THE INCIDENCE OF HEARING LOSS AND OF NONORGANIC HEARING PROBLEMS IN JUVENILE DELINQUENTS

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CHAPTER I

INTRODUCTION

Within the last decade, audiologists have become aware of the existence of nonorganic hearing losses in children. Campanelli remarks that ". . . during the auditory testing of children, it is difficult to determine why some of them demonstrate nonorganic hearing losses; however, it has been found that a number of them do manifest the problem in the school or clinical situation" (8, p. 92).

Nonorganic hearing losses have been studied by audiologists and otologists for many years. According to Klotz and others, this type of behavior has been recognized for at least a century, and literature on the subject is extensive. The material, however, deals mainly with adults and has, until recently, only a few references to children (28, p. 199).

A nonorganic hearing loss, as defined by Dixon and Newby (17, p. 619), is a hearing loss which is not correlated with actual pathology of the hearing mechanism. However, as Ventry and Chaiklin (45, p. 253) state, it may be an exaggerated loss superimposed upon an actual organic deficit. In such a case, it is referred to as a nonorganic component or a nonorganic overlay.

The term nonorganic hearing loss is used in this paper without an attempt to identify its cause or whether it is of conscious or unconscious origin. Campanelli (8) emphasizes that the clinical evaluation measures auditory function and not the subject's psychological needs or motives.

Graf (21) explains that the suspicion of such a problem is primarily aroused by intratest or intertest discrepancies and by a marked difference between the pure tone findings and the subject's good comprehension for normal conversation apart from the test situation. Follow-up evaluations in hearing conservation programs have stimulated general awareness of its existence in school-age children, but incidence has not been closely determined. Dixon and Newby (17) report that most estimates indicate that approximately two or three per cent of all hearing losses in children can be attributed to nonorganic problems.

The reported incidence of hearing loss in our nation's school-age population differs in the various studies which have been undertaken. Lack of uniformity in the age groups surveyed and the situations and methodology of the auditory testing in various hearing conservation programs appear to contribute to the different incidence statistics. According to a report issued by the United States Department of Health, Education, and Welfare in 1968, most researchers agree that about five per cent of school children have hearing loss sufficient to warrant further investigation and treatment (43, p. 3).

Two studies conducted to determine the prevalence of hearing loss in a juvenile-delinquent population report finding an unusually high incidence of losses. Cozad and Rousey (16) report an incidence of 24 per cent. Kodman and others (29) found that 18 per cent of subjects tested demonstrated deficient hearing. These results are undeniably high compared to the expected five per cent in a general school-age population.

The Cozad and Rousey study included no reported attempt to investigate the possibility that any of the hearing losses discovered by them might be of nonorganic origin. Kodman and others reported only incidentally at the conclusion of their investigation that there were indications of nonorganic problems in approximately 21 per cent of their hearing loss subjects. They cite the need for primary and more definitive research on nonorganic hearing problems among juvenile delinquents.

Purpose of the Study

The purpose of this investigation was (1) to perform hearing screening tests on 100 youths who are classified as delinquent; (2) to evaluate more completely the hearing of those who fail the hearing screening tests in order to determine the nature and severity of the losses; and (3) to determine whether or not any significant number of the youths tested demonstrate nonorganic components in their reported audiometric thresholds.

Hypothesis

The hypothesis of this study is that, if a significant percentage of hearing loss is found among a juvenile-delinquent population, evidence will show that it is at least partially attributable to a significantly higher incidence of nonorganicity than the two or three per cent expected in a normal school-age population.

Literature Review

Nonorganic Hearing Loss in Children

Incidence and clinical patterns.--In a report of the Sub-Committee on Hearing Problems in large groups, Maas and others point out problems in school populations and stress that an area needing considerably more study is that of nonorganic hearing problems in children (33, p. 292).

Only limited research has been reported on incidence, diagnosis, or treatment of the problem in children or adolescents.

Leshin (31) studied data obtained during one year from an Oregon Hearing Conservation Program in which 48 cases of suspected nonorganic hearing loss were discovered among 1,902 children seen at otologic clinics. A review of the statistics indicated that in approximately two per cent of the cases, the hearing loss was of nonorganic origin. Barr (3) reports having found only 24 cases of nonorganic hearing loss in children during a nine-year period.

