PRIMARY COMMUNICATIVE DISORDERS IN THE NASHVILLE SCHOOLS: 1979-80

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ABSTRACT

The study sought to determine the extent of service delivery for communicative disorders in the Nashville public schools during the academic year 1979-80. Of the 71,662 children enrolled in grades K thru 12, 2,877 children or 4.01 per cent of the population were receiving services for communicative disorders. Of this number, 2,023 or 2.82 per cent were primary and 854 or 1.19 per cent were secondary handicaps. From these figures, it was determined that 70.3 per cent of the service delivery was for primary handicaps and the remaining 29.3 per cent for secondary handicaps. The primary handicaps of speech, language, and hearing accounted for 83.2,10.6 and 6.2 per cent respectively. Males (63.5 percent) were seen 1.7 times more often than females (36.5 per cent). Quantitatively, there were no apparent racial differences. The in-depth analyses indicated that blacks had a greater propensity for language disorder than whites while whites had a greater propensity for hearing disorders than blacks. The multi-dimensional scaling analysis supported the significance of these and other observations.

Introduction

Communication pathologies (Taylor, 1980) of speech, language, and hearing **are** examples of health handicaps, whether chronic or tempoiary, which can hinder the intellectual and learning processes. In addition, these handicaps can cause absenteeism from school, and create other, negative social or emotional behaviors.

During the latter part of the past decade, there were renewed interests in determining the prevalence of communicative disorders (Bensberg and

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Sigelman, 1976; Stewart, 1981). The two major reasons for the interests were that timely data were lacking (ASHA, 1977) and available data were insufficient (Stewart, Martin, and Brady, 1979). A third reason was in terms of the labour market in order to better understand personnel resources, case-loads, needs, and utilizations. In addition, other reasons were for determining the impact of cultural differences and dynamics (Taylor, 1980; Williams, 1979); social differences versus disorders (Williams and Wolfram, 1977); multiple handicaps of and related to communication pathologies (Bensberg and Sigelman, 1976; Stewart *et ah,* 1979; Stewart, 1981); and factors associated with development.

Another dimension to the renewed interest in communicative disorders lay in the problems associated with determining their prevalence. ' Problems of definition of various handicapping conditions, biased samples used in studies and surveys, and the lack of uniform criteria for categorizing these conditions produce widely divergent statistics' (Bensberg and Sigelman, 1976, p. 35). Views not unrelated were expressed by ASHA (1977) in that studies'. . . . . , are based on relatively small studies that did not employ appropriate methodological controls' (p. 13). At the foundation of these problems were concepts associated with reliability and validity. The study by Stewart *et al.* (1979) revealed specific areas related to these concepts. The substance of their concerns were based on (a) the background and experience of the evaluators, (b) the types of assessment tools, (c) the nature and degree of the disorder diagnosed, and (d) the primary or secondary status of the disorder (Stewart, 1981).

In evaluating the problems associated with prevalence figures, none looms more perplexing and confounding than those of definitions. Even for the broad categories of speech, language, and hearing disorders there is less than reasonable agreement. This is especially true for delineating speech from language disorders (see for example, *Administration for Children, Youth and Families,* 1980, pp. 5-7—hereafter referred to as ACYF; Metz and Cramer 1974, p. 20; *National Centers for Health Statistics,* 1975a, b—hereafter referred to as NCHS).

It is of importance to note that ASHA (1980) in its draft statement prefaces its definition of communicative disorders with the broad categories of speech, language, and hearing. In their proposed definition, however, language is included under speech. The serious recognition that language and speech are different, yet symbiotic (Cutting and Kavanagh, 1975) is the same problem perpetuated by other agencies; that is, a maintenance of the *status quo.* Out of context, ASHA's definition (in its draft-proposed form) may be more detrimental than others because of its professional role.

Several other areas are closely interrelated to the problem of definitions and determining prevalence figures. A discussion of these areas is beyond the scope of the study; they are, however, worth mentioning. First, issues of appropriate criteria or standards have been developed by McDermott and Van Tasell (1981)

for hearing and Taylor (1980) and others for speech-language. Second, the issues of duplicated versus unduplicated counts (McDermott, 1981) or primary versus related (secondary) (Dublinske and Healey, 1978; Stewart, 1981). Third, Hogan (1973) developed two levels of concern for computing incidence figure. His orientation is germane to both criteria and statistical problems.

A fourth issue, and one of major magnitude, is (specific learning disabilities, which manifest themselves primarily as communicative disorders. In his analyses, Stewart (1981) excluded this category because of the uncertainty with defining them in communicative terms. ASHA (1976) stated its position on learning disabilities, and recognized the dual interpretations of the more commonly accepted definitions such as the language-based ones used by the (ACYF, 1980, p. 7) and Joselson (1978). ASHA does not attempt to define or to separate communicative disorders in relation to learning disabilities. On the other hand, Maisel (1981) presented the definition recommended by the National Joint Committee on Learning Disabilities. The significance of their definition is that ' learning disabilities are not the primary and direct result of other handicapping conditions and should not be so confused' (p. 4). More recent considerations on learning disabilities by ASHA (1979), is consistent with Maisel's report. The implication of Maisel's report is that learning disabilities which are primarily communicative in origin can be included in prevalence figures.

The present study attempts to contribute information in the first two interest areas outlined earlier. These two areas have direct implications on the other problems associated with determining the prevalence of communicative disorders. Some indicators to support this position can be found in Tenney and Edwards (1970), NCHS (1975a, b), Giilespie and Cooper (1973), Stewart *et al.* (1979), Evard and Saber (1979), and Stewart (1981).

This study serves two purposes. First, it presents a demographic profile of the number of school-age children receiving services for communicative disorders in a public school system by race and sex with emphasis on primary handicaps. The second purpose is to evaluate communicative disorders with respect to race and sex. The study utilizes multidimensional scaling to ascertain the significance between and related to these perspectives. The study differs from Stewart (1981) in that the data are more timely and detailed and separated by service delivery for primary and related (secondary) communicative handicaps.

Data Source

Perspective

The data presented in this study on the prevalence of communicative disorders is based upon information supplied by the Division of Research and Evaluation for the Metropolitan Board of Education. This Metropolitan public school system governs Davidson County, which includes Nashville, Tennessee. Administratively, the school system is only required by the state to report com-

municative disorders into the broad categories of speech, language, ard deafness and hearing-impaired. The analyses presented in the results are based upon these categories and the numbers indicated.

The Data

The records surveyed were for the academic year 1979-80. The official enrolment for this period was 71,662 in grades kindergarten through 12 (Basics and Metro Public Schools, 1980-81; hereafter referred to as Basics, 1981). There were 2,728 children receiving speech and language services, and 149 children seen for deafness and hearing-impairment. These subjects accounted for 3.81 and 0.21 per cent, respectively, of the school population for a combined total of 2,877 children or 4.02 per cent. The prevalence of these services in the state were 3.77 and 0.27 per cent, respectively, for a total of 4.04 per cent (State of Tennessee Annual Statistical Report . . . . . , 1981; hereafter referred to as (STASR). These figures include communicative disorders as both primary and related (other or additional) services (Dublinske and Healey, 1978; McDermott, 1981).

Limitations

Professional qualifications: The investigators made no attempt to determine the professional background or qualifications of persons making the diagnoses. The school system employed 40 speech-language pathologists and one audiologist during the reporting period. Since no assumptions are made, this fact is presented for information.

Assessment and criteria: Other limitations lie in the use of evaluative measures and criteria. In assessing speech, the Goldman-Fristoe Test of Articulation (1969) and the Templin-Darley Tests of Articulation (1969) were generally used. Language was generally assessed with the Peabody Picture Vocabulary Test (Dunn, 1965). Other tests used were: Test for Auditory Comprehension of Language (Carrow, 1973), Carrow Elicited Language Inventory (1974), Illinois Test of Psycholinguistic Abilities (Kirk, McCarthy, and Kirk, 1968), and the Boehm Test of Basic Concepts (1971). Thus, no standard measure was used, and it was unknown what criteria were used to refer subjects for therapy and whether allowances were made for dialectal differences. For hearing, screenings were conducted, but little information was available on evaluation, criteria, and follow-up.

