 2.87) for the storybook telling. In addition, the mother was asked to complete the demographic questionnaire at the end of the second session.

The interactions were coded by three M.A. students in counseling and education for the deaf. Each interaction was analyzed by two of these M.A. students, and they discussed any misunderstanding until reaching agreement. Inter-judge reliability of the three raters, computed for scoring of all the measures for 4 randomly selected children (2 boys and 2 girls), showed highly significant Kappas for the storybook telling measures, ranging from .91 to .94, and for the writing mediation measures, ranging from .90 to .92.

## RESULTS

In this section, we first present the descriptive statistics for the maternal mediation measures (storybook telling and writing mediation) and the child's early literacy measures (alphabetic skills and linguistic skills). Second, we present the correlations for all the mediation and early literacy measures with the background measures (*child's age* and *child's degree of hearing loss*) and the correlations between all the mediation measures and the early literacy measures while controlling for the background measures. Finally, via fixed-order hierarchical regression analyses, we examine whether storybook telling and

writing mediation together explained some variance in kindergarteners' early literacy, or whether each independently added to the prediction beyond the background measures.

## Descriptive Statistics

Table 1 describes the mediation and early literacy measures. Results indicate that our sample exhibited sufficient variance in all the mediation and early literacy measures.

----------*Insert Table 1 about here* ----------

### *The Mediation Measures*

Regarding the storybook telling measures (see Table 1), the scores on *interactive reading* tended toward the lower part of the scale (*M* = 1.09, *SD* = 0.45), indicating that the mothers were more active than the children and thus the task was less mutual and interactive. Regarding full *dialogic reading* cycles and *Wh questions*, some mothers made extensive use of these behaviors, whereas others used them less often. Within the *Wh questions*, mothers used the "What" questions most (*M* = 62.13%), followed by "Why" questions (*M* = 15.75%), "How" questions (*M* = 9.59%), "Who" questions (*M* = 6.01%), "Where" questions (*M* = 3.52%), "Which" questions (*M* = 2.67%), and "When" questions (*M* = 0.32%).

As for the writing mediation measures (see Table 1), on average, mothers reached the midway level of the *grapho-phonemic mediation* scale, dictating the letter without phonological segmentation or retrieving a phonological unit and then dictating the required letter name (*M* = 3.38, *SD* = 1.18). In the *printing mediation* measure, on average, mothers reached the level of giving the children a model to copy or of scaffolding them in retrieving the letter shape (*M* = 3.80, *SD* = 1.03). As a group, the mothers' *demand for precision* was moderate (*M* = 2.76, SD = 1.05). For writing mediation, like for storybook telling, mothers' *task perception* was, on average, of a less dyadic nature (*M* = 1.40, *SD* = 0.50), meaning that the mothers exerted more control over the task than did their children.

*Early Literacy Measures*

*Alphabetic skills*. Table 1 indicates that on *word writing*, the children, on average, made frequent use of random letters, either sensitively or insensitively to the words' phonological length (*M* = 8.09, *SD* = 2.28). Children showed sensitivity to the word's phonological length if they represented the longer sounding word with more letters. For example, when writing the pair of words '*et* – *iparon*' ET – AIPARON (pen – pencil), they used more random letters to represent the longer sounding word ' *iparon*' (pencil). Children who remained insensitive to the word's phonological length represented the two words with the same amount of random letters (usually between three to four). In *word recognition*, the mean score of 2.33 (*SD* = 1.15) showed that the children, on average, used rudimentary and often incorrect alphabetic explanations to a large degree when trying to read words. In *letter knowledge*, the mean score of 7.47 correctly named letters (*SD* = 4.09) was low, considering the fact that we used only 12 letters judged as among the easiest to recognize out of the 27 Hebrew letters. The scores on *letter knowledge* were lower than those reported elsewhere for hearing kindergartners (Levin et al., 2002).

*Linguistic skills*. Table 1 shows that on *phonological awareness*, children correctly identified initial and final phonemes in less than half of the 10 items presented to them (*M* = 4.00, *SD* = 1.93). These results were lower than those achieved by hearing kindergartners using the same test (Most, Aram, & Andoren, 2005). On *general knowledge* and *receptive vocabulary*, the mean scores of 10.67 and 33.60, respectively, were similar to those of younger children aged 3-4 (Aram & Biron, 2004).

