

## Child and Family Factors Associated With Deaf Children's Success in Auditory-Verbal Therapy

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**Objectives:** To identify the general demographics of children who had Auditory-Verbal therapy and to identify child and family factors associated with differences between those children for whom Auditory-Verbal therapy led to success and those for whom it did not.

**Setting:** Private tertiary care facility.

**Population:** Children who had hearing losses ranging from mild to profound.

**Intervention:** Auditory-Verbal therapy, a therapeutic intervention designed to teach parents to educate their young deaf and hearing-impaired children to use residual hearing and to speak, was used.

**Main Outcome Measures:** Clinic files, parent questionnaires,

and parent report of current success were used to determine efficacy of treatment.

**Results:** Fifty-seven percent of the clients who remained in this program for over 1 year were fully integrated into regular education, with no services from a teacher of the deaf. The population was affluent, with more females than expected. Those who left dissatisfied tended to be males with greater degrees of hearing loss who left the program soon after 1 year.

**Conclusions:** Auditory-Verbal therapy provides successful intervention to students with a particular set of demographic characteristics. **Key Words:** Auditory-Verbal therapy—Children.

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Debate surrounding the therapy and education of children who are deaf or hard of hearing has raged for centuries (1), yet little scientific or clinical evidence exists beyond testimonials and showcase children to support the efficacy of one treatment over another (2). To ensure that parents have sufficient information to make an informed decision about their child's therapy and education, professionals have an ethical obligation to provide information regarding the effectiveness of various treatments (3). Discussion of treatment efficacy must address the issue of client and family characteristics.

One available treatment is Auditory-Verbal therapy (4), an intervention approach that focuses on early identification and amplification for children with hearing loss. Auditory learning is the key to acquisition of spoken language. Caregivers and therapists provide the children with maximal acoustic stimulation to develop listening, speech, and language skills. Auditory-Verbal therapy is an early habilitation approach; it is not a classroom intervention. The present study looked retrospectively at a decade of students who participated in the services of a clinic using the Auditory-Verbal approach.

Some students remained in therapy for long periods while others moved into different educational options.

The purposes of this study were to identify the general demographics of children who availed themselves of Auditory-Verbal therapy and to identify child and family factors associated with differences between those clients for whom Auditory-Verbal therapy led to success and those for whom it did not. The amount to which Auditory-Verbal therapy, either with or without cochlear implant support, enhances the learning and use of a language system has ramifications for referral to such therapy.

The literature surrounding the Auditory-Verbal method indicates that it is a successful approach for many students. Goldberg and Flexer (3) reported survey results of 157 Auditory-Verbal graduates between the ages of 18 and 47. Responses indicated that three quarters of these graduates were fully integrated in the "hearing world," and over one quarter stated they were members of both the "hearing and deaf worlds." Fewer than 1% indicated membership in the "deaf world only." Responses also indicated successful high school and post-secondary outcomes for those Auditory-Verbal graduates who self reported. However, no attempt was made to differentiate between child and family factors associated with final group membership.

The constellation of factors that predict success in any

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given approach are numerous and complicated. Any discussion of success must define what is meant by success. Most studies have reported success to mean improvement in receptive and expressive speech. The definition of success is broadened in this study to include success in the general education environment and as measured by the gap between chronological age and language age.

## MATERIALS AND METHODS

### Study design

At the invitation of the Board of Trustees of a clinic known to use Auditory-Verbal therapy, a retrospective case review of file data and a telephone interview of parents were conducted to identify child and family traits associated with treatment success. A questionnaire and information form were developed from a compilation of sources (3,5-7) and the combined experiences of a committee comprised of an otolaryngologist, an audiologist, an educational psychologist, and a teacher of students who are deaf and hard of hearing. Therapists at the clinic reviewed the questionnaire and made suggestions, which were incorporated into the final questionnaire. File data were gathered during 1996-1997 by two trained graduate research assistants. Four graduate research assistants were involved in the telephone interviews (three students in deaf education and one student in speech-language pathology). Research assistants received basic instruction in procedures for interviewing from the primary researchers. Interviews were conducted in person in one instance and via phone for the remainder of the cases. Phone contacts were made over a 14-month period from January 1998 to March 1999.

### Clients

Clinic staff provided the researchers with a list of children enrolled during the decade of January 1986 through December 1995. Families enrolled at the clinic for less than 1 year ( $n = 51$ ) were not included in the study based on the assumption that at least 1 year of therapy was needed before treatment effects could be seen. Attempts were made during the 1996 calendar year to contact those families ( $n = 110$ ) who had received services to request their participation in the study. Those who left or graduated from the clinic and those still actively enrolled in the clinic were included. Of the remaining 110 cases, 72 (65.4%) participated in the interviews. One question was asked regarding the reason families left Auditory-Verbal therapy. Subjects were sorted into categories based on whether parents indicated that the students graduated or whether they left as a result of dissatisfaction with the therapy. Twenty-five reported leaving after graduation. Fifteen reported leaving because of dissatisfaction. Of the remaining 32, 23 were still enrolled and 9 left for reasons other than graduation or dissatisfaction (e.g., too far, too expensive). Subjects whose parents indicated that they left either due to graduation or to dissatisfaction formed the subject pool for the second objective of the study.