Learning disabilities: A third limitation in the study was in the exclusion of learning disabilities in determining prevalence figures. Rationale for this approach was considered in the previous section; they were included, however, as they impacted on related services. This strategy also served to maintain a conservative estimate of communicative disorders. Another reason for separating this category of handicaps from the primary communicative disorders was

based on the research of Birman (1979). In her study, she cited '.....the relatively high proportion of students classified as having learning disabilities' (p. 29) in Tennessee. Her statistic was about 4.0 per cent compared to the national average of 1.6 per cent during 1976-77. This figure had changed little for 1979-80; according to STASR (1981), it was 3,86 per cent. For Nashville, it was even higher at 5.93 per cent.

Definitions: The previous section discussed the major problem associated with definitions. The present study was unable to make a contribution in this area because the data structure was already established.

The investigators recognized the importance and distinction between the terms handicap, impairment, and disability; added to this list were the terms disorder and pathology. For the purposes of this study and based upon the other limitations, they all function with the same meaning. Similarly, the teims prevalence and incidence served the same meaning, although the correct term was prevalence.

Statistical Analyses

The initial phase of the data analyses concentrated on separating primary from secondary handicaps; on these respective handicaps, the figures were 2,023 children or 2.82 per cent and 854 children or 1.19 per cent. In considering the 2,877 children or 4.01 per cent of the school population, service delivery for communicative disorders of a primary nature constituted 70.3 per cent of the total with the remaining 29.7 per cent of a secondary nature. The study emphasis was on evaluating primary disorders; the secondary handicaps were not ignored, however. The main statistics was multidimensional contingency analysis by Everitt (1979).

The data also represented, by virtue of availability, statistics as point prevalences, which mean handicaps, existing at a given point in time [see discussion in NCHS (1975a)]. This position is consistent with epidemiological issues presented by Paul (1966). This point is presented for information because of the reporting time. For example, the data in this study were for the academic rather than the fiscal year; any differences could include children receiving services during the summer or the recipient of other direct or related services.

Additionally, no attempt was made to adjust item or cell computations; minor, but obvious discrepancies in the data were a function of this lack of adjustment rather than errors. The implications of this is beyond the scope of the present study.

Results

Overview of Service Delivery

Table 1 is an overview of the delivery of services for communicative disorders. The table shows, at the column head, the broad disorders of speech, language,

and hearing with totals displayed in the right-most column. Each of the disorders is further displayed by frequency (w) and per cent (%) of occurrences (delivery of services). The row heads show the race with sub-divisions of sex. These row heads include blacks, whites, and others (primarily Asians) with the bottom-most row reflecting the totals for the disorders.

TABLE 1

Distribution of Services delivered for Communicative Disorders reported by Frequency (n) and Percentum (%) for Race and Sex in Reference to the Total (n=2,877) for Grades K—12 in Academic Year 1979-80.

Race / Sex	Speech		Language		Hearing		Total	
	n	%	n	%	n	%	n	%
Blacks	710	24.7	212	7.4	31	1.1	953	33.1
Males	473	16.4	133	4.6	20	0.7	626	21.8
Females	237	8.2	78	2.7	11	0.4	326	11.3
Unknown			1				1	
Whites	1490	51.8	297	10.3	117	4.1	1904	66.2
Males	940	32.7	188	6.5	56	1.9	1184	41 2
Females	550	19.1	109	3.8	61	2.1	720	25.0
Unknown								
Others	13	0.5	6	0-2	1	—	20	0.7
Males	11	0.4	5	0.2	0	0.0	16	0.6
Females	2	0.1	1		0	0.0	3	0.1
Unknown					1		1	
Total	2213	76.9	515	17.9	149	5.2	2877	100.0
Males	1424	49.5	326	11.3	76	2.6	1826	63.5
Females	789	27.4	188	6.5	72	2.5	1049	36.5
Unknown			1		1	—	2	0.1

Speech: The table shows a total of 2,213 children or 76.9 per cent received services for speech disorders. Of this number, 49.5 and 27.4 per cent were males and females, respectively. The total can be divided further into race. The table reveals that 24.7, 51.8, and 0.5 per cent of the children were black, white, and other. The frequencies and percentages for sex by race can be viewed similarly.

Language. A total of 515 children or 17.9 per cent received services for disorders of language. Males and females accounted for 11.3 and 6.5 per cent of the services, respectively. One child, black, could not be identified administratively for sex; this subject was labeled unknown (Unk). Blacks, whites, and others accounted for 7.4, 10.3, and 0.2 per cent of the service delivery, respectively. Statistics for sex by race can also be seen in the table.

Hearing: There were 149 children or 5.2 per cent who received services for hearing handicaps. Of this total, 2.6 and 2.5 per cent were males and females, respectively. Blacks, whites, and others accounted for 1.1, 4.1 and 0.0 per cent, respectively. Table 1 is revealing also for sex by race.

In Capsule: Children receiving services for communicative disorders totaled 2,877. Of this number, males and females accounted for 63.5 and 36.5 per cent, respectively. Administratively, approximately 0.1 per cent of children were unidentified with respect to sex. Racially, the delivery of services for communicative disorders was 33.1, 66.2, and 0.7 per cent for blacks, whites, and others, respectively. The most to least prevalent services were for speech, language, and hearing.

For each disorder, males were identified more often than females. One exception may be seen with hearing disorders; for whites, females manifested a higher need for services. One may also see from viewing the data that whites, irrespective of sex, manifested a higher need for services than blacks.

As a global description of the data, Table 1 shows some interesting, if not valuable, trends. This table does not, however, clearly educe quantitatively ihe magnitude and degree of service delivery for the communicative handicaps. The data are oriented in Table 2 to view some other related perspectives.

One perspective is to delineate the distribution of services for the disorders across race. The importance of this perspective underlies whether the occurrence (delivery of services) of the handicaps manifest themselves equitably by race. The percentum for distribution is read by column and totals to 100 per cent in the bottom-most row under each disorder. A second perspective involves the composition of the disorders within race. The advantage of this approach is a determination of whether or not the disorders are equitably served (occurring or seen). The percentum for composition is read by row under each column labeled and totals to 100 per cent in the right-most column labeled for each race. A third perspective is the ma!e-to-female ratio, which reflects the equality of communicative disorders for sex. This orientation addresses the issue of whether or not the disorders occur as often in males as females. Table 2 reveals these three perspectives as a function of the total number of children receiving services for speech, language, and hearing handicaps. Missing data entries, seen in Table 1, are excluded for computation in this table.

Distribution of Services by Disorder

Speech: Table 2 shows that 32.1 per cent of the children receiving services for speech- were black. From the sub-column labeled ratio, it may be viewed that males were seen twice as often as females. The table reveals that white children accounted for 67.3 per cent of the services with males being seen 1.7 times more often than females. From the data, the need for services for speech disorders was more than twice as great for whites than blacks. Black males, however, were seen more than white males in reference to their respective female counterparts. The group labeled other accounted for less than 1.0 per cent of the children with a male-to-female ratio of 5.5:1.

TABLE 2

Analysis of Services Delivered by Race and Sex with Communicative Disorders Subdisorders Subdivided into Distribution (%), Composition (%) and Ratio (of Males to Females) in Reference to the Total (N=2,877) for Grades K-12 in Academic Year 1979-80.