----------*Insert Table 2 about here* ----------

Relationship Between Maternal Mediation and the Child's Early Literacy, Controlling for Background Measures

Table 2 presents the correlations between the two background measures (*child's age* and *child's degree of hearing loss*) and all the mediation measures as well as the early literacy measures. The child's age in months correlated positively and significantly with all the writing mediation measures ($r$ = .36, $p$ < .05 to $r$ = .54, $p$ < .01), and with the three alphabetic skills measures ($r$ = .49 to $r$ = .52, $p$ < .01). With increasing age, children revealed higher alphabetic skills and their mothers used higher levels of writing mediation. Interestingly, *child's age* did not correlate significantly with storybook telling mediation measures or with the linguistic aspects of early literacy skills.

The degree of the child's *hearing loss* did not correlate significantly with any of the mediation measures, whether for storybook telling or for writing mediation. Nonetheless, regarding the early literacy measures, the child's degree of *hearing loss* did correlate negatively with *general knowledge* ($r$ = -.41, $p$ < .05). Children who showed greater hearing loss scored lower on general knowledge.

----------*Insert Table 3 about here* ----------

Table 3 presents the correlations between all the maternal mediation measures and the children's early literacy measures, controlling for the *child's age* and *degree of hearing loss*. An interesting picture emerged, where the storybook telling mediation measures correlated significantly with the child's linguistic skills measures, and the writing mediation measures correlated significantly with the child's alphabetic skills measures. Specifically, all three joint storybook telling mediation measures (*interactive reading, dialogic reading,* and *Wh questions*) showed significant, positive correlations ranging from modest to moderate ($r$ = .32, $p$ < .05 to .51, p < .01) with all three linguistic skills measures (*phonological awareness, general knowledge,* and *receptive vocabulary*), with one exception. The correlation between *dialogic reading* and *phonological awareness* showed a tendency toward the same direction but did not reach significance ($r$ = .27, $p$ = .08). On the

other hand, only one significant correlation emerged between a storybook telling measure (*Wh questions*) and an alphabetic skill (*word writing*).

As for the writing mediation measures, as seen on Table 3, all the writing mediation measures (*grapho-phonemic mediation, printing mediation, demand for precision,* and *task perception*) showed significant, positive correlations ranging from modest to moderately high ($r$ = .36, $p$ < .05 to r = .61, $p$ < .001) with the three alphabetic skills measures (*word writing, word recognition,* and *letter knowledge*), with two exceptions. The correlations of *demand for precision* and of *task perception* with *word writing* were in the same direction but did not reach significance ($r$ = .29, $p$ = .06 and $r$ = .28, $p$ = .07, respectively). On the other hand, none of the writing mediation measures correlated significantly with any of the linguistic skills measures.

## The Unique Contributions of Storybook Telling and Writing Mediation, Beyond Background Measures and Beyond Each Other

To compare early literacy skills' links with storybook telling and with writing mediation, we calculated the contribution of each mediation measure after controlling for the variance associated with the child's background measures (*age* and *degree of hearing loss*) to each of the early literacy measures. To condense the model, we created two combined mediation variables. We created a “writing mediation” variable by combining all maternal writing mediation measures via calculation of their mean Z score (reliability of $\alpha$ = .85 between them). Likewise, we created a “storybook telling” variable by combining all maternal storybook telling mediation measures via calculation of their mean Z score (reliability of $\alpha$ = .77 between them). We then conducted two sets of separate, fixed-order hierarchical regression analyses with *child' age* and *degree of hearing loss* in the first step, and with, alternatively, the combined "writing mediation" or "storybook telling” variable in the second step. The criterion variables comprised all six early literacy measures.

----------*Insert Table 4 about here* ----------

The first step in Table 4 (the same step in both sets of analyses) shows that the *child's age* and *degree of hearing loss* contributed significant amounts of variance to *word writing* (29%), *word recognition* (30%), *letter knowledge* (27%), and *general knowledge* (23%). These measures revealed no significant contribution to *phonological awareness* or *receptive vocabulary*.

In the second step (Step 2a), after partialling out *child's age* and the *degree of hearing loss*, "writing mediation" explained an impressive added variance to the alphabetic skills: *word writing* (12%), *word recognition* (29%), and *letter knowledge* (30%). Alternatively, after partialling out *child's age* and *degree of hearing loss* in the second step, "storybook telling" (Step 2b) added significant variance to the linguistic skills: *phonological awareness* (22%), *general knowledge* (23%), and *receptive vocabulary* (18%).

