

Peer Relationships of Children With Cochlear Implants

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Previous research on children with cochlear implants has focused mostly on their speech perception and production. With the growing numbers of children who use the implant, it is important to assess other aspects of these children's functioning. This article offers a qualitative and quantitative analysis of interviews with parents who described their children's communication skills and peer relationships before they had the implant and afterward. Results show that the implant has the potential to improve deaf children's relationships with hearing peers. Nonetheless, children with implants still face communication obstacles, which impede their social relationships with hearing peers. Results are discussed in light of the different points of view of various "stake holders" regarding cochlear implants in children.

Since the mid-1980s, the cochlear implant has been used for children who have a profound hearing loss. Initially, few children were implanted. The rate of implantation has accelerated, however, and with improvement in implant technology and recent relaxation of implantation criteria (lower age at time of implant,¹ less profound hearing loss), more and more children are now being implanted. By the end of 2000, about 8,000 children had been implanted in the United States

(L. Trejo, personal communication, November 10, 2000; R. Parr, personal communication, December 19, 2000; L. Tearney, personal communication, December 19, 2000). To become a candidate for an implant, children need to have a profound, bilateral hearing loss, minimal speech perception, and a less than average performance with hearing aids (NIH Consensus Conference, 1995).

Much of the research on children with implants has focused on speech perception and production (Fryauf-Bertschy, Tyler, Kelsay, & Gantz, 1992; Geers & Tobey, 1992; Tomblin, Spencer, Flock, Tyler, & Gantz, 1999; Tye-Murray, Spencer, & Gilbert-Bedia, 1995). More recently, more complex issues in the communication ability of these children have been explored, such as the assessment of their ability to tell full stories (Starzewski & Lloyd, 1999). Even this new research, however, does not examine the child's ability to socialize with other children.

Because little pertinent literature is dedicated specifically to the social development of children with cochlear implants, we review here general literature on the social development of children who are deaf. Marschark (1993) posits that the social development of a person who is deaf is intertwined with cognitive development and with language. In view of this, oral deaf children inevitably have different social relationships with hearing peers than do hearing children with each other. Specifically, a child who has a hearing loss is less able to learn necessary social behaviors because he or

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she cannot pick up on some verbal behaviors (e.g., learning rules or turn taking; Marschark, 1993). Consequently, improving the child's ability to hear (via amplification or a cochlear implant) would be one way to improve social relationships with hearing peers.

As children get older, their educational setting becomes a key element in the development of peer relationships. Children who are deaf have multiple school placement options: residential deaf schools, day deaf schools, or mainstreaming in hearing schools, either fully or partially. Over the past two decades, the percentage of students who are educated with other deaf children has decreased from 51% in 1977 to 1978 to 28% in 1996 to 1997, whereas the percentage of students who are fully mainstreamed has increased from 18% in 1977 to 1978 to 40% in 1996 to 1997 (Holden-Pitt & Diaz, 1998). According to the 1995–1996 Annual Survey of Deaf and Hard of Hearing Children & Youth, 55% of children who had a cochlear implant were mainstreamed with hearing children to some degree (Gallaudet Research Institute, 1995–1996).

Given the increase in the number of deaf children entering mainstream classrooms—especially those with implants—it is important to examine their ability to be socially integrated with hearing peers. Roberts and Rickards (1994) examined the social development of deaf children between the ages of 7 and 17, specifically focusing on friendship patterns. For children in primary grades, those in a mainstream setting were more likely to have hearing friends than those in a segregated setting (i.e., deaf school). In addition, children whose hearing loss was less severe were more likely to have hearing friends, and children whose hearing loss was more severe were more likely to have deaf or hard-of-hearing friends (Roberts & Rickards, 1994). Antia, Kreimeyer, and Eldredge (1993) also reported that children tended to play with other children who had a similar level of hearing loss. Therefore, merely placing a child who is deaf in the same classroom with other hearing students does not ensure that the child will be accepted and integrated (Antia & Kreimeyer, 1992).

Overall, children who have a hearing loss and are mainstreamed are performing well academically. Using a proportional stratified sample of over 4,000 students from the Annual Survey of Hearing Impaired Children

and Youth, Holt (1994) reported that students who attended local schools and were integrated at least 16 hours a week with hearing peers achieved higher standardized scores in both reading comprehension and mathematics computation than students who were integrated to a lesser degree or those who attended special schools. It is not known, however, whether the higher achievement is due to integration or whether students were selected for integration due to their higher achievement levels. This question is answered in part by a longitudinal investigation in which 325 students were followed from ninth to twelfth grade (Kluwin, 1993). After ninth grade achievement and demographic variables were controlled statistically, fully mainstreamed students had the greatest positive change in their overall achievement compared to those mainstreamed to a lesser extent or not mainstreamed at all. In another study, 19 children who had attended an oral/aural early intervention program were all mainstreamed, and the reading scores of 84% of them were reported by teachers to be at or above grade level (Wray, Flexer, & Vaccaro, 1997).