Race	Speech			Language			Hearing			Total		
Sex	Dist.	Comp.	Ratio	Dist.	Comp.	Ratio	Dist.	Com.	Ratio.	Dist.	Comp.	Ratio
Blacks	32.1	74.5	2.0	41.2	22.2	1.7	20.8	3.3	1.8	33.1	100.0	1.9
Males	21.4	49.6		25.8	14.0		13.4	2.1		21.8	65.7	
Females	10.7	24.9		15.1	8.2		7.4	1.2		11.3	34.2	
Whites	67.3	78.3	1.7	57.7	15.6	1.7	78.5	6.1	0.9	66.2	100.0	1.6
Males	42.5	49.4		36.5	9.9		37.6	2.9		41.2	62.2	
Females	24.9	28.9		21.2	5.7		40.9	3.2		25.0	37.8	
Others	0.6	68.4	5.5	1.2	31.6	5.0	0.0	0.0	—	0.7	100.0	5.3
Males	0.5	57.9		1.0	26.3		0.0	0.0		0.6	84.2	
Females	0.1	10.5		0.2	5.3		0.0	0.0		0.1	15.8	
Total	100.0	76.9	1.8	100.0	17.9	1.7	100.0	5.2	1.1	100.0	100.0	1.7
Males	64.3	49.5		63.3	11.3		51.0	2.6		63.5	63.5	
Femles	35.7	27.4		36.5	6.5		48.3	2.5		36.5	36.5	
Unknown												

Language: Blacks accounted for 41.2 per cent of the services for language handicaps with a ratio of 1.7:1 for sex. White children accounted for 57.7 per cent of these disorders with a ratio mirroring blacks. Like speech, the propensity for services favored whites rather than blacks, but this tendency was not as great as the disorders of speech. There was an equivalent sex ratio of language disorders for blacks and whites. The group labeled others accounted for 1.2 per cent of the service needs with a sex ratio of 5.0:1.

Hearing: The distribution of services for hearing disorders was 20.8 and 78.5 per cent for blacks and whites, respectively; there were no incidences of services for the group labeled others. The ratio of service delivery for sex was 1.8:1 for blacks and 0.9:1 for whites. Overall, white children were receiving services 3.8 times more often than blacks. On the average, black males were seen twice as often as white males relative to their respective female counterparts and 1.8 times more often than black females. Regarding service delivery, hearing was the only disorder (for whites) which reflected a higher prevalence for females than males.

Composition of Services by Race

Table 2 also displays the percentum of service delivery of communicative disorders for each race by sex. Black children manifested 74.5, 22.2, and 3.3 per cent for speech, language, and hearing disorders, respectively. For these same services, whites accounted for 78.3, 15.6, and 6.1 per cent, respectively. From the table it can be seen that the need for services by blacks and whites differs by less than 4.0 per cent for speech and hearing. In comparison language disorders were seen 1.4 times more often with blacks than whites. For hearing disorders, whites accounted for nearly twice as much service as blacks. The others' group reflected a need for services of 68.4 percent for speech and 31.6 per cent for language disorders; hearing disorders were not found in this group. Ratios involving sex differences are redundant for the perspectives on distribution and composition.

Table 2 displays three perspectives on the delivery of services for communicative disorders. These orientations differ from Table 1 in that they are sensitive to differences due to the prevalence of thc disorders thtmrelves and to the propensity of the disorders due to race. The weaknesses in Table 1 relative to the several perspectives in Table 2 can be viewed by comparing the corresponding cell entries and totals in both tables; the latter entries are redundant, while the former ones are not. In sum, the average frequency for the delivery of services, Table 1, is a vague indicator of where needs exist. In reference to the totals in Table 2, one can view the ratios for sex as 1.9, 1.6, and 5.3 to 1 for blacks, whites, and others, respectively. This indicates that males require more services for communicative disorders than females; racially, these ratios are slightly different for blacks and whites; however, statistical significance appears improbable. With the group labeled others. The large ratio appears to be more a function of the small sub-sample size, but the trend is noteworthy.

Primary Handicaps and Related Services

Table 3 delineates the primary handicaps, left-most column, of the children for which they received services in the several communicative disorders. Each disorder is subdivided into frequency and per cent as a function of their respective column total, bottom row. The right-most column, labeled total, sums across the columns for each primary handicap, and also yields the frequency and per cent of its column total, bottom row. This column shows the total need for communicative services for a given primary handicap.

The column headings for the communicative disorders reveal another dimension of service delivery. In view of the primary handicaps, the categories of communicative disorders represent related services (see Dublinske acd Healey, 1978). Table 3 departs from the previous two in that it separates the delivery of services for communicative disorders (for the primary handicaps of speech,

language, and hearing) and related services for other primary handicaps rather than revealing the delivery of services for communicative disorders across all handicaps.

Speech: The table shows, for example, that children with the primary handicaps of speech were receiving services for speech 76.1 per cent of the total (100 per cent or n—2,213). Similarly, for speech as a related service, learning disabilities (8.9 per cent) and trainable (TMR; 6.4 per cent) and educably (EMR; 3.7 per cent) mentally retarded as primary handicaps were seen second through fourth, respectively. Table 3 reveals further that language and hearing as related services for speech accounted for 3.5 and 0.7 per cent of their respective totals.

Language: This primary handicap (including severe; 13.8 per cent) accounted for 41.6 per cent of the language services. Similarly, in order, ihe primary handicaps of TMR (18.3 per cent), learning disabilities (13.6 per cent), EMR (13.0 per cent), and severely multiple handicapped (6.8 per cent) can be viewed in Table 3 for their contribution to the total for language (as related) services, along with the other primary handicaps. It may also be seen that speech and hearing services contributed to 1.3 and 2.7 per cent toward their respective totals for the language disorders as related services.

Hearing: This primary disorder (including deafness, 24.2 per cent) accounted for 84.6 per cent of the total for hearing services. The contribution of the primary handicaps of learning disabilities (5.4 per cent) and TMR (4.0 per cent) to the total need for related services can be seen in Table 3, along with the other primary disorders. The table also shows the small contribution of speech and language as related services.

Trends: Table 3 reveals some noteworthy trends. First, the need for communicative disorders as primary handicaps is greatest for hearing (including deafness), followed by speech, and least needed for language (including severe). This observation is based on their respective column totals and is independent of frequency of occurrence. With the exception of language (41.6 per cent), the two other disorders account for at least 76.1 per cent of the service need within their respective handicaps. Second, language disorders tend to involve services for a number of diversified disorders. There is also a third, related trend worth noting. The table reveals that learning disabilities and TMR, in order, needed the related services of speech and hearing most. This order was reversed for language and with EMR very close to the service needs of learning disabilities. In relative terms, there is a greater kinship for related services of speech, language, and hearing for learning disabilities and TMR than the other primary handicaps.

In viewing the column labeled total, Table 3 brings into perspective a larger consideration of the delivery of communicative services. Speech clearly dominates the need for services at 59.2 per cent. Learning disabilities is second at 9.6 per cent. Third and fourth positions are very close with language (including

TABLE 3

Distribution of Primary Handicaps with Service Deliverances for Communicative Disorders—As Secondary Services Reported by Frequency (n) and Percentum (%) in References to the Total (N=2$_3$877) for Grades K—12 in Academic year 1979-1980.

Primary Handicap	Services Received/Delivered: Speech n	Speech %	Language n	Language %	Hearing n	Hearing %	Total n	Total %
EMR	82	3.7	67	13.0	0	–	149	5.2
TMR	141	6.4	94	18.3	6	4.0	241	8.4
PMR	2	0.1	5	1 0	0	—	7	0.2
Speech	1683	76.1	18	3,5	1	0.7	1702	59.2
Language	26	1.2	143	27.8	1	0.7-	170	5.9
Sev. Lang.	3	0.1	71	11.8	3	2.0	77	2.7
Autistic	0	—	0	—	0	—	0	—
Deaf	1	0.0	0	—	36	24.2	37	1.3
Hearing	10	0.5	3	0.6	90	60.4	103	3.6
Blind	2	0.1	0	—	0	—.	2	0.1
Visual	3	0.1	1	0.2	0	—	4	0.1
Physical	22	1.0	5	1.0	2	1.3	*2*	1.0
Lrn. Dis.	197	8.9	70	13.6	8	5.4	275	9.6
Pregnant	1	0.0	0	—	0	—	1	0.0
Behavior	15	0.7	3	0.6	0	—	18	0.6
Social	1	0.0	0	—	0	—	1	0.0
Sev. Mult.	21	0.9	35	6.8	2	1.3	58	2.0
Gifted	2	0.1	0	—	0	—	2	0.1
Other .	1	0.0	0	_____	-------	--------	1	0.0
Total	2223	100.0	515	100.0	149	100.0	2877	100.0

severe) at 8.6 per cent and TMR at 8.4 per cent, respectively. The need for services in communicative disorders in positions fifth and sixth are very close with EMR at 5.2 per cent hearing disorders (including deafness) at 4.9 per cent. The other contributions to the total may be viewed similarly.