To examine whether one type of mediation added to the prediction of early literacy measures beyond the other type of mediation, we added a third step to each of the two hierarchical regression analyses described above. In the first regression, "writing mediation" was added in the third step after partialling out "storybook telling" (Step 3a). In the second regression, "storybook telling" was added in the third step after partialling out "writing mediation" (Step 3b). The criterion variables comprised all six early literacy measures.

Analyses of the third steps in Table 4 indicate that after partialling out *child's age*, child's *degree of hearing loss*, and "storybook telling" maternal "writing mediation" (Step 3a) explained a substantial significant added variance of the alphabetic skills of *word writing* (15%), *word recognition* (31%), and *letter knowledge* (36%). Alternatively, after partialling out *child's age*, child's *degree of hearing loss*, and "writing mediation,"

"storybook telling" (Step3b) explained significant added variance of the linguistic skills of *phonological awareness* (22%), *general knowledge* (28%), and *receptive vocabulary* (18%). In sum, each of the joint literacy activities – joint storybook telling and writing mediation – made a unique contribution to different aspects of early literacy skills, beyond that of the background measures and that of the other joint activity.

## DISCUSSION

This study investigated the characteristics of storybook telling and joint word writing as predictors of early literacy among Israeli kindergartners with hearing loss. Our major finding revealed that these two parent-child literacy activities contributed uniquely to different aspects of early literacy. Storybook telling related to linguistic skills, whereas writing mediation related to alphabetic skills. Storybook telling predicted the children's *phonological awareness, general knowledge*, and *receptive vocabulary*, beyond the effect of the child's background measures (*age* and *degree of hearing loss*) and beyond the effect of maternal writing mediation. At the same time, three alphabetic skills – *word writing*, *word recognition*, and *letter knowledge* – were predicted by maternal writing mediation, beyond the effects of background measures (*child's age* and *degree of hearing* loss) and beyond storybook telling.

### *Children with Hearing Loss Gain Different Benefits from Various Literacy Activities*

Our study thus provides further support for prior research on hearing children, which suggested that distinct home literacy activities render different influences on various aspects of early literacy. Storybook reading was previously shown to contribute mainly to hearing children's linguistic skills, whereas writing and other alphabetic experiences contributed mainly to alphabetic skills (Aram & Levin, 2002; Evans et al., 2000; Sénéchal et al., 1998). Whitehurst and Lonigan (1998) conceptualized the linguistic and alphabetic areas as “outside-in” and “inside-out” processes, respectively. The former includes

semantic, syntactic, conceptual, and schema knowledge, as well as knowledge about the conventions of print, and might reasonably be encouraged through storybook reading to children. The latter includes knowledge of letter names and sounds specific to a given alphabetic script, which are likely fostered by experiences with letters (Murray, Stahl, & Ivey, 1996).

Interestingly, an even sharper picture than that described in the literature on hearing children emerged in the present study for children with hearing loss. Although previous studies reported that hearing children benefited from storybook reading in both alphabetic and linguistic skills, with an advantage in the latter (Aram & Levin, 2002; Bus et al., 1995), the children with hearing loss in the present sample seemed to benefit only in the linguistic domain. They did not seem to expand their gains to the alphabetic domain. Some evidence suggests that deaf children's sensory deficit in the auditory channel precludes them from gaining as much as their hearing peers when exposed to indirect or informal mediation (Schirmer, 2001). Apparently, deaf children may benefit more from direct alphabetic experiences to develop these alphabetic skills.

Researchers often assert that parent-child storybook reading constitutes a good context for practicing linguistic skills (e.g., Fung et al., 2005). Examining the transactions involved in joint storybook reading may help to clarify its feasible contribution to language in the context of promoting literacy. While telling a story, parents dwell at length on the illustrations (Shapiro, Anderson, & Anderson, 1997) and clarify the story's meaning (Hale & Winkeckler, 1993). Thus, the experience of storybook reading is primarily linguistic: "Children may talk about the pictures, retell the story, discuss their favorite actions…. It is the talk that surrounds the storybook reading that gives it power, helping children to bridge what is in the story and their own lives" (IRA and NAEYC, 1998, p. 199). The few studies that explored home literacy among children with hearing loss focused only on storybook

reading as a context for promoting literacy (for a review, see Williams, 2004), referring only to the linguistic aspect (e.g., Fung et al., 2005) and rather neglecting other literacy activities at home like joint writing experiences.

