

Parental Involvement in Deaf Children's Education Programs as a Predictor of Child's Language, Early Reading, and Social-Emotional Development

Rosemary Calderon

University of Washington

This study examined the impact of school-based, teacher-rated parental involvement on four child outcomes: language development, early reading skills, and positive and negative measures of social-emotional development. The 28 children were assessed for outcomes between 9 to 53 months post-graduation from a birth-to-3 early intervention (EI) program for children with hearing loss. Other factors included in the study were child's hearing loss, mother's education level, mother's current communication skills with her child, and maternal use of additional services beyond those offered by the early intervention program or the child's school program.

Parental involvement in children's school-based education program is a significant positive predictor to early reading skills but shares considerable variance with maternal communication skill for this outcome. In this study, maternal communication skills and the child's hearing loss were the strongest predictors for language development. Maternal use of additional services was the strongest predictor to poorer social-emotional adjustment. The study's findings indicate that although parental involvement in their deaf child's school-based education program can positively contribute to academic performance, parental communication skill is a more significant predictor for positive language and academic development. Factors associated with parental involvement, maternal communication, and use of additional services are explored and suggestions are offered to enhance parental involvement and communication skills.

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Parental involvement in deaf children's early intervention (EI) and school-based education programs is increasingly being encouraged and expected. Changes in the delivery and models used for birth-to-3 EI programs for deaf children have been more parent- and family-focused (Calderon & Greenberg, 1997; Roush & Matkin, 1994). The Individuals with Disabilities Education Act (IDEA), reauthorized in 1997, encourages parents to engage in the decision-making process of their child's education. One of the major themes running through the 1997 amendments to the act is increased parent participation in the special education process. The IDEA gives parents the right to participate not only in the development of the individual education plan but also in placement decisions for their children. Congress also mandated joint parent-professional training to enhance better understanding of everyone's roles and responsibilities in the process of educating the child (Margolis, 1998). Despite this phenomenon of encouraging and promoting parental involvement in deaf children's educational settings, the impact of parental involvement on deaf children's developmental outcomes has not been well investigated for either early intervention or school-based education programs.

Parental involvement with hearing children's educational programs has been more widely studied (Bloom, 1980; Christenson, Rounds, & Gorney, 1992; Comer & Haynes, 1991; Epstein, 1983; Griffith, 1996; Grolnick, Benjet, Kurowski, & Apostoleris, 1997; Haw-

ley, Rosenholtz, Goddstein, & Hasselbring, 1984; Reynolds, Mavrogenes, Bezruczko, & Hagemann, 1996; Stevenson & Baker, 1987). Early research sometimes resulted in equivocal findings, but these findings were attributed to methodological problems related to the definition, degree, site, and measurement of parental involvement and child outcomes (Reynolds, 1992). Results from more recent studies have shown very strong evidence of the importance of direct parental involvement on positive child outcomes above and beyond factors traditionally thought to dictate a child's academic success (e.g., socioeconomic status [SES], parent education) (Griffith, 1996; Reynolds et al., 1996).

For example, in a study of 42 elementary schools, Griffith (1996) found that parental involvement and empowerment accounted for substantial variance in students' standardized test performance. This positive relationship was largely unaffected by school characteristics or the socioeconomic, racial, and ethnic composition of the students. Reynolds et al. (1996) investigated a model of mediating variables on preschool intervention effects on children's later school achievement in sixth grade. The model incorporated cognitive readiness at kindergarten entry and parental involvement in school (rated by teachers and parents) as primary mediators of preschool effectiveness. Results indicated that cognitive readiness and parental involvement significantly mediated the effects of preschool participation on school achievement and grade retention 7 years after the program. The contribution of these factors was stable over time even after consideration of factors of age, parents' education, gender, and participation in primary-grade intervention. Parental involvement in school was significantly associated with preschool participation and independently predicted school achievement, lower incidence of grade retention, and less frequent school changes.

Findings like these are fueling a public consensus and a national movement to support and enhance the direct involvement of parents in their children's educational programs (Berger, 1995). Goals 2000: Educate America was originally developed by the governors and the president in 1989. In 1994, the U.S. Congress added two more goals, one of which addresses the importance of parental involvement: "Every school will

promote partnerships that will increase parental involvement and participation in promoting the social, emotional, and academic growth of children" (U.S. Department of Education, 1995, p. 43).

Research on parental involvement with high-risk and special needs children (e.g., children of poverty, handicapped children, immigrant children, children with emotional problems) has also shown that parents are instrumental in the teaching of academic, language, social, motor, and vocational skills and managing their child's behavior (D'Alonzo, 1982; Innocenti & Taylor, 1998; Kelly, 1973; Leyser 1985). Despite this understanding, several potentially troublesome issues may contribute to limited parental involvement in special education program planning. For example, conflicts may arise between home and school as a result of differences in philosophy, values, goals, and expectations. The parent-professional relationship is often marked with distrust and disillusionment. Parents and professionals may view each other as hostile, indifferent, and unable to help the child (Leyser, 1985).

Studies with hearing families and deaf and hard-of-hearing children (focusing on family values toward education, parents' attitudes/expectations toward the child's achievements, parental coping skills and child's academic and social-emotional outcomes, and direct parent instruction) have demonstrated mixed results on the link between family-based influences and the child's academic, language, and psychosocial adjustment (Bodner-Johnson, 1986; Calderon & Greenberg, 1993; Calderon, Greenberg, & Kusche, 1991; Musselman & Kircaali-Ittar, 1996; Musselman, Wilson, & Lindsay, 1988; Watson, Henggeler, & Whelan, 1990). However, parents influence all three domains of a child's academic, language, and social-emotional development, and each domain affects the others.