Primary Handicaps of Communication

Table 4 displays the distribution of communicative disorders as primary handicaps. The data in this table represent a demographic perspective on the primary handicaps of speech, language, and hearing presented in Table 3. Table 4 excludes communicative disorders as related services, because it is redundant for communicative disorders and slightly inflates the data.

From Table 3, one can tally the data entries as 2,023. This figure represents 2.82 per cent of the school population (N=71,662). This figure represents concomitantly the prevalence of communicative disorders in these school-age

children. By including the related services, this figure rises to 2,089 or 2.92 per cent of the school population. In terms of primary handicaps versus related services, Table 4 displays or represents 70.3 per cent (n=2,877) of the data presented in the several previous tables. The format of Table 4 is comparable to and referenced with Table 1.

Speech: Of the total (n=2,023) primary handicaps, 1,683 were speech. This figure represents 83.2 per cent of the total. Males and females accounted for 52.7 and 30.4 per cent, respectively. Racially, blacks, whites, and others accounted for 25.6, 57.1, and 0.5 per cent, respectively.

Language: The primary handicaps of language are divided into the categories of impaired and severe with a third category of combined which represents the total of the two. Of the total, language disorders accounted for 10.6 per cent. Males and females represent 7.1 and 3.5 per cent of this figure, respectively. Racially, blacks, whites, and others account for 4.6, 5.9, and 0.2 per cent respectively.

In contrasting impaired versus severe language disorders, a noteworthy trend emerges. Racially, one can view the table displaying the impaired disorders of language occurring 3.7, 1.3, and 4.0 times more often than severe language disorders for blacks, whites, and others, respectively. The table is further revealing for sex by race and disorder.

Hearing: Like language, hearing is divided into two categories. These categories include impaired and deafness with the category of combined representing the total of the two. The hearing disorders account for 6.2 per cent of the total. Males and females show equal prevalence of the disorders; frequency of occurrence, however, reveals a tendency toward females. Racially, blacks and whites account for 1.2 and 5.0 per cent, respectively. For race, sex revealed near equivalence, but slightly higher frequency favored females than males for whites.

In contrasting impaired-hearing versus deafness, qualitative differences appear more evident with hearing than language (or speech). The ratio of impaired-hearing to deafness is clearly equivalent for the races (2.4: and 2.5:1 for blacks and whites, respectively). The frequency of occurrence for impaired hearing for black males was nearly twice as great as black females. All other categories for race and sex were nearly equivalent with slight tendencies favoring females.

Totals: Table 4 displays the prevalence of communicative disorders as primary handicaps and their distribution by race and sex. The population prevalence of these disorders was 2.35 per cent for speech, 0.3 percent for language, and 0.18 per cent for hearing. Of this, 2.82 per cent blacks, whites, and others accounted for 31.4, 67.8, and 0.7 per cent, respectively. The missing data entries, labeled unknowns, accounted for 0.1 per cent. Males and females accounted for 62.9 and 37.0 per cent, respectively.

In contrasting the severity of the handicaps, it is evident that there are qualitative differences within the handicaps for the races and sexes, in addition to the obvious quantitative differences across the disorders. This observation takes on greater significance (not in the statistical sense) when comparing Tables 1 and 4 (see especially their total columns). One can see that the overall needs for services in (Table 1) and the prevalence of communicative disorders (Table 4) do not vary greatly. On close inspection of the two tables, one may view where the qualitative differences lie.

Distribution of Primary Handicaps by Disorder

Table 5 displays several perspectives on speech, language, and hearing disorders as primary handicaps not readily discernible in Table 4. It displays distribution, composition, and ratio for each of the disorders; these perspectives have been previously defined. The format of Table 5 is comparable to and referenced with Table 2.

Speech: The table shows that 30.7 per cent of the primary handicaps were manifested by black children. From the ratio, males were seen 1.8 times more often than females. The table further reveals that white children accounted for 68.7 per cent of the speech disorders with males being seen 1.7 times more often than females. The children in the group labeled others accounted for less than 1.0 per cent of the disorders with a male-to-female ratio of 5.0:1. Overall, males and females accounted for 63.4 and 36.6 per cent respectively, of the speech handicaps with a ratio of 1.7:1.

Language: For the combined total of language disorders, the distribution was 43.9, 53.7, and 2.3 per cent for blacks, whites, and others, respectively. For these same groups, their ratios were 1.8:, 2.1:, and 4.0:1, respectively. Across race, the distribution was 66.8 and 33.2 per cent for males and females, respectively, with a ratio of 2.0:1.

In contrasting impaired versus severe language, some qualitative and quantitative differences can be delineated, which were not discernible in Table 4. For example, the male-to-female ratio was nearly twice (1.9) as great for severe (3.0) than impaired (1.6) language in blacks, while it was somewhat comparable for white children (2.3 and 2.0, respectively). Although slight, the tendency in the latter group is also toward severe. A ratio for the group labeled others could not be computed because no females were diagnosed with severe language; however, the male-to-female ratio was 3.0:1 for the impaired language disorder.

Distributionally, impaired (51.7 per cent) language occurred 1.8 times more often than severe (28.2 per cent) language for black children. For whites, a reverse trend was found; severe (70. 4 per cent) language occurred 1.5 times more often than impaired (45.5 per cent) language. Sex by race may be viewed similarly in the table.

Hearing: As with language and consistent with 'Table 4, hearing disorders have been divided into impaired-hearing and deafness with the combined column representing their sum. For the combined total, 19.0 and 80.2 per cent of the children were blacks and whites, respectively. The groups respective male-to-female ratios are 1.4: and 0.9:1. The latter ratio reflects a trend where females were seen more often than males.

In comparing impaired-hearing and deafness, both quantitative and qualitative trends are more obvious with the distributional outlay in Table 5 than in Table 4. With black children, impaired-hearing is seen 1.8 times more often in males than females; deafness, on the other hand, is seen more often in females than males (0.8:1). With white children, it can be seen that females were seen more often than males for both hearing disorders; their ratios were equivalent (0.9:1). From the column totals, one can see that impaired-hearing was more prevalent in males than females (1.1:1) while the reverse was true for deafness (0.9:1). In the former, black males were seen twice as often as white males in reference to their respective female counterparts (1.8: and 0.9:1 respectively).

One other major trend is worth noting. In looking at the distribution for race, one can see that impaired hearing, deafness, and their combined total are all 4.2 times more prevalent in whites (80.9, 80.6, and 80.2 per cent, respectively) than black children (19.1, 19.4, and 19.0 per cent, respectively). This distributional ratio of difference for hearing disorders is much greater than for speech and totally different than for language disorders.

Composition of Primary Handicaps by Race

Table 5 reveals also the composition of communicative disorders by race and sex. As primary handicaps, overall, speech, language, and hearing disorders accounted for 83.2, 10.6, and 6.2 per cent, respectively. The proportions for these disorders in black children are 81.4, 14.8, and 3.8 per cent, respectively. White children reflect 84.3 per cent for speech, 8.4 per cent for language, and 7.4 per cent for hearing disorders. For the others' group, these figures are 66.7 and 33.3 per cent for speech and language, respectively. The contribution of sex to speech and the categories of language and hearing disorders to their appropriate percentum may be viewed in the table.

In comparing the prevalence of communicative disorders by composition, some trends are worth mention. First, for black and white children, speech differs by little, approximately 3 per cent, and severe language disorders by less than 1 per cent. Second, language impairment occurs 2.5 times more often in blacks (11.7 per cent) than white (4.7 per cent) children; this ratio is 1.8 times greater in blacks than whites for the combined category. Third, for hearing disorders, white children (7.4 per cent) are seen 1.9 times more often than black children (3.8 per cent); this ratio is also equivalent for both deafness and hearing impairment with respect to racial differences.