Although many mainstreamed children perform at or above average academically, their social integration is not as evident (Antia & Stinson, 1999; Evan, 1989; Stoen-Fisher & Balk, 1992). Many students who have a hearing loss and are educated in mainstream settings report feelings of loneliness and a lack of close friendships (Stinson & Whitmire, 1992). Most of these students are surrounded only by hearing individuals and generally have no deaf or hard-of-hearing peers (Stinson & Lang, 1994). This lack of contact with deaf peers may evoke feelings of being alone, different, or stigmatized (Evan, 1989) and may lead to negative self-perceptions (Leigh, 1999).

In addition to feelings of isolation, children who are deaf and mainstreamed face the task of orally communicating with hearing people most of the time. Oral communication poses the greatest difficulty in establishing and maintaining social relationships for children who have a hearing loss (Antia & Stinson, 1999; Aplin, 1987; Markides, 1989; Stinson & Whitmire, 1991). Although many children have the potential to hear and to speak orally with proper amplification and intensive speech therapy, not all have the capability to

speak clearly or hear and understand other people's speech. One of the common criticisms of cochlear implants is that spoken language skills of implant users remain inadequate for full functioning within a hearing community (Crouch, 1997; Lane, 1997).

Oral language is one area that, if improved by the implant, should improve the child's relationships with hearing peers. A deaf child who has the ability to speak orally will be better understood by hearing peers and, as a result, will establish social relationships with these peers more readily than one who is not oral. In two longitudinal studies, communication ability was compared for children with implants versus children with hearing aids. In one study, four children with cochlear implants were matched to four children with hearing aids and videotaped three times over a period of 2½ years (Nicholas, 1994). Children with implants outperformed children with hearing aids in oral language ability, particularly in their clarity of speech. In another study (Bat-Chava & Kosciw, 2001), 34 children with implants were compared to 12 children with hearing aids using data collected from parents over a 7-year period. Over time, parents of children with implants reported greater improvement in communication skills than parents of children with hearing aids. Based on these studies, children who have an implant likely will have largely satisfactory relationships with their hearing peers and parents probably would report improvements in their child's peer relationships after the implant.

Method

This report is part of a larger study that assessed how parents of children with cochlear implants viewed the social development of their children (e.g., Bat-Chava & Martin, 2001; Martin & Bat-Chava, 2001). Areas of investigation included the diagnosis of hearing loss, parents' expectations of their child, and the child's relationships with family members, teachers, and peers, both before and after the implant. The interview script was based in part on the Competence section of Achenbach's (1991) Child Behavior Checklist (CBCL, for ages 4–18), a widely used parent report form assessing behaviors in children with and without disabilities.

Participants

Participants were recruited from clientele of the communication department in a large hearing rehabilitation organization in the northeast United States. Children who were selected for participation had a profound hearing loss (i.e., pure tone average in the better ear >90 dB), were between ages 6 and 10, and had been using a cochlear implant for at least 2 years. Relying on "institutional memory," we obtained a list of clients from clinicians and client lists. Thus, all participants had either received speech therapy regularly or a preimplant speech and language evaluation at the organization. Of 33 families of children who used a cochlear implant invited to participate in this study, 26 (79%) participated. One interview could not be transcribed, leaving 25 interviews for analysis.

The sample in this study differs from the general population of children with cochlear implants. The majority of children in the sample (92%) used oral communication. Only two children (8%) used total communication before the implant, and both reduced their use of sign language after receiving the implant. In contrast, the Annual Survey of Deaf and Hard of Hearing Children and Youth (Gallaudet Research Institute, 1995–1996) reports that more children with an implant use total communication (61%) than use oral communication alone (32%).

Of the parents of the 25 children who were interviewed, the majority were mothers ($n = 23$); in one case a father was interviewed; and in another case both parents were interviewed together. Fifteen of the children were female and 10 were male. The children's average age at the time of the interview was approximately 8 years (range: 5–10.5 years). The majority of the children were white ($n = 24$); one was of mixed ethnicity: white and Latino.

All of the children were diagnosed with hearing loss before age 3 (average of 1 year of age, range: 0–2½ years). The average age at implantation was 3½ years (range: 1½–6½ years). On average, children received the implant 2½ years after being diagnosed as deaf (range: ½–6 years). At the time of the interview, the children had been implanted on average for approximately 4½ years (range: 1½–7½ years; see Table 1).

Table 1 Child participant demographics ($N = 25$)

	<i>M</i>	<i>SD</i>
Age	97 months (range: 59–127 months)	18.1 months
Pure Tone Average (before implant)	109 dB (range: 100–120)	7.8 dB
Age at diagnosis	13 months (range: 0–30)	7.5 months
Age at implant	43 months (range: 20–78)	15.1 months
Time between diagnosis and implant	30 months (range: 7–69)	17.5 months
Length of time participant had the implant prior to the interview	55 months (range: 19–91)	18.4 months
Gender		
Male	40.0%	
Female	60.0%	
Etiology		
Acquired	48.0%	
Congenital	52.0%	

Most of the families interviewed (60%) resided in a suburban environment. Overall, the parents of the children were very well educated, with 63% of the fathers and 58% of the mothers having completed college or graduate school. The majority of families (83%) had annual incomes over \$40,000.