It is well established that deaf children with better language and communication skills perform better academically (Marschark, 1993), and there is strong evidence for a connection between children's social-emotional development or social competence and academic outcomes (Greenberg & Kusche, 1993). Increases in children's reading scores, more constructive use of classroom teaching time, and better social and academic problem solving resulted when deaf children

reached higher levels of social-emotional competence and language and communication skills.

Calderon and Greenberg (1993) and Calderon, Greenberg, and Kusche (1991) found that maternal functioning and coping factors have significant impact on a child's functioning. These results were supported by objective teacher ratings. Teachers rated children of parents with better problem-solving skills as better adjusted and more competent than children of poor problem solvers. Findings for the relationship between parental coping resources and child outcomes suggest that maternal problem-solving skill is positively related to the child's emotional understanding, reading achievement, and social problem-solving skills. In addition, utilitarian resources (i.e., SES and parental sophistication regarding their child's education and communication needs) were positively correlated with a child's reading achievement. Last, the children of mothers who indicated more positive adjustment to their deaf children showed lower impulsivity, greater cognitive flexibility, and higher social understanding.

Bodner-Johnson (1986) found that families who pressed for achievement had children with higher math and reading achievement and that families demonstrating higher adaptation to the child's hearing loss predicted higher reading achievement in the child. However, parental involvement with the child did not predict academic achievement, and parental involvement in the child's school-based program was not measured. Watson, Henggeler, and Whelan (1990) found that poor social competence of deaf youths in their study was associated with high family stress. Higher rates of children's behavior problems were associated with poorer parental emotional status, lower family functioning, and greater hearing loss.

Musselman, Wilson, and Lindsay (1988) investigated age of intervention, program intensity, and direct parental instruction on language and social development of children with severe and profound hearing loss. Children were between 3 and 5 years old at the first assessment and then were assessed again 3 to 4 years later. Early entry into intervention was associated with higher receptive language scores in the first but not the second follow-up assessment. Neither direct parent instruction nor program intensity demonstrated consistent effects associated with the child outcomes.

Musselman and Kircaali-Iftar (1996) more closely investigated a subsample of the population of the Musselman et al. (1988) study. They examined the spoken language development of 20 of the deaf children in that sample, 10 with unexpectedly high spoken language skills and 10 with unexpectedly low spoken language scores relative to the children's background and training. Within this sample, direct parental instruction was among several variables associated with higher spoken language skills. Based on family interviews and other collected data, the researchers hypothesized that families with children with high spoken skills took the view that deafness is a challenge to be overcome, whereas families with children with low spoken language skills may view it as a difference to be accommodated. Musselman and Kircaali-Iftar concluded that educational interventions interact with aspects of family functioning to influence the course of their child's development. Despite the promotion of parental involvement in children's education, researchers and educators need to focus more systematically on family process variables. One cannot assume that a high degree of involvement represents more effective child functioning. Their findings suggest that families adapt differently and need assistance in selecting educational interventions compatible with the families' goals and functional style.

A recent study by Powers and Saskiewicz (1998) demonstrated that parents of deaf children participate to the same degree as do parents of hearing children in their children's education. However, the type of involvement differed in that parents of deaf children observed their children in the classroom more often, whereas parents of hearing children more often volunteered in the classroom. Powers and Saskiewicz did not investigate the impact of parental involvement on any child outcomes but suggested that perhaps parents realize the importance of their involvement in their child's future success. They hypothesized that parents of deaf children perhaps did not feel skilled enough to communicate with the other deaf children and felt more comfortable as observers. Despite the limitations of this study, it is the first to investigate any aspect of direct parental involvement in deaf children's education programs.

Researchers must now establish empirical evidence that deaf children benefit from direct parental involve-

ment in their child's school-based program; this relationship is important due to the differences between hearing and deaf children. For example, studies of hearing children have emphasized the importance of parents teaching the "mother tongue" to the child to increase and reinforce language skills being taught in the school (Christenson et al., 1992). What does that mean for deaf children? Historically, parents have depended on professionals to assume the responsibility of educating deaf children; conflict between parents and professionals has often resulted. Parents of deaf children have often been made to feel inadequate or at odds with professionals (Calderon & Greenberg, 2000); parents then find it difficult to be directly and actively involved in their children's education programs. Further, enrollment in early intervention can be considered the starting point of deaf children's educational history. Is there a connection between parental participation in early intervention and later parental involvement in their child's school-based program, despite the varying nature of these two types of educational programs? Early intervention is usually home-based and one-on-one; school-based involvement requires more initiative and organization on the parent's part.

Objectives of Study

This exploratory study examines the relationship between hearing parents' involvement in their deaf child's school-based program and child outcomes of language development, early reading skills, and social-emotional adjustment. Two specific questions will be addressed. First, does parental involvement significantly and positively predict child outcomes or are other parental variables such as parental education level or communication skills better predictors? Second, if parental factors do significantly contribute to the child's outcomes, is there something unique about those parental characteristics or can they be addressed, supported, and enhanced in an effort to promote better outcomes for children?