TABLE 4

Distribution of Communicative Disorders as Primary Handicaps Reported by Frequency (n) and Percentum (%) for Race and Sex in Reference to the Total (N=2,023) for Grades K—12 in Academic Year 1979-1980

Race / Sex	Speech		Language						Hearing						Total	
			Impaired		Severe		Combined		Impaired		Deafness		Combined			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Blacks	517	25.6	74	3.7	20	1.0	94	4.6	17	0.8	7	0.3	24	1.2	635	31.4
Males	333	16.5	46	2.3	15	0.7	61	3.0	11	0.5	3	0.1	14	0.7	408	20.2
Females	184	9.1	28	1.4	5	0.3	33	1.6	6	0.3	4	0.2	10	0.5	227	11.2
Whites	115	657.1	65	3.2	50	2.5	115	5.9	72	3.6	29	1.4	101	5.0	1372	67.8
Males	725	35.8	43	2.1	35	1.7	78	3.9	35	1.7	14	0.7	49	2.4	852	42.1
Females	432	21.3	22	1.1	15	0.7	37	1.8	37	1.8	15	0.7	52	2.6	520	25.7
Others	10	0.5	4	0.2	1	—	5	0.2	0	—	0	—	0	—	15	0.7
Males	9	0.4	3	0.2	1	—	4	0.2	0	—	0	—	0	—	13	0.6
Females	1	0.1	1	—	0	—	1	—	0	—	0	—	0	—	2	0.1
Totals	1683	83.2	143	7.1	71	3.5	214	10.6	89	4.4	36	1.8	126	6.2	2023	100.0
Males	1067	52.7	92	4.5	51	2.5	143	7.1	46	2.3	17	0.8	63	3.1	1273	62.9
Females	616	30.4	51	2.5	20	1.0	71	3.5	43	2.1	19	0.9	62	3.1	749	37.0
Unknowns													1	0.0	1	0.1

TABLE 5

Analysis of Communicative Disorders by Race and Sex Subdivided into Distribution (%), Composition (%) and Ratio (of Males to Females) in Reference to the Total (N=2,023) for Grades K—12 in Academic Year 1979-1980

Race Sex	Speech Impaired Dist.	Comp.	Ratio	Language Severe Dist.	Comp.	Ratio	Combined Dist.	Comp.	Ratio
Blacks	30.7	81.4	1.8	51.7	11.7	1.6	28.2	3.1	3.0	43.9	1.48	1.8
Males	19.8	52.4		32.2	7.2		21.1	2.4		28.5	9.6	
Females	10.9	29.0		19.6	4.4		7.0	0.8		15.4	5.2	
Whites	68.7	84.3	1.7	45.5	4.7	2.0	70.4	3.6	2.3	53.7	8.4	2.1
Males	43.1	52.8		30.1	3.1		49.3	2.6		36.4	5.7	
Females	25.6	31.4		15.4	1.6		21.1	1.1		17.3	2.7	
Others	0.6	66.7	5.0	2.8	26.7	3.0	1.4	6.7	—	2.3	33.3	4.0
Males	0.5	60.0		2.1	20.0		1.4	6.7		1.9	26.7	
Females	0.1	6.7		0.7	6.7		—	—		0.5	6.7	
Totals	100.0	83.2	1.7	100.0	7.1	1.8	100.0	3.5	2.5	100.0	10.6	2.0
Males	63.4	52.7		64.3	4.5		71.8	2.5		66.8	7.1	
Females	36.6	30.4		35.7	2.5		28.2	1.0		33.2	3.5	
Blacks	19.1	2.7	1.8	19.4	1.1	0.8	19.0	3.8	1.4	31.4	100.0	1.8
Males	12.4	1.7		8.3	0.5		11.1	2.2		20.2	64.3	
Females	6.7	0.9		11.1	0.6		7.9	1.6		11.2	35.7	
Whites	80.9	5.2	0.9	80.6	2.1	0.9	80.2	7.4	0.9	67.8	100.0	1.6
Males	39.3	2.6		38.9	1.0		38.9	3.6		42.1	62.1	
Females	41.6	2.7		41.7	1.1		41.3	3.8		25.7	37.9	
Others	—	—	—	—	—	—	—	—	—	0.7	100.0	6.5
Males	—	—		—	—		—	—		0.6	86.7	
Females	—	—		—	—		—	—		0.1	13.7	
Totals	100.0	4.4	1.1	100.0	1.8	0.9	100.0	6.2	1.0	100.0	99.9	1.7
Males	51.7	2.3		47.2	0.8		50.0	3.1		62.9	62.9	
Females	48.3	2.1		52.8	0.9		49.2	3.1		37.0	37.0	
Unknowns							0.8	0.0		0.0	0.0	

Tables i through 5 address the service delivery and prevalence of communicative disorders. Initial inspection of the data indicates patterns which are not valid on further analysis. In order to put the collected data in the context of the school year and its enrolment patterns, other considerations are important.

Other Considerations

The school system reported for the 1979-80 school year that 71,662 children were enrolled. Of this number, 22,943 children or 32.0 per cent were black, while 48,108 children or 67.1 per cent were white. The remaining 611 children or 0.9 per cent account for children labeled others (Metropolitan Nashville Public Schools Integration Report 1979-1980, February 1980; hereafter referred to as MNPSIR).

In viewing the totals of Table 1 (and Table 2 under distribution), one may see the figures 33.1, 66.2, and 0.7 per cent for the respective racial groups in terms of service delivery for communicative disorders. Similarly, in Table 4 (and Table 5 under distribution), one may view the figures 31.4, 67.8, and 0.7 per cent for the respective racial groups; these percentages represent the prevalence of communicative disorders by race. In comparing the racial balance within the school system with service delivery and prevalence of communicative disorders, one finds that they are in alignment and in proportion to each other. Table 6 summarizes these facts.

TABLE 6

A Comparison of Service Delivery and Prevalence of Communicative Disorders by School Sample and Population by Race expressed in per cent

Race	Distribution			Population	
	School N= 71,662	simple Prevalence of service Delivery N=2,877	Handicaps N=2,023	Service Delivery	Prevalence of Handicaps
Blacks	32.0	33.1	31.4	4.2	2.8
Whites	67.1	66.2	67.8	4.0	2.9
Others	0.9	0.7	0.7	3.3	2.5
Total	100.0	100.0	99.9	4.0	2.8

In addition to the overall percentages, Table 6 shows the population figures. Because of the overall distribution, one finds the population figures do not vary much from the population totals of race for service delivery and prevalence of handicaps. In comparing Table 6 with the previous ones, it is important to realize that the need for service delivery and the prevalence of communicative

handicaps are distorted without a breakdown by sex and disorders. Although they are accounted for in the overall distribution, implications for testing and diagnosis are hidden.

TABLE 7

An Expansion and Breakdown of the Population Distribution of Communicative Disorders for Service Delivery and Prevalence by Race and Sex expressed in per cent

	Speech Disorder Language				Hearing		Total	
Race	Service Delivery	Prevalence of Handicap	Service Delivery	Prevalence of Handicap	Service Delivery	Prevalence of Handicap	Service Delivery	Prevalence of Handicap
Blacks	3.1	2.3	0.9	0.4	0.1	0.1	4.2	2.8
Males	2.1	1.5	0.6	0.3	0.1	0.1	2 7	1.8
Females	1.0	0.8	0.3	0.1	0.0	0.0	1.4	1.0
Whites	3.1	2.4	0.6	0.2	0.2	0.2	4.0	2.9
Males	2.0	1.5	0.4	0.2	0.1	0.1	2.5	1.8
Females	1.1	0.9	0.2	0.1	0.1	0.1	1.5	1.1
Others	2.1	1.6	1.0	0.8	0.2	0.0	3.3	2.5
Males	1.8	1.5	0.8	0.7	—	—	2.6	2.1
Females	0.3	0.2	0.2	0.2	—	—	0.5	0.3
Totals	3.1	2.3	0.7	0.3	0.2	0.2	4.0	2.8
Males	2.0	1.5	0.5	0.2	0.1	0.1	2.5	1.8
Females	1.0	0.9	0.3	0.1	0.1	0.1	1.5	1.0

This latter point may be seen better in Table 7, which expands the right-most boxhead of Table 6. The table shows the population figures for service deliveiy and prevalence of communicative disorders by race and sex. In deriving the percentages for Table 7 the denominators represent the number of children by race, which sum to the total school population of 71,662.