Measures

All participants were interviewed face to face and all were asked the same set of questions. The interview schedule included two types of measures: questions from the CBCL and variables coded from the parents' narratives.

CBCL. We excluded the Problem section of the CBCL and used the Competence section, asking questions such as "Please list the sports your child most likes to take part in," and then instructing parents to indicate for each sport how much time and how well the child does "compared to other of the same age." The possible answers were "less than average," average," and "more than average." Other questions inquired about the child's hobbies, chores, and relationships with family members and peers; for example, "Compared to others of his/her age, how well does your child get along with other kids?" Possible responses were "about the same," "worse than," or "better than" other children's peer relationships. Parents were also asked about the attach-

ment level, or closeness, between the child and his or her friends, responding "very close," "moderately close," or "not very close." The parents answered all these questions twice, once about the child's behavior before the implant, and once about the child's behavior after the implant.

Variables coded from narratives. In addition to questions from the CBCL, parents were asked to describe their child's relationships with other children at school, in the neighborhood, and in the family (e.g., cousins) in a variety of play situations (e.g., alone or in groups). Parents' open-ended responses to these and other questions throughout the interview were subjected to a qualitative data analysis (Miles & Huberman, 1984), seeking to identify repeated themes in the parents' narratives, in the absence of a specific hypothesis. The themes that emerged most often as affecting the child's peer relationships were oral communication ability, personality, and ability to participate in athletic activities. Ordinal scales were developed for the dependent variable, the quality of the child's peer relationships, and for two of the factors affecting these relationships: quality of oral communication skills and athletic ability. All variables were coded on a scale of 1 (below average) to 3 (above average; see Appendix). Personality was scored as either introverted (e.g., "he was . . . quiet or reserved") or extroverted (e.g., "[She was] outgoing . . . talking a lot, babbling a lot"). Two raters scored

each theme independently based on a close reading of the full transcript. All interrater discrepancies were resolved by discussion.

Quality of peer relationships. The score for overall peer relationships was based on parental responses to the specific questions regarding the child's peer relations and any other comments related to the child's peer relationship throughout the interview. Interrater agreement was 88%.

Oral communication ability. We both coded the child's oral communication ability based on parental responses throughout the interview that were related to communication ability across all situations (e.g., "How did he communicate in social groups before the implant?"). Interrater agreement was 92%.

Ability to participate in athletic activities. Open-ended comments on the child's athletic ability or involvement were scored. Interrater agreement was 100%.

Results

Parental Reports of Improvement in Peer Relationships

Improvement in peer relationships was assessed in two ways. First, parents' reports about how well their child got along with other children before the implant were compared to responses to the same question at the time of the interview, after the implant. Most of the 25 parents ($n = 17$, 68%) reported an improvement in this area (e.g., from "worse than other children" to "same as other children"). Ten of the 25 parents (40%) reported an improvement in the degree to which their children were attached to their peers. Seven parents reported an improvement in both "getting along" with and attachment to peers.

Second, parents' open-ended comments were scrutinized for mention of improvement in at least one aspect of their child's social functioning after the implant compared to the time before the implant. Comments about the implant's limitations were also discerned.

Twenty-one of the 25 parents (84.0%) reported an improvement; of those, 7 reported improvements only, and 14 reported a mix of improvements and limitations. In addition, four parents reported only limitations.

Oral Communication

Parents reported both improvements and limitations in their child's oral communication ability after receiving the cochlear implant. Chi-square analysis showed a significant relationship between the quality of the child's peer relationship (using the CBCL questions) and the child's oral communication ability after the implant, $\chi^2(4, N = 25) = 13.15, p = .011$, indicating that the better the child's oral communication ability, the better his or her relationships with hearing peers. Chi-square analysis also showed a significant relationship between oral communication ability and whether or not the child's peer relationship improved after receiving the implant, $\chi^2(2, N = 25) = 8.03, p = .018$. Better current communication ability was related to improved peer relationships.

Improvement. Of the 21 participants who reported an improvement in their child's peer relationships, 17 parents (81%) stated that their son or daughter's oral communication skills improved after receiving the cochlear implant. This improvement in oral communication skills seems to have enhanced the child's relationship with his or her hearing peers. As the child's oral language skills improved after receiving the implant, he or she became more willing and able to interact with other children, and at the same time other children became more willing to interact with him or her.