Method

Design and Procedure

Children and families were invited to participate in this study if the child did not have significant develop-

mental delays at the time of exit from early intervention, possessed a hearing loss of greater than 50 db HL, came from an English-speaking home, and was between the ages of 42 and 90 months at time of follow-up. Families of children who met the study criteria were contacted by letter. Records from the early intervention program were reviewed and data were collected on each child's initial hearing loss, age at entry into intervention, length of program involvement, number of program contacts, and so on. Interventionists' narrative notes were rated for perceived parental involvement during the home-based visits. Families participated in a 60- to 90-minute, center-based visit to assess the child's language and prereading skills and complete a videotaped, parent-child interaction. Prior to this center-based appointment, parents were asked to complete a family information form, which included a self-report inventory surveying how many additional services related to addressing their child's hearing loss the family engaged in aside from services offered by the early intervention or school-based program. Two parent families were asked to have each parent complete the questionnaires independently. The child's teacher (with consent by the parent) rated parents' involvement in the child's school program and completed two questionnaires on the child's social-emotional adjustment. Parents were paid \$25 and reimbursed for mileage to the center. Children were given a "prize" (small toy) when they completed the testing procedures, and teachers were paid \$25 for completing their set of questionnaires. The center-based assessment followed a standard protocol, beginning with the videotaped, structured parent-child communication task followed by an examiner administering the language and early reading tests.

Participants

Participants were 28 children with prelingual, moderately severe to profound, sensorineural hearing loss (pure-tone average >55 dB HL) who graduated from the Early Childhood Home Instruction (ECHI) early intervention program (Thompson, 1994) and were 45 to 88 months old at the time of the follow-up assessment. Participants were recruited exclusively from a list of children and families who graduated from the

ECHI program, currently located at Children's Hospital and Regional Medical Center in Seattle, Washington. ECHI utilizes a Total Communication approach with Signing Exact English as the manual mode of communication. The intervention program also makes available a parent support group and a center-based playgroup to promote language development and social interaction in a play environment. At the time of graduation from ECHI, all the children were estimated to be of normal development as measured by the Rockford Infant Developmental Evaluation Scales (1979). All the children came from English-speaking homes (2 of the 28 were bilingual), had hearing parents, and had no older siblings with permanent hearing loss. Fifteen of the children and families lived in rural communities, 9 in suburban cities, and 4 lived in a major urban setting. Of the 28 children, 10 attended all deaf schools (1 attended as a day student at the Washington state school; 9 attended a private day school), 4 were in fully mainstreamed programs, and 14 were in self-contained programs for deaf and hard-of-hearing children within public hearing schools.

Preliminary screening of the eligible ECHI graduates indicated 44 children met criteria for entry into the study. Significant efforts were made to recruit all the children and families meeting the study criteria. Of the 44 families contacted, 30 consented to participate and 28 (64%) completed the study. Two consenting families later chose not to participate due to time conflicts and family responsibilities. No significant differences were found between the final 28 participating families and the 16 nonparticipating families on the variables available for comparison (estimated initial hearing loss, age at entry, duration of EI, residence, rating of maternal involvement in EI, language scores at exit from EI, or gender). Thus, the 28 participants appear to be representative of the original 44 eligible children and families.

Measures

Data were collected via interviewer-administered child assessment measures, parent and teacher questionnaires, videotaped parent-child interactions, and review of ECHI archival records. Because all 28 mothers participated in all aspects of the follow-up study, only

maternal data will be reported. (See Calderon and Low [1998] for results on the investigation of the paternal relationship to child outcomes.)

Child and family demographics and EI program information.

Child and family demographic and early intervention variables were collected either through the ECHI archival files, parent interviews, or the Family Information Form. The Family Information Form was constructed for this study and completed by the parents. Data were collected on gender of child, age of child at follow-up, place of family residence, current type of education program, maternal age, maternal education (on a scale of 1 to 7, 1 = less than eighth grade education, 7 = graduate school), age at entry into intervention, and intensity of intervention services (based on the total number of program contacts divided by the number of weeks in the intervention program). Hearing loss at time of follow-up was based on a parent-provided record of an audiogram completed within 12 months of the study. Hearing loss was defined as the average threshold at 500 Hz, 1000 Hz, and 2000 Hz in the better ear.

Parental involvement measures. The principle variable of interest, parental involvement in the child's school-based education program, was measured by asking teachers to complete a questionnaire (see the appendix) that rates parents on 14 indicators of involvement (e.g., participates in IEP meetings, requests additional services for child, volunteers in classroom, attends school related functions, etc.) using a 5-point scale (0 = not involved to 5 = highly involved). Indicators were tallied to provide a final score of teacher's ratings of each mother's involvement. The maximum score for this measure is 70. This parental involvement inventory was constructed for use in this study but is similar to other inventories measuring this construct (e.g., Powers & Saskiewicz, 1998).

Two other associated measures of parental involvement were also assessed. First, the additional services checklist asks parents to indicate whether they accessed for themselves or their child any services related to their child's hearing loss (e.g., speech therapy, sign language classes, counseling, other medical interventions, etc.) in addition to those provided by the early inter-

vention or school program. This measure was intended to capture parental involvement other than that available in the child's early intervention or school-based program. One point is given if the additional service was undertaken before or after the intervention and two points if it occurred during *and* after the intervention. The maximum score for this measure is 34.

Second, perceived parental involvement during early intervention was rated by two independent coders based on the interventionist's narrative notes completed after each of the home visits (e.g., is the parent noted to be passive or active, is the parent home for the appointments). Perceived parental involvement was rated on a 5-point scale with 1 typically absent, minimally involved or reluctant to participate; 2 present but only marginally involved; 3 present and moderately involved; 4 participates with enthusiasm but not independently or creatively; 5 participates, is highly involved, also shows creativity and independence. Interrater reliability was .81 for exact agreement and 1.00 for within 1 rating point difference for mothers ($\kappa = .70$, $SE = .17$).