Joint writing comprises a different experience that calls for alphabetic practice; thus, the relation found in the present study between maternal mediation in joint writing and children's alphabetic skills makes sense. Writing mediation reflects the mother's guidance of her child through the process of encoding – that is, segmenting the word, mapping a segment to a letter name, retrieving the letter's shape, and printing it. In the process of mediating writing, the mother focuses on her child's alphabetic skills. Although the literature regarding literacy of deaf children refers to the importance of alphabetic skills (e.g., Schirmer, 2000), its focus on the educational environment tends to neglect opportunities to practice these skills at home with parents. We found in this study that writing appears to offer a meaningful context for promoting alphabetic skills at home for kindergartners with hearing loss. In prior research on hearing children, these skills repeatedly predicted reading and writing acquisition in school (e.g., Aram, in press; Evans et al., 2000; Shatil, Share, & Levin, 2000). Moreover, previous studies showed that maternal writing mediation of hearing children in kindergarten predicted literacy achievements in second grade beyond the effect of the child's literacy level in kindergarten (Aram & Levin, 2004). Despite deaf children's auditory and speech deficits, letter-sound connections are eminent to their reading acquisition, and such children who enter first grade with good phonological skills and alphabetic knowledge acquire reading efficiency quicker (Colin et al., 2004; Harris & Beech, 1998; Musselman, 2000). We espouse Schirmer's (2000) statement that there is no reason to wait for some arbitrary level of language development prior to initiating alphabetic interactions with children who have hearing loss.

*The Nature of Mother-Child Literacy Interactions Among Children with Hearing Loss*

What are the characteristics of mother-child early literacy interactions among children with hearing loss? We found that in both storybook telling and joint writing interactions, the scores on measures that assessed interactivity leaned toward the lower end of the scales. Studies on hearing children using the same measures reported higher scores of interactivity (see DeBruin-Parecki, 1999 for storybook reading, and Aram, 2005 for writing interactions). The outcomes of the present study corroborated previous findings that hearing mothers of deaf children appear to be more dominant than are mothers who share a similar hearing status with their children (e.g., Pressman, Pipp-Siegel, Yoshinaga-Itano, & Deas, 1999). From the child's point of view, our study supported the stance that children with hearing loss are generally less active, responsive, or involved while reading books with their hearing parents than are children in dyads matched for hearing status (Bishop & Mogford, 1993). Interestingly, Lederberg and Everhart (2000) suggested that most of the differences in communication by hearing mothers of deaf and hearing 3-year-old children seemed attributable to the deaf children's linguistic delays and less so to the mothers' tendency to control the interaction.

Our results suggest that higher interactivity may be linked with higher early literacy. Children whose mothers' mediation in both tasks was characterized by higher interactivity scored higher on both linguistic and alphabetic skills. Language development of deaf children seems to be facilitated by encouraging children's participation and using a more contingent and child-centered interaction (Janjua, Woll, & Kyle, 2002). Some evidence has suggested that sensitivity in hearing mothers, i.e., the level to which they were alert to their children's skill level and mediated in their children's zone of proximal development, predicted their deaf children's expressive language. A mother who does not become discouraged from the interaction when her child's language is slow may contribute

to her child's long-term success. Mothers of deaf children should be motivated as mediators, in order to make compensatory adjustments to their children's communicative needs (Koester, 1994; Lederberg & Mobley, 1990).