For example, one mother said:

When Andrea² was about 3 or 4 [before the implant] she was in a group, and it was clear to me that she really wasn't doing very well any more in group [and] that even within the little community of deaf and hearing impaired kids, she was beginning to [falter]. And her language was not moving along at the pace that it should have been, just

based on what the other kids were doing. . . . [And now] I think that her hearing is amazing, compared to how she heard before. . . . [H]er hearing, is phenomenal.

Sophie's mother reported that her daughter became more involved with other children due to an improvement in her speech and language ability.

Interviewer: How was she with other children before the implant?

Mother: She wasn't with oth[ers]—I mean, she wasn't dealing with them. She was playing on her own.

Interviewer: So in that way, there's been a lot of improvement?

Mother: Yes. I mean, with speech and language, yeah. She, you know, she participates. She didn't participate before [the implant].

Some of the children even conquered one of the most difficult tasks for children with a profound hearing loss: talking on the telephone. Kim's father said, "We don't do any formal [speech] therapy with her at home. . . . The only practicing we're doing now is helping her with the use of the phone. She's using it—constantly." When asked how she is doing with the phone, the father replied, "Very good, very good. She and her girlfriends call each other all the time."

Limitations. Eighteen of the 25 parents (72%) reported one or more limitations related to the implant that they felt might impede their son's or daughter's peer relationships. All parents who reported difficulties in their child's social relationships mentioned that their child had some continuing difficulties in oral communication. One factor that may explain some of the variability in the children's residual lag in oral communication skills is age at diagnosis. To test this possibility, we calculated a Pearson correlation coefficient between oral communication ability and age at diagnosis ($r = -.55$, $p < .004$), indicating that children diagnosed earlier had better communication skills, possibly because the earlier the child was diagnosed with a hearing loss, the earlier he or she received intervention that included amplification and speech/language therapy, resulting in better oral communication skills. Other variables,

such as the age at implant, length of time a child was deaf before implantation, or how long he or she has had the implant at the time of interview, were not related to communication ability or quality of peer relationships.

Examination of the parents' narratives revealed four subthemes in the area of oral communication difficulties: residual lags in speech and hearing, difficulties in group interactions, level of acceptance by the child's peers, and level of familiarity with these peers.

1. Acceptance by peers. Eight of the 18 parents (44%) stated that for children who experienced communication difficulties, the level of patience that other children exhibited was an important factor in peer relationships. If the other child was willing to take additional time and effort, the relationship was reportedly better. If the other child was impatient, the relationship was worse.

One mother said, "Maybe making friends is difficult for [Mary], because kids are accepting only to a point. [Children will say] 'Mary doesn't understand so just leave her out of it.' I can see that: 'Don't ask Mary to play, because she can't understand,' that kind of thing."

Another mother stated, "I think [Michael] gets along really well with the children that have a little compassion in their souls."

2. Familiarity with the other children. Eight of the 18 parents (44%) stated that the length of time the child knew the other children was a factor in the child's communication ability, and thus was related to the quality of the child's overall peer relationships. One mother said, "In [Audrey's] group at school, she's right there, doing great. When it's strange kids, then she holds back, and she's more reserved. She doesn't participate."

Although familiarity with others probably plays a role in any child's relationship with peers, children with implants have the added burden of having to explain their hearing loss or the implant to new playmates. Several of the parents reported that this burden sometimes hindered their child's involvement in activities with new children.

Jerry's mother reported:

[He] has to break the ice and explain to [other children] what it's about and sometimes he's in the

mood to do it and other times he's sort of like a little annoyed about doing it. You know, there are repetitions that get to him sometimes. . . . But once they break the ice, if they're in the same class or the same sports group . . . no problem. Once they see Jerry as a person, they're [OK about it].

For children who are more assertive, having to explain their hearing loss or the implant is less daunting. Kayla's mother reported:

With strange children on the block or something, she was very sure of herself. I remember, [she] walked down the block once and a little boy told his sister, "You see, she's the girl with that machine." And [Kayla] turned around and said, "Well, yes, I need it because I can't hear properly."

3. Residual lags in speech and hearing. Seven of the 18 parents (39%) commented on the difficulties their child had in speech or hearing. One set of parents stated that poor articulation was the reason their son was being left out of social activities. The father said, "[Other children] are definitely not pulling him in. . . . I feel that has to do with his speech and hearing. . . . [H]is speech is very garbled; it's not crisp clear [and] kids don't have the patience [that] adults have. Some *adults* don't even have the patience to listen to him." The mother agreed, saying, "No. Boys don't have the patience."

Other difficulties in oral communication involved the child's compromised ability to hear and understand what other children were saying. Mary's mother commented, "[My friends and I get together with all of our children around the swimming pool.] When we go over there, a large group of kids like to play 'Marco Polo' [but] she can't play [because she cannot hear]. So that kind of . . . interaction I think is difficult."