Berk and Feldman (5) found the "nonorganic hearing loss syndrome" in three per cent of their child patients at the audiology clinic of the Pittsburgh Eye and Ear Hospital. They cite the results of Doerfler's survey of leading audiology centers in the United States which revealed that 74 per cent of the centers reported few or no cases of children with nonorganic hearing loss; 21 per cent of those responding estimated the incidence as one to five per cent; and seven per cent reported an incidence of more than five per cent.

Dixon and Newby (17) reported that during a two-year period, some 40 children with nonorganic hearing problems were examined at the San Francisco Hearing and Speech Center. They ranged in age from six to 18 years, with a mean age of 10.9 years. Thirty-one were female and nine were male. In all 40 cases, the audiogram indicated a marked bilateral loss, but follow-up examinations eventually revealed the hearing to be within normal limits in each ear in each child.

During a twelve-month period, Campanelli (8) found 41, or 1.7 per cent, of 2300 children who demonstrated nonorganic hearing losses. They had been referred for audiological assessment to the Audiology Clinic, Bureau of Maternal and Child Health of the District of Columbia Public Health Department. Twenty-seven were female and 14 were male with ages ranging from six to 17 years. Thirty-five demonstrated bilateral simulation of hearing loss, while six were unilateral in nature. All showed perceptive losses of the "flat" type with fairly equal reduction for all tones tested.

Brockman and Hoversten (7) discuss nine cases of children demonstrating nonorganic hearing problems. The six females and three males were from eight to 15 years of age. They observed that the variability of threshold responses for a single tone covered as wide a range as 35 decibels (dB). The majority of the audiograms were of the perceptive type, air conduction and bone conduction being equal.

After reviewing data presented by other researchers, Berger (4) concludes that enough cases follow a pattern such as to almost warrant the term syndrome in the majority of the children who manifest nonorganic hearing loss. The eight cases that he tested within a two-year period demonstrated this "recognizable pattern:"

1. Bilateral hearing loss of moderate to severe degree (40-70 dB loss), with equal air conduction and bone conduction pure tone thresholds. The loss appears rather suddenly.
2. Although usually of normal intelligence, the child has been having difficulty with his school work or with a particular teacher. Less often there is considerable conflict in the home, and this usually involves pressures on the child to excel academically.
3. The child is usually in the upper elementary grades or in junior high school, i.e. eight to 14 years old.
4. Voice quality and speech are better than that which might be predicted by pure-tone threshold.
5. There may be a seasonal element, with the loss appearing or noticed most often in the late winter or early spring. Earaches or ear infections usually having occurred within the previous several months are noted in the case history (4, p. 450).

Chaiklin and Ventry (11, p. 113) comment on an interesting, but unexplained, finding emerging from several of these studies. The nonorganic hearing loss in children seems to be found approximately three times more often in females than in males.

Personality variables and psychological correlates.--In a discussion of children with nonorganic hearing loss, Barr (3) states that psychiatric investigation usually indicates that they are in conflict with home or school. He studied 24 such children, ranging in age from nine to 14 years. The majority of them were investigated by a child psychiatrist. Twenty were classified as normally intelligent, and four were designed as "slightly mentally deficient." Although most of their homes were considered "socially good," the psychiatrists reported that the children showed signs of being "in conflict with their environments." Barr explains that they seemed to be living with external pressure or inner stress which they were trying to escape.

The 48 Oregon school children, reported previously by Leshin (31) as having nonorganic hearing problems, were investigated by medical-social consultants. In many instances they found operant an "unconscious element of preservation of emotional defenses in the face of real or imagined loss of familial affection or attention" (31, p. 291). They determined that the nonorganic loss appeared to result from unconscious motivations rather than from a deliberate, preconceived plan to deceive.

A case involving a similar judgment of unconscious motivation was presented by Bailey and Martin (2). They report the case history of a 16-year-old boy, the son of congenitally deaf parents, who demonstrated nonorganic hearing problems during examination for admission to a school for the deaf. The boy became distraught when questioned by the audiologist and admitted that he wanted to be deaf like most of his friends. He was referred for psychiatric study and guidance. A final report suggests that although his behavior seemed to be of conscious origin, he appeared to have a "need" for deafness operating at the unconscious level as well.

