

Perception of Vocal Abuse in Hearing-Impaired Children

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Twenty-five hearing-impaired children and their teachers were tested with a self-report scale for vocal abuse. These scores were then compared to perceptual ratings of voice by two speech-language pathologists. Significant differences were noted among the three sets of ratings. Such differences would indicate a need for therapy goal clarification.

Descriptors such as inadequate auditory monitoring, pitch deviation, breathy vocal quality, and improper laryngeal valving and vocal register have characterized discussions of severely and profoundly hearing-impaired children's vocal production (Angelocci, Kopp, & Holbrook, 1964; Martony, 1968; McGarr & Osberger, 1978; Silverman, 1971). Ling (1976) stated that, despite current technological advances, deviant vocal behaviors — first identified in the 1930s as problems for the severely and profoundly hearing-impaired — are still being identified in the 1980s. These same behaviors have been related to vocal abuse in the normal-hearing population (Andrews, 1986; Boone, 1977; Saniga & Carlin, 1986; Wilson, 1972). Ling (1976) noted that habitual use of too high a pitch and/or tension, especially in the larynx, will lead to vocal nodules in the hearing-impaired child as well. If these behaviors are exhibited in hearing-impaired children, it might be expected that vocal abuse would be perceived as characteristic of this group.

Vocal abuse has been distinguished as the most common vocal disorder in children (Wilson, 1972). Among the most common voice problems noted in this population have been vocal nodules and hoarseness without pathology. Speech-language pathologists are trained to screen for and diagnose such voice disorders as a prelude to remediation.

Two types of scales have been utilized to rate voice production and vocal abuse. These have included ratings by trained listeners such as speech-language pathologists. The *Buffalo Voice Profile*, a typical listener-rated scale,

was developed by Wilson (1979). It consisted of twelve 7-point scales that allow the clinician to ordinally rate parameters of a child's or adult's voice. Other scales utilizing similar ordinal ratings include those of Wilson and Rice (1977) and Moncur and Brackett (1974). A self-rating scale, the Voice Conservation Index for Children (VCIC), has been developed by Carlin and Saniga (1986). This ordinal scale is completed by the child who answers 16 questions about frequency of vocal behaviors related to intensity, pitch, and auditory monitoring.

Subtelny, Orlando, and Whitehead (1981) developed a different kind of instrument, *The Speech and Voice Characteristics of the Deaf*, that features the systematic analysis of voice and speech in the vocal production of hearing-impaired individuals. Through a series of audio tapes, the authors provided clinician training in rating the intelligibility of hearing-impaired speech. Although not developed to diagnose vocal abuse, acoustic characteristics related to vocal abuse would be evident as the instrument includes ordinal scaling of pitch register, pitch control, control of air expenditure, and prosodic features.

As many hearing-impaired speakers have abnormal attributes in their vocal repertoire, it was hypothesized that these hearing-impaired speakers either could be at risk for or did abuse their vocal mechanism. Awareness and perception of vocal abuse has not been studied in this population.

The present study was developed to investigate:

1. Whether hearing-impaired children in a state school for the deaf would report behaviors that were abusive to the vocal mechanism.
2. Whether the teachers of these hearing-impaired children would report similar abusive behaviors for the children.
3. Whether speech-language pathologists utilizing an established rating scale for the hearing-impaired would identify related abuse problems in the children's voices.
4. Whether speech-language pathologists would provide a rating similar to those of the children and their teachers.

PROCEDURES

Subjects

Twenty-five hearing-impaired children (16 boys and 9 girls) participated. All students were enrolled in a state school for the deaf which used total communication. The high school principal selected those students 13-18 years of age who met the following criteria: (a) possessed personal amplification, (b) were enrolled in an academic track, and (c) attained at least a third-grade reading level. All 25 children who met those criteria were tested. Their mean age was 16 years 5 months, ranging from 14 years 1 month to 18 years 6 months. The mean pure tone average for 500, 1000, and 2000 Hz in the better ear was 89 dB HL (ANSI, 1969), ranging from 49 dB to 108 dB HL with a

mode of 103 dB HL.