Several parents reported that their child's limited hearing has hindered the child's ability to pick up idioms or subtle cues. This, in turn, was detrimental to his or her social relationships. One mother reported, "The language thing will always be the biggest problem for [Lisa]. There are certain things that I see in my 5-year-old niece that Lisa [who is 6½] hasn't caught on to . . . like silly little . . . idioms and stuff like that, that normal hearing children catch on to."

4. Group communication versus one-on-one discussion. Six of the 18 parents (33%) who mentioned peer relationship problems reported that their child was better able to follow conversation and communicate with peers when he or she was either in one-on-one situations or in small groups. Most children were able to understand what the other person was saying in these settings and were therefore more confident in responding. As groups grew larger, many children had more difficulty in both understanding the conversation and in having the confidence to respond. One mother stated:

If it's one-on-one, [Jacob is] okay. He has no problems. He's able to communicate and the kids understand him. In a group it's more difficult for him. . . . Some situations will be hard, such as . . . a crowded room. . . . [Jacob] won't go to parties; [instead] he will go out with [one] friend.

Personality

Another theme related to peer relationships was the child's personality. Seven of the 21 parents (33.3%) who reported an improvement in their child's peer relationships commented on either a complete change in their child's personality or a change in a personality trait or characteristic. Most often, parents reported that before the implant, the child was more introverted. After the implant, the child exhibited more extroverted behavior and therefore was more apt to interact with other children. For example, one mother reported:

We always thought [Emily] was shy because she spoke so little and she was reserved . . . but two months after the implant she was a different person. My sister . . . used to talk to Emily and try to bring her out because . . . [Emily] would be quiet. . . . And it was so amazing that it made a total change in her personality so quickly. It was such an amazing thing, which also made us feel very sad about the years before, that she was like so into herself just because of her hearing loss, not really because that was the way that she really wanted to be.

Another mother reported that her child had a complete personality change:

Andrea was a very bubbly, funny little girl until [age] 2 or so. . . . At about 3, 3½, as her ability to function and communicate declined, and as other children's [ability to communicate] increased, she was beginning to withdraw; she was becoming more introverted. . . . And that was another reason that we decided to do the implant. I couldn't bear seeing this child whose natural instinctive personality was clearly to be . . . not [just a] part [of but] leading in the world. So, after the implant . . .—it didn't happen immediately because it took some time for Andrea to start adjusting to this new sound—her personality became the personality of the child that she is today and that she was before. If I have to say one [thing that the implant gave her], apart from the speech and the language and the communication ability, it's the ability that it gave Andrea to be herself. . . . It sounds really dramatic . . . but it *was* dramatic. . . . [Although] nothing happened immediately . . . by the time she was 6 and she was in kindergarten . . . she was the Andrea I had known at 2 and 3. [She is] this undaunted, courageous, confident little girl.

The described change in personality is probably related to the parents' choice of communication modality. Because these children were being raised orally, they were missing much of the communication around them. Once implanted, they received more auditory information and were therefore able to participate in their social environment to a larger extent.

Participation in Athletic Activities

Seven of the 25 parents (28%) who were interviewed for this study reported that their child experienced difficulties in athletic activities related to the implant. Specifically, parents raised two issues. First, parents discussed the potential for physical complications in certain activities. Parents were fearful of a blow to the head and how that may affect the implant and their child's hearing. Second, some parents stated that the implant did not improve their child's hearing enough to allow him or her to hear in group sports or activities where the participants were constantly moving or where there was a lot of background noise. (Statistical analy-

ses revealed no significant relationships between participation in athletic activities and quality of peer relationships, possibly because of the small sample size.)

Difficulties due to the implant itself. One mother, when asked about sports her son has been involved with since the implant, stated:

The only negative [thing about the implant] is that [Brad] can't play contact sports, football and wrestling. My husband was a wrestler, and [Brad] is so physically capable of [wrestling], it would be great for him, but I'm not going to take a chance. I was reading an article that one out of five kids who play football have concussions. To take that chance with an implanted kid with a head injury, you can't do that.

Seven of the 25 parents (28%) mentioned that they were concerned about the possibility of losing the implant's program (map³) because of static electricity from plastic play equipment, such as slides:

I think it bothers [Lisa] . . . that she has to take [the implant] off when she goes outside to play, because everything's plastic now. And I find that very sad. Because part of [the] reason [she received the implant] was for her own safety, that if she's outside and somebody in a hurry needs to get to her she was going to be able to at least know her name enough to turn around and look at somebody—and she can't do that [if she isn't wearing the implant]. . . . I think it's an unfair thing now that . . . she's outside playing with her friends [and] she can't hear anything anybody says. And she's got to be really careful. That to me is going to be the biggest problem.

Difficulties due to the nature of the particular activity. Certain sports or activities were more difficult than others. Those activities that require group participation were reportedly more difficult due to communication problems, not only with other children but also with the coach or the person in charge. One father remarked:

[Mark] still has a problem in the gymnasium . . . if there's a lot of noise. . . . [In soccer] he's running, which [makes it] worse because now as you're run-

ning, you have the wind, and you're breathing, and you can't hear . . . and your coach is screaming and yelling on the sideline. I said [to the coach], 'Save your breath because he isn't hearin' you. There's no way he's hearing you because he has all the other parents screamin' and cheering on. . . . [T]he only instruction that he's going to get is [when] you point.'