Reed (41) studied personality variables in 26 children diagnosed as "functionally hard-of-hearing." Ranging in age from eight to 14, 14 of the subjects presented elevated thresholds for pure tones but were within normal limits for speech. The other 12, though normal in tone testing, presented elevated thresholds for speech.

The children in the first group presented outgoing behavior problems and were psychiatrically diagnosed as being predominantly "hysteric." Those of the second group were characterized by timidity, withdrawal, and mild phobic symptoms. The majority of them were classed as anxious or as having acquired the loss as an anxiety-reducing avoidance mechanism. Reed's finding of so many cases who presented normal pure tone audiograms but elevated thresholds for speech is certainly atypical. In other studies, almost without exception, the child with nonorganic hearing loss demonstrates better hearing for speech than for tones.

To study, discover, and treat young patients with nonorganic hearing losses, Klotz and others (28) teamed the cooperative efforts of the otologist, audiologist, psychologist, social worker, and psychiatrist. The majority of their patients had one or two diagnostic sessions with the psychiatrist, and in all cases, psychiatric disturbances were noted. In the one case study presented, many features suggested psychoneurosis: semidelinquent behavior, multiple phobias, a tendency to somatize, and an apparent difficulty in controlling agressive impulses (28, p. 204).

The authors report that otologists receive certain clues from the history which may include: identification, loss of a loved one, the formulation of an over-strict conscience, or a constant hearing of threats. From their findings they conclude that ". . . the force is often an escape from emotional duress, with the deafness being a means for the end" (28, p. 200).

Lehrer and others (30) conducted intensive diagnostic studies on ten adolescent patients with nonorganic hearing problems, with special attention focused on the psychodynamics of the condition. The subjects, ranging in age from 11 to 16 years, demonstrated mostly bilateral nonorganic losses of the perceptive type. Otological examinations revealed no active infections or obstructions, but several of the patients had a history of middle-ear problems which, the researchers theorize, may be related to the "choice" of the auditory mechanism as the focus of the nonorganic problem.

All patients were evaluated by psychometric tests which included the Wechsler Adult Intelligence Scale, the Stanford-Binet Intelligence Scale (Form L), and the Columbia Mental Maturity Scale. Psychodiagnostic instruments used included the Rotter Sentence Completion Test, the Thematic Apperception Test, the Rorschach Test, and the Bender Gestalt Test. Subjects' I. Q. scores ranged from 69 to 116 with a mean of 89. Each of the children revealed emotional problems which the examiners considered to be related to the nonorganic hearing problems. Among the emotional problems identified were feelings of insecurity and inadequacy, hostility toward parents, anxiety, aggression, phobias, and disturbed parental relationships (31, p. 68).

Juers (27), an early investigator of the clinical entity of a disproportionately greater loss for pure tones than for speech in cases of nonorganic hearing loss, presented a theory for its origin on the basis of Myklebust's maturation explanation. Myklebust (34) asserts that some children with normal hearing acuity demonstrate poor voluntary response to pure tones. He explains that a pure tone is abstract and meaningless and does not "arouse cortical recognition" in the young child. In the process of auditory maturation, the child, according to Myklebust, responds first to speech or meaningful sound; his response to pure tones is often delayed. He points out that the problem is not in the organ of Corti or the central pathways, but that conscious evidence of response may merely be delayed in developing.

Juers (27) discusses the generally accepted phenomenon that under undue stress some predisposed individuals will regress to infantile patterns psychologically in certain areas of their behavior. "Since the function of hearing represents to some extent a psychological reaction, it is possible that some individuals are so sensitized or conditioned as to regress in the auditory area under certain situations of psychological stress" (27, p. 407). If regression occurs in the auditory function, he explains that the first loss would involve the function last to develop in the maturational process - the conscious recognition of and response to pure tones. Juers describes the concept as "psycho-auditory regression" and suggests that it is one basis for psychogenic or nonorganic hearing problems.