*Maternal Mediation and Early Literacy Among Children with Hearing Loss*

The current study demonstrated that maternal mediation on both storybook telling and writing interaction predicted the child's early literacy. Perhaps mothers' main strategy of mediation relates to their perceptions about their children's knowledge (Aram, 2005). Alternatively, mothers may mediate according to their pedagogical beliefs about teaching and about themselves as mediators and according to their general beliefs about their children's competence (Korat & Levin, 2001). In line with this second explanation, a previous study (Aram & Levin, 2001) reported that the mother's style of writing mediation did not relate consistently to her child's level of literacy; some mothers mediated within their children's literacy zone of proximal development (Vygotsky, 1978), whereas others did not. Indeed, parents of high-performing deaf children reported that they accepted their role as their child's mediators and were highly committed to their child's development (Musselman & Kircaali-Iftar, 1996). However, our own correlational data between predictors and predicted variables do not permit causal interpretation**.** The results indicated that mothers' mediation both in storybook telling and in word writing was related to the child's early literacy skills and not to the child's degree of hearing loss. Evidence suggests that hearing loss in itself cannot predict the child's developmental level in different developmental aspects such as speech production and perception (Most & Frank, 1994) or vocabulary and verbal reasoning (Moeller, 2000). Our results that highlight parent-child interactions are in line with Moeller's findings that family involvement was the strongest predictor of deaf and hard of hearing children's language at age 5, regardless of degree of hearing loss. We recommend that future studies focus on other aspects related to the

development of children with hearing loss. It is important to investigate variables like the degree of hearing loss, degree of language delay, auditory comprehension skills, communication mode, age at identification, and duration of hearing loss to determine their contribution to children's early literacy as well as to the nature of parent-child literacy interactions. Moreover, our study investigated mother-child storybook telling and joint writing as predictors of early literacy only among kindergartners with hearing loss. Future studies should include a hearing control group that may strengthen understanding of the unique characteristics of mother-child literacy-related interactions among children with hearing loss. This line of investigation may support practitioners and pave the road for future early literacy interventions as well as for programs promoting parent-child interactions among children with hearing loss.

*Implications*

So what should parents of kindergartners with hearing loss do in order to promote their children's literacy? Our study suggests that both storybook reading and joint writing interactions are productive contexts for promoting the major aspects of early literacy among children with hearing loss. Parents should not give up on any of these contexts. Unfortunately, evidence indicates that young deaf children are less exposed to written language and participate less in literacy interactions than are their hearing peers (Luetke-Stahlman, 1999; Marschark, 1993). We believe that in kindergartens and centers for children with hearing loss, parents should be systematically introduced to early literacy development. Parents should learn about the potential importance of parental mediation and the differential contributions of storybook telling and joint writing to early literacy. If parents were more aware of the efficacy of specific mediation strategies in parent-child literacy interactions, they would likely read more to their children, be more sensitive to sporadic occurrences of writing interactions, and maybe even initiate more writing

activities at home. Inasmuch as the characteristics of literacy mediation are significant, parents who practice joint literacy interactions with their children may gradually gain experience conducive to learning how to become better mediators, thereby enhancing important aspects of literacy within both the linguistic and alphabetic domains.

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*Appendix*

*Scoring Criteria for Grapho-Phonemic Mediation, Printing Mediation, Demand for Precision, Word Writing, and Word Recognition*

| *Measure* | *Score* | *Scale description* |
|---|---|---|
| *Grapho-phonemic mediation* [a] | 1 | Mother refers to the word as a whole without segmentation. Example: The boy sat on his mother's lap holding a pencil. She held his hand, murmured the word to herself, and wrote the word by leading his hand. |
| | 2 | Mother utters the sequence of the sounds that create the word (mɛ-la-pɛ-fon 'cucumber'). |
| | 3 | Mother segments the word into its letters, and dictates a letter. Example of writing N in <u>zakɛn</u> 'old man:' Mother: Now, write Nun (letter name). |
| | 4 | Mother retrieves a phonological unit (syllable, sub-syllable, or phoneme) and immediately dictates the required letter name. Example of writing R in <u>gɛzɛr</u> 'carrot:' Mother: gɛ-zɛ-r, /rrr/, Rɛiʃ (final letter name). |
| | 5 | Mother retrieves a phonological unit and encourages/helps the child to link this unit with a letter name. Example of writing P in <u>mɛlafɛfon</u> 'cucumber.'<br>Mother: /mɛ-la-fɛ/ /fɛ/ /fɛ/. What is it?<br>Child: Bɛt? (letter name).<br>M: No. Bɛt sounds as /bɛ/ and /vɛ/ (letter that stands for /b/ or /v/).<br>C: Pɛi? (letter name).<br>M: Right. Pɛi is for /pɛ/ and /fɛ/. |
| | 6 | Mother encourages/helps the child to retrieve a phonological unit and to link it with a letter name. Example of writing Z in <u>gɛzɛr</u>:<br>M: What do you hear next? Listen carefully to the sound.<br>C: Zɛ.<br>M: How do we write it?<br>C: Zayin? (letter name)<br>M: Great! |