A second parent encountered a similar situation. Lila's mother reported, "I signed her up for ballet three years ago, just after the implant, which was *not* appropriate [because she could not hear or understand the instructor]." The mother tried to correct the problem, with a certain degree of success: "[After the first unsuccessful attempt] I signed her up in a less challenging program. But I put her up with a buddy, so her buddy helps her a little bit. [If] she doesn't understand [what the instructor is saying] . . . then her buddy helps her."

Relationships With Other Children Who Have a Hearing Loss

Beyond the potential improvements and limitations of the cochlear implant, an additional theme related to the children's social relationships emerged in the interviews: relationships with other children with a hearing loss. Without prompting, 6 of the 25 parents (24%) mentioned that their child had deaf or hard-of-hearing friends, and they believed that these relationships were very important for the child. All of these children had initially attended self-contained programs for deaf and hard-of-hearing children, and even after being mainstreamed in local schools, remained in touch with their old friends.

One mother stated:

[Mary] thinks of her hearing impaired friends much more than she thinks about the new friends she's made at school this year. When her speech therapist [was asking], 'Who do you know that plays baseball?' 'Who do you know that has freckles?' she mentioned all of her [friends with a hearing loss]. . . . [S]he never [mentioned] her new friends in school. She didn't bring up any, [not even her] best friend. . . . So her attachment to these

hearing impaired kids . . . there's a bond there that she doesn't have with hearing kids.

The parents whose children had such relationships indicated that these were important relationships to their child and that they would like them to continue and develop them further.

Marcus's mother said:

I do try to get him together with hearing impaired kids. That's something I feel I should do more frequently. There's one little boy [with] a cochlear implant. And his family and our family, we have become friends as families . . . but unfortunately, they live [too far away]. So we get together, but not as much as I'd like to. [Once] we went to Great Adventure. Which was good because [when] we took off their implants and it was a very normal type of thing because we were doing it together. . . . [Another time] . . . we met them down at Busch Gardens in Virginia. And again, it was very normal, you know, they had water rides so we took off their implants . . . and it was all very normal.

A few parents whose child did not have friends with hearing loss reported that they would like their child to have such relationships. One mother reported, "Lisa doesn't communicate with a lot of deaf children. It was good this year when she got a child in her class that had the implant. That made her really happy." Another mother echoed this sentiment by stating, "I wish Lila would have hearing impaired friends."

In some cases associating with other children with implants and their parents was a normalizing experience not just for the child but for the *parents*. It made the parents feel less alone in their role of a parent of a child who is "different."

Discussion

According to parents' reports, the cochlear implant offers deaf children opportunities for improved social relationships. Specifically, the implant can improve the children's hearing and speech, and, because of these improvements, it also has the potential to change the children's personality or increase their level of confidence. Indeed, we found that ability to communicate

orally was related to quality of relationships presently as well as improvement in peer relationship from the time before the implant to the time of our interview. Other factors related to better peer relationships identified through the qualitative analysis of parents' narratives were not statistically significant (personality, athletic activity), possibly because of the small sample size.

Several recent studies suggest that children who are oral communicators have higher scores on speech assessment measures (Lusk, Lai, Stroer, Fears, & Piccirillo, 1997; Meyer, Svirsky, Kirk, & Miyamoto, 1998; Osberger & Fisher, 1997) and have more intelligible speech (Osberger, Robbins, Todd, Riley, & Miyamoto, 1994; Svirsky, Sloan, Caldwell, & Miyamoto, 1998) than children who use total communication or cued speech. For those parents (and professionals) who are interested in mainstreaming their children via oral communication, our study presents a largely favorable picture of the cochlear implant.

Nonetheless, several possible limitations of this study must be noted. Parents whose children were successful implant users may have been more willing to be interviewed than parents whose children were struggling with oral communication and with communicating with hearing peers after receiving the implant. For example, one mother, who was initially reluctant to be interviewed because her child was not doing well with oral communication and peer socialization, said it was painful for her to talk about the implant. Thus, the parents who chose to participate in the study may have had mostly positive experiences with the implants, whereas parents who chose not to participate were not happy with the implant's results. Therefore, the generally positive portrayal of the implant in this study may not represent typical experiences with the implant. Furthermore, other sources of data about these children's social functioning (such as teacher reports) are currently unavailable; this further limits the generalizability of our findings.

Even the parents who were pleased with the implant's results, and reported that their children's peer relationships improved after the implant, nonetheless reported lasting difficulties. Some children had continued problems communicating, particularly in group situations or with children who were impatient. Other children encountered communication difficulties in

certain sports, such as soccer or ballet, and some parents were concerned about the potential danger of the child hitting his or her head in contact sports.