Methods of Detecting Nonorganic Hearing Loss in Children

Pure tone audiometry.—Results obtained from pure tone audiometric tests are of undeniable value in detecting nonorganic hearing loss. Chaiklin and Ventry enumerate the following advantages of pure tone audiometry:

> (1) no special equipment is needed other than a pure tone audiometer; (2) the administration of the test can be standardized easily (Carhart and Jerger, 1959); and (3) the limits of variability (reliability) have been established for both normal and hard-of-hearing subjects (11, p. 91).

Often one of the first indications of nonorganic hearing loss is intratest or intertest discrepancy in pure tone threshold responses. Chaiklin and Ventry explain that it is routine in clinical practice to retest at least one frequency in each ear during the course of pure tone testing. It has been established that threshold responses at any frequency should not vary more than plus or minus 5 dB in normal subjects (11, p. 91).

In a study of the efficiency of audiometric measures used to identify nonorganic losses, Chaiklin and Ventry (12), using 40 nonorganic and 26 organic subjects, found that 66 per cent of the nonorganic subjects had a plus or minus 15 dB or greater test-retest difference in pure tone thresholds, and only 11 per cent had the test-retest agreement of plus or minus 5 dB. They explain that subjects with nonorganic hearing losses, whether intentional or not, have difficulty in demonstrating the same degree of loss on repeated tests. A nonorganic loss may be suspected if the subject cannot duplicate his test results within plus or minus 10 dB (25, p. 141).

Harris (24) used three groups of subjects in a study to devise a rapid method of detecting a nonorganic hearing loss. The groups were comprised of 25 subjects who had been diagnosed as having nonorganic hearing losses, 25 subjects known to have organic losses, and 25 sophisticated subjects who were asked to malinger or feign losses. The procedure included testing each subject's air conduction thresholds at 500, 1000, and 2000 Hertz (Hz). This was accomplished first by an ascending method of presentation which began at minus 10 dB and was increased in 5 dB steps until threshold was established. Then a descending method was used which began at 90 dB with the intensity reduced in 10 dB steps until the subject ceased responding.

Harris' results demonstrated that the ascending method provided a 22.20 dB better average for the three tones in the group who had been asked to malinger; a 26.20 dB better average in the nonorganic group; and for the organic group, a better average of less than 2 dB. Based on these results, he concluded that a subject might be suspected of having a nonorganic hearing loss if there is a 5 dB discrepancy between the averages obtained through presenting the tones first in an ascending and then a descending manner. A difference of 10 dB or more between the two thresholds is "highly indicative of nonorganic involvement" (24, p. 760).

Absence of appropriate lateralization, one signal of a nonorganic problem in unilateral hearing loss, is described by Chaiklin and Ventry (11, p. 92). Although an elevated shadow curve should arouse definite suspicion, complete absence of lateralization is even more indicative of nonorganic involvement. However, since most nonorganic studies report almost exclusive bilateral problems in children, this indication may be rarely encountered.

Berger (4, p. 451) lists two pure tone phenomena which should alert the audiologist to the possibility of nonorganic hearing loss in children:

a fairly flat audiogram showing a 40 to 70 dB loss by air and bone conduction; and any manifestion of a senorineural flat loss of sudden onset.

In examining nine children suspected of having nonorganic hearing losses, Brockman and Hoversten (7) included the following two conditions among their diagnostic criteria: (1) variable and inconsistent pure tone responses and (2) inconsistency in spontaneous conversational ability as compared with pure tone audiometric results. They suggest using the following procedural technique:

> As a general rule, we think it is advisable again to expect the response at softer intensity levels so that the child is not given a loud tone as a base-reference. Only when all efforts are exhausted at getting a pure tone response at these levels (approximately 30 dB or below) should the audiologist present tones at louder intensity levels. We think much of the error on school tests may have been simply in "cranking" up the sound to high levels until the child responded.
>
> The pure tone testing is introduced with some such casual remark as, "You will have no trouble hearing these tones; they are easy to hear." A tone is then presented at 25 to 30 dB, and if the child does not respond, the audiologist's attitude is one of surprise. The audiologist may suggest to the child that he hears the tones and that he simply did not understand the directions. Often a child can be coaxed into a response in this manner. Sometimes the ascending approach, starting with minus 10 dB and interspersing coaxing, can result in a nearer true threshold response. If such coaxing fails at these levels, it becomes necessary to present tones of higher intensity (7, p. 829).