Voice Evaluation Instruments

The VCIC was a forced choice self-report scale containing 16 items, written at the third-grade level (see Appendix A). The test was developed to assess vocal usage among normal-hearing children so that those who were at risk for developing vocal pathology and had established patterns of poor vocal hygiene would be identified. The questions covered topics such as amount of time spent talking, use of loud speaking, and incidence of hoarseness. The total test took 10 to 15 minutes and could be individually or group administered. Approximately 1000 normal-hearing children in midwestern and southern states have been tested with this instrument and the current Cronbach alpha data, a measure of internal reliability, was at the .85 level (Cronbach, 1951). Previous studies have indicated that (a) the instrument is a quick, easily administered rating scale; (b) it identifies vocal abusers; and (c) the ratings of children and teachers have good agreement with each other (Carlin, Saniga, & Worthington, 1985). Although developed for normal-hearing children, all the items except one (use of telephone) were deemed acceptable for use with this population.

Each of the 16 items was scored on a 5-point scale ranging from "almost always" to "never". The responses were scored according to their point value such that "almost always" received a value of 1, "sometimes" received a value of 2, and so on, and these values were summed for a final score. Possible scores were in a range from 16 to 80. A higher score was indicative of better vocal usage or less vocal abuse. A low score was indicative of poor vocal hygiene.

Subtelny, Orlando, and Whitehead (1981) developed materials to assess the overall competence of the speech/voice of hearing-impaired young adults. Ten speech/voice characteristics were utilized in their assessment. Five of these that relate to vocal abuse were selected for this experiment: (a) pitch register (Cooper, 1971, p. 586; Moncur & Brackett, 1974, p. 45), (b) pitch control (Cooper, 1971, p. 586; Boone, 1977, p. 35), (c) rate (Cooper, 1971, p. 586), (d) control of air expenditure (Boone, 1977, p. 107; Cooper, 1971, p. 592; Gray, 1983, p. 47), and (e) prosodic features (Moncur & Brackett, 1974, p. 63). All, when used inappropriately, contribute to vocal abuse. A sixth scale, intelligibility, was also selected because in other speech-language disordered populations factors that affect or are affected by over-all intelligibility have been correlated with the presence of vocal pathology (McWilliams, Morris, & Shelton, 1984). Each of these attributes was rated on a 1- to 5-point scale with 5 being the best possible score for each attribute. The highest score possible was 30 and the lowest 6. The higher score, then, was indicative of better vocal performance.

The VCIC was group-administered to all subjects. Several proficient signers gave the test instructions and were present to translate any unfamiliar words if necessary. After the children completed the test, one teacher per child who

knew the child well rated the children on the VCIC according to their best knowledge of the children's vocal usage.

Finally, the children were tape recorded reading a modified "My Grandfather" passage shortened and rewritten by a reading specialist at the third-grade level and presented in Appendix B (Fairbanks, 1960). These recordings were scored independently by two certified speech-language pathologists employing the Subtelny et al. (1981) rating system for voice and speech. Inter- and intra-examiner reliability had been obtained prior to the study with similar recordings resulting in $R = .90$ and $.94$ for inter- and intra-examiner reliability, respectively. Following this, the scores from the two examiners were totaled for statistical analysis.

RESULTS

The VCIC was a rating of vocal usage, a subjective impression of how much time was spent in specific speaking activities such as yelling or talking. The Subtelny et al. (1981) rating system was a perceptual rating of various aspects of voice usage. If the perceptual ratings by the speech-language pathologists indicated deviant vocal behaviors, then those behaviors causing the deviancy should have been reported frequently or excessively by the subjects.

Means and standard deviations were computed for the ratings from each of the three groups of raters. A Friedman two-way analysis of variance by ranks was utilized for analyzing the ordinal repeated measures data. The means and standard deviations from each group of raters are summarized in Table 1. The Friedman analysis of variance yielded an S of 29.12, $df = 2$, which was significant at the .001 level (Ferguson, 1976). This indicated that at least one mean was significantly different from the others and theoretically was not drawn from the same population (Ferguson, 1976, p. 394).

DISCUSSION

The statistical analysis indicated that there were differences among the ratings by the three groups. This was not unexpected. While all three groups were rating components of vocal abuse, two were investigating amount of vocal use and frequency of voice behaviors; the third evaluated voice characteristics associated with vocal abuse.