Several solutions may be offered to alleviate these difficulties. First, with continued use of the implant, communication difficulties diminish for some children (Bat-Chava & Kosciw, 2001), although we did not find this in this study (possibly because of restricted range of length of use and the small sample). Difficulties described by parents, therefore, may lessen simply by sustained use of the implant. In some situations when difficulties continue, the child may benefit from the use of assistive devices to complement the implant. Children who have trouble hearing a coach or an instructor during a sports activity, for example, may benefit from using an FM system. In addition, some children may benefit from assertiveness training, which would better enable them to field questions from new peers about hearing loss and the cochlear implant.

Finally, interaction with other children who have a hearing loss may be helpful. Research with deaf and hard-of-hearing children and adolescents in the mainstream documents pervasive feelings of isolation and loneliness (Evan, 1989; Stinson, Whitmire, & Kluwin, 1996), resulting from the youngsters' compromised ability to communicate orally with hearing peers. Parents in our study whose children had deaf friends reported that, despite their children's improved ability to function in the mainstream, they had special relationships with these peers. Deaf children should be encouraged to socialize with similar others. This can "normalize" their experience and provide social support. Socializing with deaf peers can give these children the experience of success in developing relationship skills, which could then be transferred to hearing peers. School districts and organizations that serve deaf and hard-of-hearing students could offer support groups that would enable these students to socialize with each other in a supportive environment.

These suggestions are offered for parents and professionals who hope to improve the ability of children with implants to function in the mainstream through oral communication. These suggestions, however, do not solve the larger controversy about the benefit of implants to young prelingually deaf children. As mentioned earlier, some critics of the implant maintain that

the resulting spoken language skills of children with implants are still inadequate for full functioning within a hearing community (Crouch, 1997; Lane, 1997). Our results suggest that, with extensive oral communication training, the implant can improve a child's ability to participate in the mainstream.

The critics are correct, however, in that there are still many situations in which a child with an implant has difficulties in communication. Minimal or no benefit from the implant may lead to discontinued use. Rose, Vernon, and Pool (1996) surveyed residential and day schools for the deaf, asking school officials how many prelingually deaf children in the school had an implant and how many had stopped using it. Over half of 151 identified children in 45 schools used their implants only intermittently or did not use them at all. Rose et al. report that the majority of children who continued use of their implant attended educational settings that used oral communication exclusively. Holden-Pitt (1997), using data from the 1996 Annual Survey of Deaf and Hard of Hearing Children and Youth, also reports that a sizable minority of children with implants discontinued using their implants, especially when they reach adolescence. In this age group, up to 50% discontinued use of their implants. (No attempt was made to associate discontinued use with mode of communication or other variables.)

Several factors may explain the discrepancy between our findings of relative success for the implant and those of others who report less success. Children surveyed by Holden-Pitt (1997) were more likely to discontinue use of their implant if they were implanted between the ages of 8 and 10 (implanted at a later age compared to children in our sample). Although Rose et al. (1996) do not describe their sample (numbers of children who stopped using their implants were reported by school officials), children in their sample likely were also older when implanted than children in our sample and they likely received less intensive oral training. Both factors would affect the degree of benefit from the implant. Although we did not find in this study that age at implantation is a factor in the relative improvement in oral communication skills and quality of peer relationships, this is probably due to the small sample and a restricted range of age at implant. Future

research with larger samples could determine whether, as previous studies suggest, age at implant is associated with better outcomes in oral communication (Dawson et al., 1992; Fryauf-Bertschy, Tyler, Gantz, & Woodworth, 1997).

In addition, the discrepancy between our findings and those of the studies that find that many children stop using their implants may reflect the point of view of different "stake holders" in the debate about implants: the point of view of parents versus the point of view of deaf children and adolescents themselves.

Because most parents of deaf children are hearing and have limited exposure to adults who are deaf, many of them choose the implant in hopes that it would make their children better able to communicate orally and be educated in the mainstream. It is understandable that most hearing parents want their children to be like themselves and attempt to give their children the best educational and occupational opportunities they can get. These parents perceive the implant as a key to a better life for their children. Because they want the implant to succeed, they may overestimate the degree to which the implant is actually helping their child.

No study to date has directly asked deaf children whether they find the cochlear implant beneficial. Many of them are currently too young to voice their own opinions about the cochlear implant. There is some indirect evidence, however, that deaf children and adolescents may not perceive deafness with the same trepidation as their hearing parents, may not attach the same importance to being a part of the hearing world (Weisel & Reichstein, 1990), and may find oral communication difficult and frustrating (even with the implant).