Campanelli (8, p. 100) cautions against using the standard clinical procedure of asking the child to indicate his "good" or "better" ear at the beginning of voluntary pure tone testing. He believes this approach may be too suggestive to the child in that it seems to imply that one ear should be better than the other. He warns that this procedure may tend to complicate or fixate the aberration for a child manifesting signs of a nonorganic hearing loss.

Speech audiometry.--A comparison of pure tone audiometry with speech audiometry seems to be one of the most efficient techniques in identifying nonorganic hearing loss in children. Carhart explains that a patient's speech reception threshold (SRT) should ordinarily be within 6 dB of the pure tone average (PTA) of the three speech frequencies (500, 1000, and 2000 Hz) unless he presents an audiometric curve with a sharply dropping contour in the higher speech frequencies (9, p. 108). In a series of investigations in which he measured PTAs as compared to SRTs in nonorganic and organic patients, Carhart found that an SRT significantly lower than the volunteered PTA is an audiometric indication of nonorganic hearing loss.

In an investigation of 183 "inconsistent patients," Walker and Shutts (47) found that 53.5 per cent had better SRTs than PTAs, and only 8.5 per cent had better PTAs. They agreed that the SRT - PTA discrepancy is a valid criterion for indicating a nonorganic hearing loss.

According to Dixon and Newby (17), the method used in obtaining the child's SRT is important. They report achieving best results through using an ascending technique. Using the following procedure, they obtained SRTs of 10 dB or better in each ear in 33 of 40 nonorganic children tested:

> Starting at maximum attenuation, the examiner presents 6 to 10 spondee words, interspersed with such comments as, "I know it's very soft, but you must try hard to repeat these words." If the child fails to respond, the intensity is increased by 5 dB and the examiner tries again, coaxing the child to respond at almost every word. Occasionally the examiner may insert a question, such as, "Will you take off the earphones now?" to see if any reaction is observed to indicate that the child heard the question. Also it may be possible to engage the child in a conversation on a topic that the examiner knows is of particular interest to the child (17, p. 621).

Upon successful completion of speech audiometry, an attempt is made to obtain valid pure tone thresholds, or thresholds which more closely agree with the SRT. In children with whom pure tone and speech techniques do not establish reliable hearing thresholds, it is sometimes necessary to resort to the use of special tests.

Special tests.--A number of special tests designed to identify non-organic hearing losses, which are used in audiology clinics, with adult patients are not discussed in the literature dealing with children. One of the most commonly used special tests with children as well as adults is the electrodermal response test (EDR). Frequently referred to as the galvanic skin response test (GSR), it makes possible the measurement of an individual's threshold without requiring voluntary responses on his part. Instead, electric shock is used to condition the patient to respond involuntarily, through decreased skin resistance, to the auditory stimuli. The electrodermal response is mechanically recorded on a graph. The conditioning process involves the random presentation of a tone paired with a mild shock and the presentation of tone alone. Newby (35, p. 155) explains that when the patient has become conditioned, the presentation of tone alone elicits a decrease in skin resistance in anticipation of the shock.

The EDR test is generally considered an objective method of measuring an individual's hearing. Goldstein states that electrodermal changes following auditory stimulation can be accepted as objective responses in that ". . . they are not under the voluntary control of the patient or dependent upon his subjective awareness of the stimulus" (20, p. 178). However, he points out that audiometry is a procedure, not merely a response. EDR audiometry requires objective procedures carefully controlled and executed by the audiologist if it is to produce valid and reliable results.

The reliability of EDR pure tone audiometry was evaluated by Chaiklin and others (13) by a test-retest technique. Results showed that 95.1 per cent of their subjects had retest thresholds within plus or minus 5 dB of their first thresholds. They report that the test has high validity and reliability in evaluating patients with nonorganic hearing loss.

Hardy and Pauls (23) made a study of EDR procedures that can be used most effectively with children. They suggest that it requires a two-man team, one to work with the child and one to operate the instruments. They state that the primary clinical requirement in using the GSR test with children is the need to learn how to read the significant responses and eliminate the extraneous ones. The authors warn against using a level of shock intense enough to traumatize the child.