| *Measure* | *Score* | *Scale description* |
|---|---|---|
| *Printing mediation* [a] | 1 | Mother writes the letter on her own. |
| | 2 | Mother writes the letter holding the child's hand. |
| | 3 | Mother writes the letter and the child copies it. |
| | 4 | Mother scaffolds the child in writing the letter. |
| | 5 | Child writes the letter independently, usually encouraged by mother. |
| *Demand for precision* [a] | 1 | Low demand, that is, the mother hardly refers to the outcome; she lets the child write freely and accepts the product even if it is unconventional. |
| | 2 | Medium demand, that is, the mother tries to make the child produce the proper letter in the proper position, but when the child has difficulties she compromises and accepts a less conventional product. |
| | 3 | Higher demand, that is, the mother insists that the letters and the words be written accurately and, if any product is unsatisfactory, she requires corrections. |
| | 4 | Highest demand, that is, the mother demands words that are written absolutely conventionally. |
| *Word writing* [b] | 1 | Scribble. |
| | 2 | A big single good form, e.g., a square or a circle-like form. |
| | 3-5 | Use of three writing-like schemes, each adding a point: linearity, segmentation, or diverseness. |
| | 6 | Pseudo letters. |
| | 7 | Random letters insensitive to phonological length. |
| | 8 | Random letters sensitive to phonological length. |
| | 9 | Basic consonantal spelling without vowels. |
| | 10 | Basic consonantal spelling with vowels. |
| | 11 | Partial consonantal spelling without vowels. |
| | 12 | Partial consonantal spelling with vowels. |
| | 13 | Advanced consonantal spelling without vowels. |
| | 14 | Conventional writing. |
| *Word recognition* [b] | 1 | Pre-alphabetic explanation: egocentric, contextual, or ‘I don’t know’ (e.g., “Because I know,” “I guessed”). |
| | 2 | Rudimentary incorrect alphabetic explanation, i.e., the explanation |

| *Measure* | *Score* | *Scale description* |
|---|---|---|
| | | refers to characteristics relevant to writing, by noting letter names or phonological length, but applies them erroneously. |
| | 3 | Partial alphabetic, mixed correct and incorrect explanation, i.e., the explanation refers to characteristics relevant to writing, but applies them partly correctly and partly incorrectly (e.g., providing a correct name to a letter, but deriving the conclusion that it should be a word that is actually not spelled with that letter). |
| | 4 | Correct alphabetic explanation, i.e., the explanation correctly refers to the written system (e.g., naming a letter correctly and deriving the correct conclusion as to the written word). |

[a] Maternal writing mediation measures

[b] Children's early literacy measures

## Author Note

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Table 1

*Early Literacy and Maternal Literacy Mediation Measures: Means, Standard Deviations, Minimum and Maximum Scores (N = 30)*

| Measures | | | *M* | *SD* | *Min.* | *Max.* |
|---|---|---|---|---|---|---|
| Maternal mediation | Storybook telling | Interactive reading | 1.09 | 0.45 | 0.43 | 2.14 |
| | | Dialogic reading | 6.00 | 4.90 | 0.00 | 20.00 |
| | | Wh questions (%s) | 44.00 | 19.31 | 0.00 | 80.00 |
| | Writing mediation | Grapho-phonemic mediation | 3.38 | 1.18 | 1.00 | 5.47 |
| | | Printing mediation | 3.80 | 1.03 | 1.00 | 5.00 |
| | | Demand for precision | 2.76 | 1.05 | 0.00 | 4.00 |
| | | Task perception | 1.40 | 0.50 | 1.00 | 2.00 |
| Child's early literacy | Alphabetic skills | Word writing | 8.09 | 2.28 | 2.00 | 13.25 |
| | | Word recognition | 2.33 | 1.15 | 1.00 | 4.00 |
| | | Letter knowledge | 7.47 | 4.09 | 0.00 | 12.00 |
| | Linguistic skills | Phonological awareness | 4.00 | 1.93 | 0.00 | 8.00 |
| | | General knowledge | 10.67 | 4.06 | 2.00 | 20.00 |
| | | Receptive vocabulary | 33.60 | 7.44 | 20.00 | 48.00 |