Maternal communication. Because of the impact maternal communication skill can have on the parent-child relationship and the transmission of information about academic or social-emotional topics, a measure of maternal communication was conducted. Maternal communication skill was assessed with the Language Proficiency Profile-Parent Version (LPP-PV) (Calderon, Sidman, & Bargones, 1996). The LPP-PV was created based on the Language Proficiency Profile (LPP) (Bebko & McKinnon, 1993) to evaluate parental communication skills during a videotaped, structured parent-child interaction task. During the parent-child structured interaction task, each mother was instructed to encourage her child to tell a story about each of three pictures of varying familiarity. The pictures were presented to the child in an order progressing from most to least familiar (concrete to abstract). The first picture contained children in a preschool setting, working on arts and crafts projects. The second picture portrayed a diver in a wet suit and diving helmet standing on a dock; this less familiar scenario would allow for novel material to be introduced and discussed. The final picture was an abstract painting of a dancing Native

American. This drawing provided the opportunity to use abstract language and concepts.

Observers rated the videotapes of the parent-child interaction task. LPP-PV skill areas were credited if the information was provided in the child's demonstrated communication mode (e.g., if a child relied on sign language and the mother only used oral communication, then no skills were credited as the communication was inaccessible to the child). The original five LPP subscales (content, reference, use, cohesion, and form) were maintained in the LPP-PV, although individual skills not relevant to the designated task were deleted (22 skills were dropped from the LPP inventory, leaving 61% of the original LPP listed skills). Six additional skills were added (e.g., uses multiple word/sign messages, introduces new vocabulary, uses wh-questions to elicit language). Scores of 1 or 0 were assigned based on absence or presence of the skill. The maximum score on the LPP-PV is 40. Exact interrater agreement across the total measure was .88 and ranged between .81 to .89 for individual subscales. Kappas ranged from medians of .60 to 1.00, with an average median of .76 across all five subscales.

Child outcomes. All assessments were administered in the child's preferred communication mode, sign language and/or orally (i.e., ASL, simultaneous communication: oral and Signed Exact English, or oral only). The test administrators were experienced in communicating in the child's preferred sign language system. Additionally, the assessment measures were reviewed prior to the study and the assessment questions were modified as appropriate to reflect the underlying measurement issue while making the question accessible for those children who rely on sign language.

The child's language development was assessed with the Preschool Language Scale-3 (PLS-3) (Zimmerman, Steiner, & Pond, 1992). The PLS-3 is an examiner-administered language measure assessing both expressive and receptive English language skills. This test is standardized for hearing children age 0 to 84 months. The PLS-3 provides age-based standard scores, percentile ranks, and age equivalents for the receptive, expressive, and total language scores. Only the PLS-3 total language standard score is used in the analyses due to the high correlations between the two

subscales ($R = .78$, $p < .000$) and each subscale with the total language score ($R_s = .96$ and $.92$, respectively, $p < .000$) and the standard score controlled for the varying ages of the study participants. The PLS-3 was determined to be a reasonable language measure for this study population, despite its primary use with hearing children and assessment of English skills, because all the children in the study graduated from an EI program that taught Signing Exact English and the vast majority of families (96%) reported SEE or spoken English to be their primary mode of communication.

Early reading ability was assessed with the Test of Early Reading Ability-Deaf/Hard of Hearing (TERA-D/HH) (Reid, Hresko, Hammill, & Wiltshire, 1991). The TERA-D/HH measures the child's ability to attribute meaning to printed symbols, knowledge of the alphabet and its function, and understanding of the conventions of print. The TERA-D/HH has norms for deaf and hard-of-hearing children. This assessment tool was chosen because of its ability to assess age-appropriate early reading skills in normally developing deaf children over a range of ages. It provides scores in their raw form, as percentiles, quotients, and standard scores. The quotient score was used in the analyses as a measure of controlling for the various ages of the children in the study.

Teachers rated social-emotional adjustment with use of two measures. Teacher ratings were used because of the interest in determining whether parental involvement influences the child's school-based behavior. One measure reflects positive social-emotional adjustment and the second measures externalizing behavior problems. The focus on externalizing rather than internalizing behavior problems is due to the higher than normal incidence of externalizing behavior problems in young deaf children (see Greenberg & Kusche, 1993). To assess for positive sociable, communicative behaviors, Scale 1 from the Social Emotional Assessment Inventory-Preschool Version (SEAI; Meadow, 1983) was used. The SEAI is a 49-item, teacher-completed behavior rating scale developed specifically to assess deaf and hard-of-hearing children. The SEAI yields normative information on four subscales (sociable, communicative behaviors; impulsive, dominating behaviors; developmental lags; and anxious,

compulsive behaviors) plus three special items related to deafness. Norms are provided for girls and boys with hearing loss ages 36 to 83 months. Scores range between 1 and 4 with higher scores indicating better sociable, communicative skills.

Externalizing child behavior problems were assessed with the Teacher Rating Form of the Child Behavior Checklist (CBCL; Achenbach, 1991, 1992). The CBCL contains 100 or 113 (dependent on the age of the child) behavior-problem descriptions rated by teachers for degree of frequency of the problem (none, sometimes, a lot) shown by the child. It provides standardized scores (controlling for gender/age differences) and percentile scores for internalizing, externalizing, and total problems scores. Only the externalizing standard score was used from this measure. Higher scores indicate more severe externalizing behavior problems.

Results

Final variables included in the regression analyses are the four child outcomes (PLS-3 language score, TERA-D/HH early reading score, SEAI Scale 1, and the CBCL externalizing subscale score) as dependent variables, child's hearing loss as a covariate, and maternal communication score, maternal education, teacher-rated parent involvement in the child's school-based program, and the use of additional services as independent variables. Table 1 shows the means, standard deviations, and ranges for the variables in these regressions.