Grings and others (22) studied the relations of conditioning and EDR audiometry with children. They found that brief clinical measurement sessions preclude a complete duplication of classical conditioning procedures. They report that the majority of their child subjects required only five to fourteen unconditioned stimulus reinforcements in order to achieve a conditioning criterion of two consecutive EDRs to tone.

The Bekesy test has recently been recommended for use with children showing signs of nonorganic hearing problems. In Bekesy audiometry, a patient records his own threshold automatically on an audiogram blank by depressing a hand-held switch as long as he hears tonal stimuli and releasing it when he ceases to hear the tones. Based upon the relationship between two threshold tracings for each ear, with interrupted versus continuous tones, locus of the pathology causing the hearing disorder is indicated.

Price and Falck (39) conducted an investigation to determine the applicability of standard Bekesy audiometric techniques to normal hearing children. They were particularly concerned with determining minimum chronological and mental age levels necessary for adequate performance in the test. Fifty-four subjects ranging in age from six to eleven years were tested with the Bekesy audiometer. From the clinically useful information obtained from the majority of the subjects, the investigators concluded that the test seems applicable when used with children of normal intelligence who are at least seven years of age.

Jerger (25) described the possible basic outcomes in the Bekesy test. He reports four types of patterns corresponding to middle-ear, cochlear, and VIIIth nerve lesions based on the relationship between the threshold tracings by continuous and interrupted tones (25, p. 141). In all four types the threshold tracings with continuous tonal stimuli are equal to or poorer than the threshold tracings with the interrupted stimuli.

Jerger and Herer (26) describe a fifth type of pattern which they found in three cases of nonorganic hearing loss. This Type V audiogram is characterized by converse tracings, greater sound pressure level for interrupted than for continuous tones. They found that in the range from 250 to 2000 Hz the continuous tone threshold is as much as 20 dB higher than the interrupted threshold. From these findings, Jerger and Herer report that a Type V audiogram is indicative of a nonorganic hearing loss or overlay.

Peterson (37) reports his testing of four patients between the ages of nine and thirteen who presented Type V audiograms. The three females and one male had all demonstrated inconsistencies in pure tone and speech tests. On the basis of final test results, each patient revealed hearing within normal limits. Peterson advocates the use of Bekesy audiometry for indicating exaggerated hearing loss but explains that it does not allow the audiologist to estimate the degree of the nonorganic involvement.

Another study on the use of Bekesy audiometry with children was conducted by Rintelmann and Harford (42). Their subjects were ten children suspected of having nonorganic hearing losses. The group, equally divided in sex, ranged in age from nine to nineteen years. Each subject showed an average pure tone air conduction hearing loss of 25 dB or greater in one or both ears initially. Each showed a pure tone average improvement of 20 dB or more in one or both ears from the initial to the final pure tone test given on the same day. The Bekesy test was routinely administered to all subjects, and nine of the ten traced a Type V pattern. Based on these results, Rintelmann and Harford recommended that the Bekesy test be included in the battery of audiological tests for assessing nonorganic hearing loss in children.

Juvenile Delinquency

Descriptions and definitions.—Cohen has observed that ". . . delinquency, like measles, seems to be regarded as a homogenous something which people have or have not, and it is thought sufficient to note simply that a person is or is not delinquent" (15, p. 172). He cautions that the phenomena is complex and actually subsumes a variety of meanings and definitions.

The literature on juvenile delinquency covers at least four distinct uses of the term, as reported by Cavan. They are "(1) delinquency as deviant behavior; (2) delinquency as a distinct legal and/or social status; (3) delinquency as a subcultural trait; and (4) delinquency as a social problem" (10, p. 44). She explains that delinquency as a legal or social status may include predelinquency, protodelinquency (unofficial), real delinquency (adjudicated), and confirmed (recidivistic).

Generalizations about delinquency, as about anything else, can be misleading and utterly erroneous unless the usage or meaning is clarified or specified. The federal Children's Bureau defines juvenile delinquency cases as follows:

> Juvenile delinquency cases are those referred to the courts for acts defined in the statutes of the State as the violation of law or municipal ordinance by children or youth of juvenile court age, or for conduct so seriously antisocial as to interfere with the rights of others or to menace the welfare of the delinquent himself or of the community (10, p. 16).