Table 2

*Background Measures' Correlations with Mediation and Literacy Measures (N = 30)*

| Measures | | | Child's background | |
|---|---|---|---|---|
| | | | Age | Hearing loss |
| Maternal mediation | Storybook telling | Interactive reading | -.05 | .09 |
| | | Dialogic reading | .08 | .20 |
| | | Wh questions | .23 | .25 |
| | Writing mediation | Grapho-phonemic mediation | .54** | .15 |
| | | Printing mediation | .53** | .19 |
| | | Demand for precision | .37* | .06 |
| | | Task perception | .36* | .03 |
| Child's early literacy | Alphabetic skills | Word writing | .50** | .19 |
| | | Word recognition | .49** | .24 |
| | | Letter knowledge | .52** | -.01 |
| | Linguistic skills | Phonological awareness | -.09 | .04 |
| | | General knowledge | .24 | -.41* |
| | | Receptive vocabulary | -.24 | -.33 |

* $p < .05$; ** $p < .01$; *** $p < .001$.

Table 3

*Correlations Between Mediation and Early Literacy Measures, Controlling for the Child's' Age and Degree of Hearing Loss (N = 30)*

| Child's early literacy measures | | Maternal mediation | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Storybook telling | | | Writing mediation | | | |
| | | Interactive reading | Dialogic reading | Mother's Wh questions | Grapho-phonemic mediation | Printing mediation | Demand for precision | Task perception |
| Alphabetic skills | Word writing | .05 | .14 | .36* | .36* | .36* | .29 | .28 |
| | Word recognition | .12 | -.16 | .13 | .56*** | .56** | .44** | .48** |
| | Letter knowledge | .18 | .02 | .24 | .55*** | .61*** | .48** | .42** |
| Linguistic skills | Phonological awareness | .43** | .27 | .51** | -.06 | -.10 | -.13 | -.03 |
| | General knowledge | .44** | .46** | .43** | .19 | .17 | .18 | .18 |
| | Receptive vocabulary | .33* | .32* | .49** | -.08 | -.04 | .22 | -.16 |

* $p < .05$; ** $p < .01$; *** $p < .001$.

Table 4

*Summary of Hierarchical Regression Analyses for the Background and Maternal Mediation Measures Predicting Early Literacy (N =30)*

| Step | Variable | Child's early literacy measure | | | | | |
|---|---|---|---|---|---|---|---|
| | | Alphabetic skills | | | Linguistic skills | | |
| | | Word writing | Word recognition | Letter knowledge | Phonological awareness | General knowledge | Receptive vocabulary |
| | | $\Delta R^2$ (*p*-value)<br>$R^2$ | | | | | |
| Step 1 | Child's age and hearing loss | .29 (.01)<br>.29 | .30 (.01)<br>.30 | .27 (.01)<br>.27 | .01 (.88)<br>.01 | .23 (.03)<br>.23 | .16 (.09)<br>.16 |
| Step 2a | Writing mediation | .12 (.03)<br>.41 | .29 (.00)<br>.59 | .30 (.00)<br>.57 | .01 (.62)<br>.02 | .05 (.21)<br>.28 | .00 (.93)<br>.16 |
| Step 3a | Writing mediation | .15 (.01)<br>.47 | .31 (.00)<br>.61 | .36 (.00)<br>.65 | .00 (.97)<br>.24 | .10 (.02)<br>.56 | .00(.63)<br>.34 |
| Step 2b | Storybook telling | .03 (.27)<br>.32 | .00 (.85)<br>.30 | .02 (.37)<br>.29 | .22 (.01)<br>.24 | .23 (.00)<br>.45 | .18 (.01)<br>.34 |
| Step 3b | Storybook telling | .06 (.08)<br>.47 | .02 (.24)<br>.61 | .08 (.02)<br>.65 | .22 (.01)<br>.24 | .28 (.00)<br>.56 | .18 (.01)<br>.34 |

*Note*. **First regressions:** Step 2a = Writing mediation entered at the second step after partialling out child's age and degree of hearing loss in the first step, and Step 3a = Writing mediation entered at the third step after partialling out child's age and degree of hearing loss in the first step, storybook telling in the second step. **Second regressions**: Step 2b = Storybook telling entered at the second step after partialling out child's age and degree of hearing loss in the first step, and Step 3b = Storybook telling entered at the third step after partialling out child's age and degree of hearing loss in the first step, writing mediation in the second.