As children get older, social relationships become more important (Steinberg, 1999). Deaf children and adolescents whose ability to interact with hearing peers is compromised may become increasingly frustrated. Previous research with prelingually deaf adults found that many of those who grew up orally were frustrated with oral communication (Bat-Chava, 2000; Foster, 1988). In adolescence or early adulthood, some of them learned sign language and became part of the signing deaf community (Bat-Chava, 2000). Many of these people perceived their parents' insistence on oral com-

munication as harmful to their social relationships and identity development.

It is impossible to know what would have happened to people who were educated in the oral tradition if cochlear implants had been available to them. Would they have found oral communication less frustrating and would not have sought out other deaf people and sign language? Or would they have stopped using their implants, just as the children in Rose et al.'s and Holden-Pitt's studies did? Until children who are implanted early become old enough to make their own judgment about the implant and tell us about it, we will not know how beneficial the implants are to them.

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Notes

1. At the time of this writing (December 2000), the FDA allows children 18 months and older to be implanted with most implants and allows children who are as young as 12 months old to be implanted with the Nucleus 24 Contour.

2. All children's names have been changed to protect their identity.

3. The cochlear implant is made up of internal surgically implanted components (an electrode array implanted into the cochlea and a receiver, which is placed under the skin) and external components (a microphone, a speech processor, and an external transmitter). The processor is programmed or "mapped" to meet the needs of the individual cochlear implant user by identifying the most comfortable levels of response for each electrode. The map is then saved onto the audiologist's computer and copied into the speech processor. Static electricity (which may result from playing with plastic equipment) may wipe out the processor's map. When this happens, the map has to be recopied from the audiologist's computer to the speech processor.

Appendix

Coding Samples

	Score	Frequency (N = 25)	Example
Quality of peer relationships			
Above average	3	6	<i>How does [Andrea] get along with other children her age?</i> Very well. I think she gets along very well with other children . . . <i>Do you see a difference in her social relations, between before the implant and now?</i> Oh yeah, yeah. Exceptionally different! Before, she was withdrawing; [now] I would say that Andrea is a leader. Before the implant, I could not have described her as a leader; she was just kind of doing what everybody else did. [Now] she's very sure of herself.
Average	2	14	<i>How does Sophie get along with other kids her age?</i> Fine, fine . . . with children at school, fine. Children whom she does not know, it depends. If she feels comfortable in the environment then she's quite fine. <i>So you think she gets along with other kids as well as other kids get along with each other?</i> I think it depends on what the activity is. If they're playing a game outside she can't hear, if it's a field game . . . it depends on the environment. If it's a sleepover— no [she's not as good as the other children]. She takes her CI off and the whispering and the talking in the dark, [she can't do that].
Below average	1	5	Lila's social skills are delayed. It's a problem. [The speech therapist] teaches Lila how to say "please" and "thank you" and "excuse me," but in a stressful situation Lila doesn't have access to these words. She needs skills to deal in difficult situations in a verbal manner rather than hitting or pushing. <i>Do you think the way she gets along with the other kids is similar to how they get along with each other?</i> She has more difficulty.
Oral communication			
Above average	3	13	I expected Emily to hear better [with the implant], but not as well as she hears now. I never expected her to overhear things. That came as a shock to me . . . I'm sure she misses things, but she still manages to get the gist of it and manages to play.
Average	2	3	I keep my house quiet and I speak loudly and clearly at all times for him. And [Marcus] gets just about everything I say. [But] his speech is sloppy. The phone has an amplifier and he does well with that depending on whom he's speaking to. If he's talking to his dad, no problem. Full conversation, gets everything. And certain other people he'll do well. Some people he doesn't get.

	Score	Frequency (N = 25)	Example
Below average	1	9	If [Mark] is one-on-one, he does very well, in [quiet] . . . If he doesn't know the words—because he still has a limited vocabulary—he still acts that out. . . . When he tells you [something] and then if we don't understand it, he'll say it two or three or maybe even four times over, and after that he'll just show you. . . . he'll get frustrated because he doesn't know the words.
Athletic ability (N = 24)			
Above average	3	14	<i>Do you think Brad plays more than other kids?</i> Yes; he is physically more capable . . . he has always been a physically active little boy. That's just an inborn trait, I think.
Average	2	3	<i>What activities does Audrey most like to take part in?</i> She was on a basketball team. She loves basketball. We have a hoop out front, and she plays it almost every day. . . . This is her third year playing girls' softball. . . . she roller blades. She rides a bike . . . she likes to bowl. . . . We tried ice-skating, but she's not too good at that. But swimming . . . she loves to swim. She's a good swimmer. <i>Compared to other children of the same age, how much time does Audrey spend on each?</i> I would say about the same. <i>An average amount of time?</i> I think average; I would say average. <i>And compared also to children of the same age, how well would you say she performs in each sport?</i> Average. Average for kids her age.
Below average	1	7	Katelyn likes to play volleyball and basketball at school, but she's not really into sports. That's really about it. <i>Compared to others of the same age, how much time would you say she spends in each sport?</i> I think less than average. <i>How about in terms of how she performs in each sport?</i> Less than average . . .

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