### Intervention

No additional interventions were conducted beyond those provided by the clinic.

## Main outcome measures

Main outcomes of the first objective of the study were measured by comparing demographic traits of the subjects with those of the school-aged deaf population in general. Main outcomes of the second objective of the study were measured, in addition to the questionnaire, by the Parent Rating Scale of the Leiter International Performance Scale-Revised (8) and by parent-reported updates on the child's present level of performance. Information was requested regarding either current reading level or current language level, as identified by several sources (current levels of performance on the child's most recent Individualized Education Plan, results of a recently administered group or system-wide test of achievement, determination of reading levels of curriculum materials or trade books the child was reading at the time, or when no other source was available, parent perceptions).

## RESULTS

Demographic traits of all subjects ( $n = 72$ ) were compared with those of the school-aged deaf population in general ( $n = 50,629$ ) (9) (Table 1). The data in Table 1 reveal a sample of subjects that is atypical of deaf students in general. Most students were very young, with approximately 60% under 6½ years of age. The remaining children, except for one, were 10½ years of age or younger. Fewer subjects in this study were male than the general population; fewer were nonwhite; fewer had additional disabilities than the general population of deaf students; and more were placed in regular education classes on a full-time basis than the general population. In addition, the subjects tended to come from families with small numbers of children (mean = 2.14; standard deviation = 1.05), where the mother was well-educated (95.8% completed high school with some additional education; 63.4% completed college or higher). The mothers may or may not have worked outside the home (55.6% worked; 44.4% did not), and 82.9% of those who worked

**TABLE 1.** Demographic characteristics of Auditory-Verbal (AV) versus general population deaf students

Trait	AV subjects (%) ( $n = 72$ )	U.S. population (%) ( $n = 50,629$ )
Sex		
Male	41.7	54
Female	58.3	46
Race		
White	97.2	58
Nonwhite	2.8	42
Additional disabilities		
Present	18.2	34
Absent	79.2	66
Educational placement		
Regular education	56.9 (Full-time)	40 (> Half-time)
Special education	29.2	60 (Full-time)
Mother's work history		
Yes	55.6	Not available
No	44.4	Not available
Family income		
>\$50,000 annually	88.9	Not available
<\$50,000 annually	9.8	Not available

did so over 20 hours weekly. Finally, 88.9% of the parents reported annual income levels for 1997 in excess of \$50,000, whereas only 9.8% reported income levels under \$50,000. Both the entire sample studied and the smaller sample identified for the second objective of the study exhibited traits atypical of the deaf population in general and were members of families whose annual incomes were high relative to the general population.

To determine the child and family factors associated with success in Auditory-Verbal therapy as measured by successful graduation ( $n = 25$ ) versus leaving because of dissatisfaction ( $n = 15$ ), several analyses were conducted (Table 2). Pearson chi-square analyses were performed to determine if differences existed between students who graduated and those who left dissatisfied on the following variables: sex of child, presence or absence of additional disabilities, whether the child did or did not adapt well to therapy, presence or absence of a cochlear implant during Auditory-Verbal therapy; whether the mother worked during therapy; family income; parent report of current language or reading to age gap; performance on the Leiter-R Parent Rating Scale; and placement in regular or special education (Table 3).

Table 3 shows that there were significantly more female subjects who graduated than males, and more parents of male subjects expressed dissatisfaction than parents of females. There was no significant difference for presence or absence of additional disabilities. Both of these factors were consistent with the overall clinic population. There was no significant difference for presence or absence of a cochlear implant, possibly because the successful students without implants tended to have milder degrees of hearing loss. There was no significant difference for mothers who worked or mothers who stayed in the home, nor was there significant difference in likelihood for graduation with mother's increasing hours of intervention at home. However, most of the mothers were spending a notable amount of time in therapy at home (92.5% greater than 3 hours; 62.5% greater than 6 hours), so comparisons were moot. Simi-

**TABLE 2.** Demographic characteristics of graduates versus leavers

Trait	Graduates (%) (n = 25)	Leavers (%) (n = 15)
Sex		
Male	37.5	62.5
Female	79.2	20.8
Race		
White	96	100
Nonwhite	4	
Additional disabilities		
Present	16 (n = 4)	32 (n = 5)
Absent	84	67
Use of implant		
Yes	38	47
No	62	53
Educational placement		
Regular education	75	29
Special education	25	71