The relations among the study variables were first investigated by use of Pearson correlations, histograms, and scatter plots. All variable pairings were examined to ensure that correlations were not influenced by outlying or extreme values. Review of the correlations and plots revealed no significant outliers, extreme values, or skewed relationships among the variables. Table 2 presents the correlation matrix for the regression variables.

Among the variables in the correlation matrix, maternal communication skill was significantly and positively correlated with teacher-rated parental involvement. The PLS-3 language score was significantly and positively correlated with the child's hearing loss and maternal communication skill. The TERA-D/HH early reading score was significantly and positively cor-

Table 1 Means, standard deviations, and ranges for the regression variables

	<i>M</i>	<i>SD</i>	Range
Parent involvement variables			
Teacher-rated maternal involvement in child's school-based education program	31.43	16.21	6.00–56.00
Maternal use of additional services	10.57	4.96	4.00–21.00
Child and family factors			
Child's hearing loss	91.21	17.52	55.00–115.00
Maternal education ^a	5.00	1.25	2.00–7.00
Observer-rated maternal language skill (LPP-PV)	27.89	8.49	13.00–38.00
Child outcome variables			
PLS total standard score	67.93	19.95	50.00–124.00
TERA/DHH quotient	97.82	15.78	70.00–127.00
SEAI-1 (sociable and communicative) ^b	3.45	.32	2.78–3.89
Teacher CBCL (externalizing subscale standard score) ^c	51.61	7.63	39.00–64.00

^aMaternal education scale = 1—up to 9th grade, 2—partial high school, 3—completion of GED or high school, 4—one year of college, 5—two years of college or technical school, 6—four years of college, 7—graduate school.

^bSEAI-1 is scored between 1 and 4 with higher scores reflecting higher social, communicative behavior.

^cCBCL externalizing subscale scores reflect more behavior problems as scores increase.

Table 2 Correlation matrix of dependent and independent variables entered in regression models

	Teacher-rated maternal involvement	Maternal use of additional services	Child's hearing loss	Maternal education	Maternal communication skills	PLS-3 total language score	TERA D/HH quotient	SEAI Scale 1	CBCL externalizing score
Teacher-rated maternal involvement	—	.047	.000	.441*	.587***	.266	.519***	.143	-.281
Maternal use of additional services	—	—	-.171	.006	.032	.146	-.186	-.462*	.578***
Child's hearing loss	—	—	—	-.239	-.335	-.616***	-.210	-.090	.112
Maternal education	—	—	—	—	.357	.412*	.427*	-.165	-.156
Maternal communication skills	—	—	—	—	—	.579***	.610***	.210	-.445*
PLS-3 total language score	—	—	—	—	—	—	.675***	.312	-.207
TERA D/HH quotient	—	—	—	—	—	—	—	.485**	-.483**
SEAI Scale 1	—	—	—	—	—	—	—	—	-.540**

n = 28.

**p* < .05.

***p* < .01.

****p* ≤ .001.

related with maternal communication skill, the PLS-3 language score, the SEAI sociable, communicative subscale, and negatively correlated with the CBCL externalizing behavior problem subscale. The SEAI and CBCL scores were significantly but negatively correlated with one another, as might be expected since one (SEAI) indicates positive social behaviors and the other (CBCL) represents externalizing behavior problems. Maternal use of additional services was also strongly correlated with the CBCL externalizing score for child behavior problems and less strongly and in a negative direction with the SEAI sociable, communicative scale. To a lesser but still significant degree, maternal education was correlated with teacher-rated parent involvement, child's PLS-3 language score, and TERA-D/HH early reading score.

Multiple regression analyses were conducted to determine whether the primary variable of interest, parental involvement in the child's school-based program, is a significant predictor of the child outcome measures or if other parental factors may be more predictive. Because of the exploratory nature of this study, variables were initially entered in the following uniform order for each of the dependent variables: hearing loss was entered first as a covariate; then parental involvement, maternal communication, additional services, and maternal education were entered second in a step-wise fashion. Table 3 presents results of the multiple regression analyses for the four child outcomes.

With the PLS-3 language score as the dependent variable, regression results indicate that child's hearing loss accounted for a significant 38% of the variance, followed by maternal communication skill accounting for an additional 15.7%, which was also at a significant level. Together they explained 53.7% of the variance. No other variable made a significant contribution in explaining child's language development. Regression results for the TERA-D/HH early reading score indicate that child's hearing loss accounted for only 4% of the variance (a nonsignificant contribution) followed by maternal communication skill, which explained a significant 33% of the variance. None of other variables was a significant predictor. Results for the sociable, communicative scale from the SEAI indicate that child's hearing loss was noncontributory at less than 1%, while maternal use of additional services accounted for a significant 23.5% of the variance. This was a negative relationship in that higher scores for use of additional services predicted poorer ratings on sociable, communicative skills for the child. No other variable added further in explaining the variance for this outcome. Last, when teacher ratings on the CBCL for externalizing behavior problems was the dependent variable, child's hearing loss accounted for only 1% of the variance, followed by maternal use of additional services accounting for a highly significant 37% of the variance, and maternal communication skill explaining, at a significant level, an additional 17% of the overall

Table 3 Results of regression models for child outcomes of language development, early reading, and social-emotional adjustment

Variable	β	<i>df</i>	R^2	<i>df</i>	F_{eqn}	R^2_{change}	F_{change}
PLS-3 total language standard score							
Child's hearing loss	-.476*	1, 26	.380	1, 26	-3.291	.380	15.918*
Maternal communication skills	.420*	1, 25	.537	2, 25	2.908	.157	8.457*
TERA-D/HH early reading skills							
Child's hearing loss	.006	1, 26	.044	1, 26	.037	.044	1.196
Maternal communication scores	.607**	1, 25	.372	2, 25	3.610	.328	13.036**
SEAI scale 1: sociable, communicative							
Child's hearing loss	-.174	1, 26	.008	1, 26	-.985	.008	.213
Additional services	-.492*	1, 25	.243	2, 25	-2.784	.235	7.752*
Teacher-rated CBCL externalizing behavior standard score							
Child's hearing loss	.067	1, 26	.013	1, 26	.456	.013	.330
Additional services	.604**	1, 25	.380	2, 25	4.360	.368	14.820**
Maternal communication skill	-.442*	1, 24	.553	3, 24	-3.050	.173	9.302*

* $p < .01$.