Many of the factors reflected in the table have been discussed in previous sections. The importance of Table 7 lies in the fact that the population statistics are mentally manageable and manipulatory. One can better see that racially there is little difference in the populations. In terms of sex, males generally out-number females by two-to-one; the range varies from equivalence for hearing

disorder (whites) to six-to-one or higher for speech (others). The table also reveals more clearly that there is a larger ratio of difference for service delivery and prevalence for language associated disorders than for the other two broad categories of communicative disorders.

Statistical Analyses

Table 8 is a summary of a (3x3x2) multidimensional contingency analyses (Everitt, 1979) of the data taken from the combined broad categories of Table 5. The major efforts of this investigation concern the prevalence of communicative disorders as primary handicaps. This accounts for the statistical analyses on Table 5 rather than Table 2, which deals with service delivery for communicative disorders. The data in the latter table are also confounded by communicative disorders as both primary and secondary handicaps, and therefore, is not as valuable as the analyses of Table 5.

TABLE 8

Summary Statistics for Testing Hypothesis of Mutual Independence (MI) and Three Levels of Partial Independence (PI) in a (3 x 3 X 2) Multidimensional Contingency Analysis of Communicative Disorders, Race, and Sex

Hypotheses	Analysis	df	X^a
Mutual Independence of Race, *Sex,* and Communicative Disorders	MI	12	48.5*
Communicative Disorders is Independent of Sex and Race	PI_1	10	31.9*
Race is Independent of Communicative Disorders	PI_2	7	27.8*
Sex is Independent of Communicative Disorders	PI_3	5	17.8

• P <.001

The table displays the results of the main analysis of mutual independence (MI) on the three groups of race and types of communicative disorders and the two classifications of sex;. Table 8 also displays the results of the conditional analyses of partial independence (PI) reflecting combinations of the several variables. The column headings show the hypothesis under test, type of analysis, degrees of freedom (df), and the obtained Chi-square (x^2).

The table shows that the analysis on mutual independence and two of the conditional analysis are significant. Only the conditional analysis of partial independence on sex and communicative disorders is not significant.

Although the hypothesis of mutual independence is rejected, the partial independence analyses indicates that race and communicative disorders are the confounding variables. This interpretation is warranted because of the signi-

Scant results of the partial independence analysis for handicaps by race and sex (PI_1) and race and handicaps (PI_2), on the one hand, and the lack of significance for sex and communicative disorder (PI_3), on the other.

The statistical analyses appear to indicate a need to reflect on the observations in the previous results with caution. Supportive data, reflected in Tables 4 through 7, indicate the perplexity of the analyses. These perplexities are discussed subsequently.

The analysis on mutual independence reflects the fact that the three variables are confounding. Based on the test of significance for partial independence (PI_1), the totals for and the combined categories of communicative disorders in Table 4 indicate that the prevalence figures of 83.2, 10.6 and 6.2 per cent for speech, language, and hearing, respectively, account for statistical significance in part, while data in Table 5 indicate the overall male-to-female ratio of 2.0:1 accounts for the other part. In understanding the results of partial independence (PI_2), it appears that sex created significance since the racial balance within the school system mirrored the prevalence of the handicaps. In addition, an adjustment for race was made for the analyses to balance the differences in numbers, while it was not made for sex. In reference to sex, data were not available on the total number of males and females differentiated by race.

With the prevalence of handicaps proportional to and in alignment with the racial distribution of the school system, it appears that qualitative differences exist, that is, are real. This fact was established in previous analyses and can be seen in Table 5. Based on the indices outlines earlier in this table, statistical significance is warranted.

The summary in Table 8 reveals that sex and communicative disorders are not significant. This result appears to contradict the observation reflected in Tables 4 and 5 that males are seen generally twice as often as females. This observation is consistent with other results in similar, related studies. In light of the consistently higher prevalence of communicative handicaps in the present study, the question becomes, why was statistical significance not obtained?

The reason for the non-significant result is not obvious. The partial independence (PI_3) analysis addresses the issue of whether or not sex is independent of the handicaps. The result indicates that they are independent; and essentially supports the continuity associated with the higher frequency of handicaps across the disorders for males. The independence analysis does not address the issue of whether the prevalence of communicative disorders differ by sex. Without a test of significance, the male-to-female ratio of 2.0:1 indicates non-significance in reference to the former issue. In testing a hypothesis on the latter perspective, it is important to adjust the male-female distribution in order to account for the frequency of the sexes in the school system. In light of these two perspectives, the finding in the multidimensional contingency analysis is valid for the former issue.

Discussion

In Retrospect

Communication pathologies of speech, language, and hearing were evaluated as primary and secondary handicaps in the Metropolitan-Nashville Public School System for the academic year 1979-80. During this period, prevalence figures indicated that 2,877 or 4.01 per cent of the school population (N=71,662) were receiving services for these disorders in grades K through 12. Of this number, primary handicaps (2.82 per cent) dominated service delivery at 70.3 per cent; the remaining 29.7 per cent were for secondary handicaps.

The results of this survey were consistent with trends which have been reported in other, earlier investigations (see reviews by Milisen, 1971; Bensberg and Sigelman, 1976; Stewarts *al.,* 1979; see also Metz, 1973). However, the present study found a prevalence figure less than those reported in these earlier studies, and approximating more recent data reported to the U.S. Office of Special Education and Rehabilitative Services (1980; hereafter OSERS). The results supported the utility of the multidimensional scaling analysis, and verified the quantitative, qualitative, cultural trends found by Stewart (1981). As a consequence of the analytical perspective developed in this survey, one can better understand the depths of the problems elucidated in the *Introduction.*

The difficulty of comparing related studies has already been outlined. More timely studies such as McDermott (1981), McDermott and Van Tassell (1981), and Leske (1981a, b) have expressed this difficulty as well. The present study was no different in this regard. Some meaningful comparisons can be, however, made with other recent studies. With this in mind, the major findings and their implications are discussed subsequently.

Nationally: During 1979-80, OSERS (1980) reported the national average as 3.01 per cent for the primary handicaps of communicative disorders. This statistics represented school-age children served under Public Laws 94-142 and 89-313. This figure can also be contrasted with (BEH) their earlier finding of 4.4 per cent in 1970 (Metz, 1973). Later, BEH data utilized by Craig and McEachron (1975) placed speech-hearing prevalence at 4.07 per cent and NCHS data at 4.43 per cent. Their analyses found these differences statistically non-significant. These data, along with Metz, were obtained prior to the implementation of P.L. 94-142. This accounted for the differences between OSERS data and the others; that is, the OSERS data included primary handicaps and the others included both primary and secondary handicaps.

Statewide: In the OSERS report, the State of Tennessee indicated its prevalence as 3.94 per cent. The state figure used in this study was 4.04 per cent; this statistic was computed from STASR (1981). The slight discrepancy reflected different times of reporting. These figures indicated that Tennessee was approximately 1.0 per cent above the national average.

Locally: Nashville's prevalence at 2.82 per cent was a little less than the national average. One major cause of this difference was in the school system contracting services for some of its special needs' children such as the autistic. This fact and the State's responsibilities under P.L. 89-313 can account for the differences between Nashville and Tennessee. Evaluation of these considerations appears to indicate that the prevalence of communicative disorders as primary handicaps was representative rather than inconsistent or different than the national and state figures. There was also little change from the 2.88 per cent for the academic year 1978-79 reported by Stewart (1981).