**TABLE 3.** Chi-square significance levels for ( $n = 40$ ) graduates/dissatisfied by child and family factors

Child/family factor	Chi-square	p
Sex of child	7.111	0.008*
Additional disabilities	1.615	0.204
Cochlear implant	2.837	0.092
Mother working	.000	1.0
Hours of home intervention	1.226	0.747
Family income	3.690	0.297
Leiter-R emotional/regulatory	121.500	0.336
social/cognitive	159.135	0.250
Regular or special education	7.819	0.005*
>1 year language/reading to age gap	4.934	0.026*

\*Significant ( $p < 0.05$ )

larly, although there was no significant difference for family income, the average of the sample was notably higher than the average for the general population, making a comparison difficult. Further, no children whose parents reported incomes under \$50,000 annually graduated; however there were too few in this category to draw any conclusions. Two significant student outcomes for those who graduated were placement in regular education and a communication (i.e., language or reading) gap of less than 1 year below chronological age.

Additionally, *t*-test analyses were performed to determine if significant differences existed between students who graduated and those who left dissatisfied on the following variables: unaided pure-tone average (PTA), age child was enrolled in therapy, chronological age when left, developmental age when left, and family income (Table 4).

The data in Table 4 reveal a significant difference between the groups' unaided PTAs, with mean PTA loss for the graduates 15 dB below the mean for the dissatisfied group. Although there was no significant difference between the groups on age of entrance, there was a significant exit difference, with graduates remaining in the program longer than those whose parents left dissatisfied. There was a significant difference between the groups for developmental age (based on average of Alp-

**TABLE 4.** *t*-Test significance levels of graduation or dissatisfaction by child/family factors

Child/family factor	X	Standard deviation	<i>t</i>	p
Unaided pure-tone average			-2.384	0.024*
Graduated	79	18.25		
Dissatisfied	94	15.61		
Age enrolled in therapy			-1.239	0.223
Graduated (months)	30.60	21.49		
Dissatisfied	47.67	63.52		
Chronological age when left			1.865	0.007*
Graduated (months)	89.31	33.76		
Dissatisfied	61.36	59.24		
Developmental age when left			3.834	0.001*
Graduated (months)	78.87	30.24		
Dissatisfied	39.23	29.60		

\*Significance ( $p < 0.05$ )

ern-Boll scores) with graduates' scores higher than dissatisfied leavers' scores. This may be accounted for by the fact that the graduates were chronologically older as well.

## DISCUSSION

To add to the body of literature regarding treatment efficacy for children with hearing losses, this study undertook to compare those students who left Auditory-Verbal therapy at graduation with those who left dissatisfied. The population studied was atypical of the general population of deaf students in that they came from affluent families, had a larger percentage of females, was mostly white, and had fewer additional disabilities. This last trait may be due to the fact that many mild disabilities, such as attention deficit/hyperactive disorder, learning disabilities, and mild retardation, are not identified until well into the school years, and the subjects who were dissatisfied tended to leave by kindergarten. Because the population was already skewed from the norm, some areas of potential differences did not bear out statistically. However, in addition to being a select group in general, certain significant differences were noted between those who left dissatisfied and those who left after completion.

The group whose parents indicated that they left the program dissatisfied tended to have more males, greater hearing loss, and did not remain in therapy as long as the group whose parents indicated that they left the program at graduation. Given the decade studied, only a few children had cochlear implants, so future studies might be expected to show different results. Those children who stayed in the program until graduation, however, were less likely to have an educationally significant communication gap and had a high probability of being completely included in regular education with no support from a deaf educator. Those who left the program because of dissatisfaction were more likely to require the services of a teacher of the deaf.

Given the child and family characteristics of the subject pool, Auditory-Verbal therapy was clearly successful for those who graduated. The question becomes: How shall the most important features of Auditory-Verbal therapy be framed so as to enhance accessibility for those who do not fit the profile of children who were successful at this clinic? Because Auditory-Verbal therapy is an early habilitation approach and typically is not available in public service settings, the vast majority of children with hearing loss do not have access to it. If Auditory-Verbal therapy were accessible to more children, families with more diverse demographics might find it to be effective for their children.

Currently, investigation of those students who left this

therapy before 1 year is underway. In addition, similar studies of efficacy should be initiated to determine profiles for whom other treatments are most effective. Additional research is also needed to determine effective modifications to the existing program so that it may reach a larger segment of the population. Efforts to determine efficacious child profile/treatment matches are long overdue.

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## INVITED COMMENTS

When I began my otology practice 10 years ago in Chicago, it soon became evident that the deaf and hearing-impaired children in my practice who experienced success in the mainstream were frequently receiving Auditory-Verbal therapy. These children fit the profile of the successful children described in this study. They had some residual hearing, and their parents were well educated and had the financial means to pay for private therapy.

The tremendous success and growth of pediatric cochlear implantation have resulted in a dramatic growth in the demand for Auditory-Verbal therapy, especially for young congenitally deaf children. There is a need to better understand the critical components that make Auditory-Verbal therapy effective to determine if this educational philosophy can successfully be applied to a broader, more diverse population of deaf children and their families.

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