** $p \leq .001$.

variance, for a total of 55%. Maternal communication skill was negatively related to this outcome; that is, mothers with lower-rated communication skills had children with higher teacher-rated externalizing behavior problems. Neither teacher-rated maternal involvement nor maternal education was significant.

Because of the significant correlation between maternal communication skill and teacher-rated maternal involvement, another set of regressions was computed in which maternal communication was removed from the second entry step of the independent variables and entered as a third step. This was done to determine whether this order would reveal any information about parental involvement as a predictor variable prior to entering maternal communication and whether maternal communication remained a significant predictor beyond that variance potentially explained by parental involvement. Results for these second regressions indicate that when maternal communication is entered last, parental involvement does explain a significant amount of the outcome variance for early reading scores at 27% and maternal communication skills drop to a more modest but still significant contribution of an additional 10%. This order of entry increased the explanation of the total variance to 41.5% from the original 37%. There was no change in the results for the PLS-3 language scores with this alternate entry of variables. Maternal communication remained the only predictor after hearing loss to contribute additional significant understanding of the outcome variance for the PLS-3 language development score.

Similar alternate regressions were computed for the two measures of social-emotional adjustment. For these regressions, use of additional services was taken out of the second stepwise entry and entered in a third step to determine whether teacher-rated parental involvement would emerge as a predictor variable prior to entering use of additional services and whether use

of additional services would remain a significant predictor beyond that variance explained by parental involvement. Regression outcomes remained unchanged for the SEAI measure of positive sociable and communicative behaviors regardless of entering use of additional services last. Additional services remained the only significant predictor variable. When use of additional services and maternal communication were entered last in a third step for the dependent variable of CBCL externalizing behavior, the results remained unchanged, hearing loss remained nonsignificant and maternal communication skill and use of additional services remained significant predictors. Table 4 presents the one different significant finding of this second set of regression models.

After deriving the results from the regression analyses, further analyses were computed to determine whether any child, maternal, or early intervention variables are associated with teacher-rated parental involvement, maternal communication, and maternal use of additional services. Variables hypothesized to be associated with these three predictor variables included child's hearing loss, maternal involvement in early intervention, child's age of entry into early intervention, intensity of EI, maternal education, and SES. Table 5 presents the mean, standard deviation, and range for these variables and Table 6 the correlation matrix between teacher-rated parental involvement, maternal communication, additional use of services, and the various child, maternal, and early intervention variables.

Teacher-rated maternal involvement was most highly correlated with ratings for maternal involvement in early intervention, the intensity of the early intervention program, and SES. Maternal education was marginally correlated with teacher-rated maternal involvement. Maternal communication skill was significantly correlated only with SES. Use of additional services was marginally correlated with child's age of

Table 4 Significant results of alternate regression model for child outcome of TERA-D/HH early reading skills

Variable	β	<i>df</i>	R^2	<i>df</i>	F_{eqn}	R^2 change	F_{change}
Child's hearing loss	-.065	1, 26	.044	1, 26	-.381	.044	1.196
Teacher-rated parent involvement	.266	1, 25	.314	2, 25	1.332	.270	9.835**
Maternal communication skills	.431*	1, 24	.415	3, 24	2.035	.101	4.143*

* $p \leq .05$.

** $p = .002$.

entry into early intervention and intensity of the early intervention services.

Regression analyses were then computed to determine which of these variables might explain a significant amount of the variance in teacher-rated parental involvement, maternal communication skill, and maternal use of additional services. Regressions were computed by entering all independent variables in one stepwise entry for each of the three variables of interest. Regression results for teacher-rated parental involvement indicated that maternal involvement in early intervention and the intensity of the early intervention explained 49% of the total variance. Maternal involvement in early intervention explained 35% and intensity of the intervention accounted for an additional 13.5%. For maternal communication skill, only SES was a significant explanatory variable, accounting

for 15% of the variance. Variables that were significant in explaining use of additional services were age of entry into early intervention and the intensity of the intervention. Age of entry and intensity of early intervention services explained approximately 34% of the total variance, with age of entry explaining a significant 16% and intensity of intervention services accounting for an additional significant 18%. More additional services were used by mothers of children who entered later into early intervention or were provided more intense early intervention services. Table 7 presents the results of these regression analyses.

Last, it is not unusual for deaf children to travel relatively long distances to attend centralized special education programs. This may affect how easily a parent can directly be involved with his or her child's school program. An ANOVA was computed to determine whether place of residence (urban, suburban, or rural) might affect parental involvement in the child's current school program. Results were not significant, indicating that place of residence was not related to level of parental involvement.