Other Comparable Studies

In looking at other studies, some meaningful contrasts can be made. Hull, Mielke, Timmons, and Willeford (1971) conducted a national survey of speech and hearing disorders in school-age children. They used a stratified random sampling of the nine census divisions of the United States. In adjusting their data for comparison, their results indicated a prevalence of 4.16 per cent. This figure excluded language disorders, which they did not test. Since the present study included language disorders, the prevalence found by Hull *et al.*, was larger than the one found in this investigation. The differences were even greater when considering their survey tested grades 1 through 12 and this study evaluated grades K through 12.

Hull *et al.* did not consider race. For speech, they found an overall male-female prevalence ratio of 1.5:1; this study found 1.7:1, which excludes language. Further adjustments downward must also be made to exclude kindergarten. Thus, the ratio for the two studies appears comparable. On the other hand, this was not true for hearing disorders. The data of Hull *et al.* indicated a ratio of 1.9:1. This study found a ratio of 1,0:1, which reflected equivalency for hearing disorders. In these two studies, one might suspect the criteria were different; they were not obtainable for this study. Stewart (1981) found a ratio of 1.1:1; both studies, however, were confounded by race. Similarly, Grant, Fearnow, Herbertson, and Henderson (1973) also found equivalency between males and females with hearing disorders. Their study is illustrative in the need to know the number of males and females in a population.

Gillespie and Cooper (1973) evaluated speech disorders in the junior- and senior-high schools in the city of Tuscaloosa (AL). For grades 7 through 12, they found a prevalence of 5.5 per cent. This figure was nearly twice as great as the 2.88 per cent found by Stewart (1981) and the 2.82 per cent of this study for speech, language, and hearing disorders. In looking at the same grades for speech only, then their finding was more than four times greater than the statistics found by Stewart (1981). One may begin to suspect the different evaluative criteria and measuring instruments accounted for this large difference.

Gillespie and Cooper also found a male-female ratio of 1.5:1 (actually it was 1.4:1). This statistic was consistent with Hull *et al.* (1971) and the one found

in this study, excluding kindergarten. For race, they found a ratio of blacks to whites at 2.1:1. The present study found a nearly equivalent ratio with whites slightly outnumbering blacks for speech. As with the overall prevalence figure, the criteria for assessment appear questionable (especially from a cultural perspective); in addition, they came to their conclusions without adjusting the sex and race imbalance in the school population.

In reference to development, Hull *et al.* (1971), Gillespie and Cooper (1973), and Stewart (1981) found that communicative disorders decreased with grade level. This finding was also clear in Metz (1973). The present study did not evaluate development. This decision was made because age and grade level are somewhat overlapping and therefore confounding. Standard measures of speech and language are age-normalized. Reporting by grade reflects less than an accurate assessment of the importance and significance of maturation in viewing communicative disorders.

Tenney and Edwards (1970) evaluated the hearing of public and private school children of Milwaukee in grades K, 2, 4, and 6. Of the 855 randomly selected children, 44 or 5.2 per cent failed the screening test under controlled conditions. The population statistic was not computed for this study, because the total number of children in the several grades was not given. On the other hand the distribution statistic of 5.2 per cent matches the one in the present study for service delivery of hearing handicaps (Table 1). In comparing the two studies, this figure is valid even though the numbers of children and grades were different. The reason for this lies in the fact that the greatest number of handicaps occur in grades 6 and below. This is another means of viewing the developmental variable. The more recent findings on this observation have been made by Craig and McEachron (1975) and Stewart (1981). The importance of this consideration is manifested in the areas of service delivery and personnel utilization; the lower grades have the greater needs in these areas (see a policy discussion by Craig and McEachron, 1975).

In the study by Tenney and Edwards, the more valuable finding was that white children were seen 2.7 times more ofttn than black ones. Although they considered race and ethnic origin in the selection of the schools, it appears that they did not control or otherwise adjust for the racial or ethnic distribution in these schools. This study (Table 1) found that whites with hearing disorders Were seen 1.8 times more often than blacks; this ratio takes into account the fact that there were nearly twice as many whites than blacks in the Nashville school system. If one considers only primary disorders of hearing (Table 5), then the white-black ratio rises to 1.9:1. Stewart (1981) found this ratio to be 1.1:1. This difference can be reconciled by allowing for the exclusion of grades K and 12 and some contractual arrangements by the school system to educate some of the children with hearing disorders. Since Tenney and Edwards did not test junior- and senior-high schools, the developmental factors may account for the discrepancy in the ratio they found and in the ratios of the latter studies.

A study by DesRoches (1976) represents an interesting and important contrast to the present study. She reported a six-year overview of speech, language, and hearing services in grades K through 12 for the public schools in Montgomery County, Maryland. For the academic years 1968-69 through 1973-74, there was a range of 3.1 to 4.0 per cent for the school population enrolled in therapy. These figures did not include children waiting for services. Looking at the total number of children with diagnosed needs, the range was actually from 4.41 to 5.06 per cent.

DesRoches' data is difficult to evaluate. It is unclear whether the 3.1 to 4.0 per cent were primary communicative disorders and how many of the waiting children had. primary disorders of communication. Based on the other data presented in her study, the waiting list and the actual therapy caseloads included communicative disorders as secondary handicaps. It appears questionable that the range found in her study differed significantly from the 4.01 per cent of this study. Nothing can be said about the prevalence of primary handicaps. The accuracy of the overall male-to-female ratio of 1.8:1 is subject to the same considerations.

A strength in the DesRoches study lay in the refined delineation of primary disabilities. She was able to report eight major categories; this study could produce only three.

Commonality in Research

In contrasting comparable studies and the present one, there were some recurrent conformity. First, the prevalence of communicative disorders as primary handicaps hovered around 3.0 per cent. Second, communicative disorders as secondary handicaps manifested themselves at slightly more than 1.0 per cent. Third, population and/or distribution prevalences were confounded by the disorder, race, and/or sex. Fourth, studies tended to evaluate communicative disorders singularly or in combination, excluding language. In some cases, language was included under speech. For the most part prevalence figures on language disorders are limited and/or speculative (Leske, 1981a).

Fifth, studies indicated that males have a greater propensity for communicative disorders than females, but this finding was confounded by race and type of disorder. By extrapolation of data in comparable studies, with support from Stewart (1981), and the present investigation, the male-female ratio for speech disorders was 1.7:1 in grades K through 12. Noting the paucity of data on language disorders, the current study and Stewart (1981) found male-female ratios of 2.0:1 and 1.3:1, respectively. The former ratio appears more representative, since all grades were included. This ratio was also in excellent agreement with the data available in Stevenson and Richman (1976). For hearing, the data indicated a ratio of near equivalency. This observation, like related ones, was confounded by race.

Sixth, race was an intervening variable. The broader issues, that is, cultural differences and dynamics, were considered earlier. The present investigation and the others supported the realism of culture as a variable in understanding communicative disorders. Although previous research uncovered the variables (Tenney and Edwards, 1970; Randall, Reynell, and Curwen, 1974; Calnan and Richardson, 1976), it was the research of Taylor (1980) which revealed the scope of the problem as international in magnitude.

This section attempted to bring together the findings of other, representative, closely related studies. In doing so, studies were generally evaluated which utilized data from direct (physical) examination procedures with defined populations. This consideration was developed in accordance with the principles outlined in the Health Examination Surveys (HES; for example, NCHS, 1974, 1980). In short, '....It is the most precise way to secure reliable information on unrecognized and undiagnosed conditions as well as on a variety of physical, physiological, and psychological measurements within the population...' (NCHS, 1974, p. 1). Also, in selecting studies for comparison, attention was directed toward the special concerns of Bensberg and Sigelman (1976), Stewart *et al.* (1979), and Hogan (1973); these were outlined earlier.

What this section omitted were studies which could not be directly related to the present one. For example, studies on communicative disorders in hospitals, health-care centers, Headstart Programs, and Health Interview Surveys (HIS; for example, NCHS, 1975a, b) were excluded because they were not necessarily representative of all school-age children and did not define, clearly, the general population they served. HES were also excluded. They were excluded because there were none which evaluated and examined speech and language directly. What one finds were estimaets made from HIS.