Interestingly, the hearing-impaired children's scores, on average, did not indicate vocal abuse and were only slightly different from those of normal-hearing children and children in special education classes (Carlin, Saniga, & Worthington, 1985). The latter data were collected in a previous study and the mean scores are presented here for comparison: children in regular classrooms, 53.22; special education children, 53.82; hearing-impaired children, 57.56. Hearing-impaired children knew when they used their voices but their concept of "voice" included all forms of language expression. The children stated that, for them, talking included manual communication, with or with-

Table 1
Means and Standard Deviations on Two Scales
Rating Speech/Voice Characteristics of Hearing-Impaired Children

	Sp Path^a (Max = 60)	Children (Max = 80)	Teachers (Max = 80)
	Subtely Ratings^a	VCIC^b	VCIC^c
Mean	29.00	57.56	64.00
SD	14.60	8.60	11.25

^aSpeech-language pathologists used the Speech and Voice Characteristics of the Deaf scales. Scores are summed over two raters.

^bThe Voice Conservation Index for Children, used as a self-rating scale.

^cThe Voice Conservation Index for Children, used to rate hearing-impaired subjects.

out voice.

The speech-language pathologists' ratings were low. The mean of the ratings after the two raters' scores were summed was 29; the highest score possible was 60. It was not surprising that the speech-language pathologists were so critical when rating the acoustic characteristics of hearing-impaired speech as their training emphasized the analysis of deviant vocal attributes. The teachers and the students, using the same scale, had similar ratings. An inspection of the data indicated that the teachers rated the children slightly higher than did the students themselves. A higher score indicated better vocal hygiene (i.e., less vocal abuse) (Saniga & Carlin, 1986). However, it appeared that when the two different scales were used to assess vocal abuse, the three groups rated different vocal attributes and thus obtained significantly different scores.

The purposes of this study were to see if hearing-impaired children would report abusive vocal behaviors. They did not. Second, estimates of vocal usage from the reference point of the hearing-impaired students and from their teachers were compared. These were similar with a substantial over-lapping of the two sets of ratings. However, the teachers' estimates were of less abusive voice usage than were the students'.

Finally, we were interested in learning if trained listeners, speech-language pathologists, using an established voice rating scale would rate the students' voice characteristics similarly to the students and their teachers. Obviously from the data, speech-language pathologists rated the speech of the hearing-impaired as generally poor. As Black (1971) would have predicted, all (rated) aspects of speech were deemed abnormal. In some cases, these abnormalities might be indicative of abuse.

We suggest that information from all three sources (hearing-impaired individual, teacher, and clinician) would be important in the preparation of a therapy plan. Clinicians routinely evaluate speech/voice production. This facilitates diagnosis. The additional information from the children themselves and their teachers will facilitate treatment and perhaps improve prognosis.

For, if students have a different perception about their vocal usage than do their clinicians, it could create confusion about therapy goals (Andrews, 1986). If a clinician is working on vocal intensity or pitch and the student has reported vocal usage within normal limits, there is an obvious need for therapy goal clarification. This improved communication should affect planning and therapy outcomes positively.

ACKNOWLEDGEMENTS

The authors wish to thank the Mississippi School for the Deaf, Jackson, MS, for their kindness and cooperation.

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APPENDIX A

VOICE CONSERVATION INDEX FOR CHILDREN

1. When I get a cold, my voice gets hoarse.
2. After cheering at a ball game, I get hoarse.
3. When I'm in a noisy situation, I stop talking because I think I won't be heard.
4. When I am in a noisy situation, I speak very loudly.
5. At home or at school I spend a lot of time talking every day.
6. Outside I like to talk to people who are far away from me.
7. When I play outside with my friends, I yell alot.
8. I lose my voice when I don't have a cold.
9. People tell me I talk too loudly.
10. People tell me I never stop talking.
11. I like to talk.
12. I talk on the phone.
13. At home, I talk to people who are in another room.
14. I like to make car or other noises when I play.
15. I like to sing.
16. People don't listen to me unless I talk loudly.

APPENDIX B

MODIFIED GRANDFATHER PASSAGE

You wished to know all about my grandfather. Well, he is very old. He dresses himself in a black coat which is missing buttons. He still thinks as fast as ever. A long beard sticks to his chin, giving those who see him a feeling of respect. When he speaks, his voice is just a bit cracked and shakes a little. Twice each day he plays a small organ. In the winter when there is ice, he takes a short walk in the open air. We have often asked him to walk more and smoke less.