Discussion

This exploratory study is an examination of the relation between school-based parental involvement and later child outcomes specific to hearing mothers with deaf and hard-of-hearing children. Two questions were asked. First, does parental involvement significantly and positively predict child outcomes or are other parental variables such as parental education level or

Table 5 Means, standard deviations, and ranges for child, early intervention, and maternal variables

	<i>M</i>	<i>SD</i>	Range
Child's hearing loss	91.21	17.52	55.00–115.00
Child's age at entry to EI	21.00	7.36	4.20–31.57
Maternal involvement in early intervention	3.52	.94	2.00–5.00
EI program intensity (home visits per month)	2.87	.99	.44–5.3
Maternal education ^a	5.00	1.25	2.00–7.00
SES	3.3	.09	1.00–5.00

^aMaternal education scale = 1—up to 9th grade, 2—partial high school, 3—completion of GED or high school, 4—one year of college, 5—two years of college or technical school, 6—four years of college, 7—graduate school.

Table 6 Correlation matrix of teacher-rated maternal involvement, maternal communication skills, and use of additional services with child, maternal, and early intervention program variables

	Teacher-rated maternal involvement	Maternal communication skill	Use of additional services
Child's hearing loss	.000	-.335	-.171
Child's age of entry into early intervention	-.239	-.013	.380*
Maternal involvement in early intervention ^a	.593***	.353	-.295
Intensity of early intervention program	.476**	.276	.373*
Maternal education	.441*	.357	.006
SES	.467**	.390*	-.013

^a*n* = 27.

**p* < .05.

***p* < .005.

Table 7 Results of regression models for teacher-rated maternal involvement, maternal communication skills, and use of additional services

Variable	β	<i>df</i>	R^2	<i>df</i>	F_{eqn}	R^2 change	F_{change}
Teacher-rated maternal involvement							
Maternal involvement in early intervention	.577	1, 26	.352	1, 26	3.939	.352	13.588**
Intensity of early intervention	.367	1, 25	.487	2, 25	2.510	.135	6.299*
Maternal communication skills							
SES	.391	1, 25	.153	1, 25	2.123	.153	4.509*
Use of additional services							
Age of entry into early intervention	.467	1, 26	.159	1, 26	2.771	.159	4.712*
Intensity of early intervention services	.426	1, 25	.336	2, 25	2.530	.177	6.400*

* $p \leq .05$.** $p \leq .001$.

communication skill better predictors of deaf children's outcomes? Second, if parental factors do significantly contribute to the child's outcomes, is there something unique about those parental characteristics or can they be addressed, supported, and enhanced in an indirect effort to promote better outcomes for children? Results from this study suggest that school-based parental involvement does predict early reading skills but shares considerable predictive power with maternal communication skill. In other studies, there is no clear-cut relationship between parental school-based involvement and child outcomes.

Maternal communication skill proved to be a more significant indicator for both language development, early reading skills, and social-emotional development. Mothers who demonstrated better communication skill with their children had children with higher language and reading scores and less behavior problems, after controlling for hearing loss. Although maternal communication skill was not conceptualized as an indicator of direct, school-based parental involvement, it does suggest a strong aspect of parental involvement. A parent would have to be quite involved with his or her deaf or hard-of-hearing child to develop good mutual communication. For the young children in this study, developing a common language base requires a fair amount of work on the parents' part, especially if that common language is a new language to the parent, such as sign language. Even sharing spoken English with deaf or hard-of-hearing children requires a significant amount of practice and sensitivity to make the spoken message meaningful and accessible.

Of the various parent, child or early intervention

factors thought to possibly predict maternal communication skill, only SES was significant though marginal. SES has not been shown in past studies to be directly related to outcomes associated with deaf children, but the relationship between SES and maternal communication in this study may demonstrate an indirect link to child outcomes. Mothers with higher SES may have the resources to access those tools that can enhance mutual communication with her child, such as private or public sign language classes, books, videotapes, auditory-verbal training for the child, or the most advanced listening devices. Interestingly, maternal education alone was not predictive for maternal communication skill, parental involvement, or any of the child outcomes. This is contrary to findings in studies of hearing children, which indicate maternal education to be a strong predictor to child outcomes (Stevenson & Baker, 1987). This may indicate that even mothers with higher levels of education may not be able to influence their child if they do not share a communication mode.

With regard to the relationship between maternal use of additional services and the two child social-emotional outcomes, it is interesting that use of additional services predicts poorer outcome on both these measures. Mothers who used more outside additional services (and might be thought of as a more involved parent) had children with more behavioral problems and poorer sociable, communicative skills. Normally, one might think that the more services and the more involved the parent, the better off the child. This counterintuitive result may be better understood when one examines the factors associated with use of additional services: age at entry into early intervention and inten-

sity of intervention services. Those children who used the highest number of additional services entered the birth-to-3 early intervention program after 24 months of age, some as late as 30 months old. Children who enter intervention later tend to have poorer outcomes for language development at exit from intervention, and these delays continue well after intervention (Calderon & Naidu, in press). Thus, it is not surprising that parents whose children entered late into intervention may feel more compelled to seek out other resources to compensate for missed EI services. Additionally, those families who received higher intensity of services may have had children with higher needs either due to late entry or slower progress with the standard intervention services provided. Given the relationship between poor language skills and behavior problems in both hearing and deaf children, it is not surprising that use of additional skills predicts poorer social-emotional adjustment.

A similar dynamic is also illustrated with the relationship between poorer maternal language skill and higher externalizing behavior problems. Without good models for verbal mediation of behavioral difficulties and facilitative instruction for alternative good behaviors or reasons why the behavior is inappropriate, children tend to exhibit acting-out behaviors. This is true for hearing as well as deaf children (Greenberg & Kusche, 1993). Unfortunately, results from this study did not give clear indicators as to what parental factors predict positive sociable, communicative skills or prevent externalizing behavior problems.