This was not true for the availability of data on the prevalence of hearing disorders from HES. However, there were still several problems with comparing this data with the present study. First, there was no timely data available on school-age children; the last examining period reflected the period of the mid-1960s (see for example NCHS, 1970, 1975c, and others). This fact is supported by Leske (1981b). On the other hand, there was more current data (1971-75) on adults (see NCHS, 1980). Second, the HES excluded ages 5 and 18 years; these ages include school-age children. Third, the HES audiometric criteria (see NCHS, 1970, p. 12 and others) do not correspond to professionally accepted ones. There were other, minor problems as well. Additionally the HES and HIS data were not correlated.

Nashville—a second look: In comparing the distributions of service delivery for (Table 1) and primary handicaps of (Table 4) communicative disorders, differences were found. For the delivery of services in speech, language, and hearing disorders, one finds the distributional figures of 76.9, 17.9, and 5.2 per cent, respectively. These primary handicaps accounted for 83.2, 10.6, and 6.2 per cent, respectively. This contrast revealed that the two distributions

were different. In comparing the latter distribution for primary handicaps and the one reported by Stewart (1981), there were differences. The differences were greater in the present study for language and hearing handicaps. This can be attributed to the inclusion of grades K and 12.

In order to gain further insight into the distributional differences, one must analyze the handicaps by race and sex. The analysis focused on primary handicaps, and was reflected in Table 5.

In understanding the importance of Table 5 and the significant findings of the scaling analyses, Table 6 is helpful. Table 6 is an overview of the disorders by race with column 1 reflecting the race distribution of the school system. The table indicates that there were little differences in the distributions for service delivery and primary handicaps in reference to race.

In returning to Table 5, one can see that only the distributions for speech and severe-language come close to approximating the racial distribution of the school system. More importantly, the table shows that the distribution of the disorders differs by race. This rinding should be added to the assertion, '…, age-specific prevalence is more meaningful than overall prevalence data on speech disorder' (p. 217), made by Leske (1981a).

There was further variability when one considers the severity of the disorders. For example, under language handicaps, blacks and others were seen more often for impaired- rather than severe-language. On the other hand, the reverse was the situation with the white children. Hearing disorders were equitable from this perspective. The two levels of severity were lacking in the data analyzed by Stewart (1981).

The second perspective, composition, presented in Table 5 is an intra-racial dimension, which was independent of the racial distribution. As such, theoretically, the relative order and proportions of primary handicaps within each race should have been approximately the same. This was found not to be completely true. First, the order of speech, language and hearing pathologies was found from most to least prevalent, but white children had a 1.0 per cent overall difference between hearing and language disorders. On the other hand, hearing handicaps were clearly least prevalent among black and other children. Hearing disorders as primary handicaps (see, however, Table 1) were non-existent in the children labeled others. This was also the case of the data analyzed by Stewart (1981).

Second, still with reference to hearing and with implications for the other disorders, the importance of separating the duplicated and unduplicated statistics were considered by McDermott (1981). Her concerns can be seen in this study by comparing Tables 5 and 1. Under the totals for hearing disorders, Table 5 shows 6.2 per cent and Table 1 shows 5.2 per cent. Without the separation of the service delivery (duplicated) and the primary handicaps (unduplicated) statistics, the greater need for and recognition of the primary handicaps in terms of service delivery would have been overlooked. This fact is important because

it is well-known and accepted professionally that hearing lies at the foundation of language and cognition. This is further underscored by referring to Table 3. This table indicates that impaired-hearing and deafness accounted for 84.6 per cent of the service needs for hearing pathologies. The other disorders could not match this in their respective communicative areas. From this, it can be seen that the unduplicated count is the more valuable one for planning and budgeting considerations.

Third, it is clear that children classified as others had a much greater, relative proportion of language disorders than black and white children. Based on their cultural differences, this does not appear unusual. It is also worth noting that the prevalence of primary language handicaps among these children were diagnosed beyond the needs of the bilingual programs provided by the school system; that is, these children manifested 'true' language disorders. This fact does not hold with black children, who were diagnosed 6.4 per cent more often than white children for language pathologies.

As outlined earlier, language-assessment is problematic professionally, and therefore confounds prevalence data on communicative disorders. Some potential, reasonable solutions to the problem were developed by Taylor (1980); Williams and Wolfram (1979); Evard and Sabers (1979); and Leonard, Perozzi, Prutting, and Berkley (1978). The validity of the solutions have support from the research of Baran and Seymour (1976), Seymour and Seymour (1977), and Nober and Seymour (1979). Of late, further considerations on the assessment of language for the bilingual have been expressed by S'mpson and Stewart (1981) and others.

Based on this type of evidence, Stewart (1981) generated a concern for under-assessment; an area given little to no consideration. Like ihe data in this study, his investigation indicated quantitatively an overall prevalence in alignment with and proportional to the racial distribution for black ard other children. On the other hand, the composition of the disorders indicated a much higher prevalence for the children labeled others and a higher prevalence for black children in reference to white children. He felt that underassessment may be a problem because of the disproportionate number (over-assessment) of non-whites diagnosed with the problems and the behavioral advantages given to whites. The specifics of this supposition, although supported with facts, is beyond the scope of this discussion.

The broad issue reflects the fact that there are no clear standards for language "assessment, This fact is confounded by culture and/or socio-economic variables. This is further confounded because of the limited and inadequate data available on the prevalence of language disorders. Where assessment and prevalence data oh language disorders are serious problems, the evaluation and prevalence data-on hearing disorders are not. As Taylor (1980), pointed out,

'. . . . .there is an international standard for measuring hearing sensitivity' (p. 68). With further developments in the understanding of language, one can only hope that standard measures will also become available.

It is well-known that males have a greater propensity for communicative disorders than females. This notion is empirical in nature; it assumes equal numbers in the population and equiprobability of occurrence for the disorders. The notion is useless because it is confounded both by race and type of disorder. This can be seen in Table 5 and supported by the non-significant finding in the analysis reported in Table 8. These tables present contradictory results.

The statistical analysis did not adjust for the male-female ratio in the school system; this ratio was 1.0:1 (computed from STASR, 1981) representing (near) equality. It should have been this population ratio versus the computed ratio (that is, 1.7:1) which should have been tested. Had this been done, like Stewart (1981), statistical significance would have been obtained.

Ideally, development, that is age-grade and preferably age, should be utilized for testing the computed versus population ratios. This problem was identified by Stewart (1981) and outlined in a previous section. Treatment of this problem was not developed in this study because of data limitations, along wi(h the scope and nuances associated with the problem. It is of value to note that one of the earliest studies to consider the statistical impact of sex was Ciocco and Palmer (1941). Although earlier, related studies found sex differences, it was this study which tested a limit dimension of this variable.

Summary: The study had two purposes which stemmed from a number of critical concerns in the area of communicative disorders. The demographic profiles of communicative disorders were presented for service delivery ard "primary disorders. The scaling analysis focused on the primary handicaps of communication because service delivery included them as secondary as' well. Secondary communicative disorders are confounded by their primary disability; they were ignored in this study for this reason. The school population manifested a 2.82 per cent prevalence in communicative handicaps. Of this statistic, speech, language, and hearing disorders accounted for 2.35, 0.30, and 0.18 per cent, respectively. In analyzing the 2,023 (or 2,82 per cent) primary handicaps, speech language, and hearing disorders accounted for 83.2, 10.6, and 6.2 per cent, respectively.

Quantitatively race was not a factor in viewing the overall prevalence of communicative disorders. What confounded communicative disorders was a qualitatively factor associated with race. Thus, race was a factor in understanding the prevalence of communicative disorders. Sex was also a factor in the prevalence perspective, but it was also affected by race and the particular disorder. Although this study found males were seen (nearly) twice as often as females, one must also consider the disorder and its severity. The study also revealed that there are still many issues associated with the prevalence of communicative disorders, including development and its impact.

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