Direct, school-based parental involvement may not be a more significant predictor for deaf children's outcomes for a number of reasons. First of all, perhaps for deaf children, unlike hearing children, direct parental involvement in the child's school program is not as primary, or parental involvement as measured in this study is not sensitive enough, or hearing parents of deaf children do not participate to a high enough degree to make an impact. In this study, the mean average teacher rating for parental involvement did not reach the midpoint of the highest score possible. This dynamic of less parental involvement by hearing parents of deaf children was suggested by Powers and Saskiewicz (1998) when they observed that the type of involvement differed for the parents of hearing versus

deaf children. Parents of deaf children observed their children in the classroom more often, whereas parents of hearing children more often actively volunteered in the classroom. Perhaps parents of deaf children do not feel skilled enough in communicating with the other deaf children to be a classroom volunteer.

Another hypothesis for the lack of direct, school-based parental involvement involves the nature of the difference between parental involvement in early intervention and later in the child's school. In early intervention, the teacher comes to the home at a convenient time for the family, works one-on-one with the parent and child, and often functions as a primary support person during the early diagnosis phase, which can be a very emotional time for parents. In contrast, for the parent to be involved in the child's classroom, a number of obstacles may arise, including transportation, time, distance from the school, as well as parents' own feelings about being in a school building. Also, the teacher's role may be very different from that of the early interventionist and the goals of the school-based education program may be quite different from those of the EI program. The bureaucracy of special education may intimidate parents and discourage them from participating. Parents also report varying degrees of interest from teachers when seeking to become involved in their child's school program. Further investigation of direct parental involvement including in-depth interviews with the parents will provide resolutions for these hypotheses.

Future investigations can further the results of this study by addressing the several limitations concerning the population and measures for child outcome and parental involvement. Studies that include older children of a more uniform age; measure school-based parental involvement with more breadth, depth, and objectivity; and utilize stronger measures of academic child outcomes, such as the standardized test scores in several different academic subjects, will provide a more definitive investigation of the questions posed in this study.

In summary, deaf children are considered a high-risk population because of their well-documented delays in language and communication skills, academic achievement, and social-emotional adjustment (Greenberg & Kusche, 1989; Marschark, 1997). Direct parental involvement in their *hearing* children's school pro-

gram can have a positive influence on the child's academic and social-emotional development. Results from this study provide initial evidence that direct parental involvement in *deaf* children's education programs may not play as significant a role as other indicators of parental involvement (e.g., maternal communication skill). Parental involvement may depend on the development of other parent skills first, as demonstrated by the moderate correlation and shared variance between direct parental involvement and maternal communication skill in explaining early reading skills. This study suggests that mothers who can communicate better with their deaf child may also feel more at ease to interact with their child in settings other than the home, feeling more comfortable participating in their child's school environment.

Given the preliminary results of this study, educators, counselors, school administrators, and other related professionals should more systematically and actively invite parental involvement with the goal to

enhance parental communication skills with their child. The following recommendations are offered in an effort to create and support improved parent-professional teamwork for deaf children's educational and life success. First, designate the role of a parent educator in school programs to facilitate parent-school involvement and parent-child communication. Second, systematically incorporate parent volunteer opportunities in the child's educational setting. Parents can then readily observe teachers model communication strategies with their child. And, last, do not undervalue the importance of school-sponsored sign classes, family retreats, open door policies, or other efforts that can help families increase their communication skills with their child. These activities indicate to families that they are vitally important to the education of their child and that schools value the home-school connection.

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Appendix

Teacher Questionnaire

Please rate how involved you think _____'s parent(s) is in the following activities that are oftentimes associated with a child's education program.

0 = not involved 2 = a little involved 3 = average 4 = a lot involved 5 = highly involved
 NA = Not Applicable DK = Don't Know

Provides input into the child's Individualized Education Plan	Mother	NA/DK	0	2	3	4	5
	Father	NA/DK	0	2	3	4	5
Requests additional educational services	Mother	NA/DK	0	2	3	4	5
	Father	NA/DK	0	2	3	4	5
Attends classroom functions, (e.g., open house, plays, etc.)	Mother	NA/DK	0	2	3	4	5
	Father	NA/DK	0	2	3	4	5
Volunteers in classroom	Mother	NA/DK	0	2	3	4	5
	Father	NA/DK	0	2	3	4	5
Engages in spontaneous contact with the teacher	Mother	NA/DK	0	2	3	4	5
	Father	NA/DK	0	2	3	4	5
Observes in child's classroom	Mother	NA/DK	0	2	3	4	5
	Father	NA/DK	0	2	3	4	5

Asks questions about the curriculum	Mother	NA/DK	0	2	3	4	5
	Father	NA/DK	0	2	3	4	5
Knows child's classmates	Mother	NA/DK	0	2	3	4	5
	Father	NA/DK	0	2	3	4	5
Uses teacher established system for keeping in contact with parent (e.g., writes in daily notebook, keeps phone appointments)	Mother	NA/DK	0	2	3	4	5
	Father	NA/DK	0	2	3	4	5
Facilitates or enhances child's learning opportunities	Mother	NA/DK	0	2	3	4	5
	Father	NA/DK	0	2	3	4	5
Reinforces or expands on topics/lessons presented in school	Mother	NA/DK	0	2	3	4	5
	Father	NA/DK	0	2	3	4	5
Helps out with school fundraisers	Mother	NA/DK	0	2	3	4	5
	Father	NA/DK	0	2	3	4	5
Reviews child's classroom work	Mother	NA/DK	0	2	3	4	5
	Father	NA/DK	0	2	3	4	5
Other, please describe _____	Mother	NA/DK	0	2	3	4	5
	Father	NA/DK	0	2	3	4	5

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