According to Lunden (32), the White House Conference of 1930 established a concept of delinquency which has gained wide acceptance in the United States through the years. "The Committee agreed that, in general, delinquency has meant merely apprehended delinquency. Delinquency is any such juvenile misconduct as might be dealt with by the law" (32, p. 16). The age range which the term "juvenile" covers varies from state to state, but the majority of the states consider individuals as juvenile if they are over six and under 18 (44, p. 4).

The Texas civil statutes define the delinquent child as follows:

> The term "delinquent child" shall include any boy between the ages of 10 and 17 years and/or any girl between the ages of 10 and 18 years who violates any penal law of this state, or who is incorrigible, or who knowingly visits a house of ill repute, or who is guilty of immoral conduct in a public place, or who knowingly patronizes or visits any place where a gambling device is being operated, or who habitually wanders about the streets in the nighttime without being on any business or occupation, or who habitually wanders about any railroad yard or tracks, or who habitually jumps on or off of moving trains, or who enters any car or engine without lawful authority. Any such child committing any of the acts herein mentioned shall be deemed a delinquent child... (46, art. 5143a).

<u>Physical and intellectual factors</u>.--The literature is replete with theories and opinions on physical and mental conditions being correlated

with delinquency. Vedder (44) states that many believe delinquents are undernourished and undersized youths who possess physical and mental defects. He reports that on various test batteries, delinquent subjects suffer little by comparison with a nondelinquent group. Vedder finds no consensus among practitioners in the field of juvenile delinquency that physical or mental conditions are positively associated with delinquency.

Christie (14) studied physical defects in 282 delinquent boys matched in age with the same number of nondelinquent boys. Complete physical examinations were conducted and case histories taken. Although fewer actual physical defects were found in the nondelinquent group, the author considered the difference insignificant and concluded that "the delinquent does not form a special group physically" (14, p. 22).

Glueck and Glueck (19) equated 500 delinquent boys with 500 nondelinquents in respect to age, intelligence, ethnic background, and residence in underprivileged neighborhoods. They found that little if any difference exists between the physical conditions of the two groups as a whole. They report little difference between the groups in the extent to which they suffer from respiratory infections, earaches, mastoid and middle-ear infections, or allergies. They did find twice as many delinquents as nondelinquents, however, with histories of enuresis (19, p. 107).

Mental retardation has been causally related with delinquency by many investigators. Lunden (32) reports intelligence ratings of 200 juvenile offenders in two Iowa training schools. The boys demonstrated a mean I. Q. of 90.4; the girls, 94.1. The mean I. Q. for 458 nondelinquents in the same age-group tested was 103 for boys and 105.5 for girls.

Pierson and others (38, p. 142) reject the contention that the delinquent is below average intellectually. In a study of 338 male juveniles ranging in age from 14 to 17 years, they report finding that the intellectual level of the delinquent population does not differ from the normal. He concedes that the group is handicapped in terms of academic achievement, reading, and verbal skills, ". . . but they are not stupid."

Vedder (44) reports Shulman's research in juvenile delinquency which traced certain relationships between types of offense and intelligence level. He found intelligence positively correlated with forgery, lack of parental control, and malicious mischief; and negatively correlated with sex offenses, truancy, and vagrancy.

Studies conducted by Quay reveal that the I. Q. scores of delinquent subjects are approximately eight points lower than a general population. He predicts, however, that they are probably comparable to those of nondelinquents of similar background tested under like circumstances (40, p. 131).

The Gluecks (18) found confirmation of Quay's prediction after administering the <u>Wechsler-Bellevue Full Scale Intelligence Test</u> to their carefully equated delinquent and nondelinquent groups. Average I. Q. of the two groups proved to be 92 among delinquents and 94 in the control group.

Scores on the individual subtests showed delinquents to be most deficient in certain constituents of abstract intelligence, such as vocabulary, information, and comprehension. They scored more closely to the control group in average of performance (97: 98).

<u>Incidence of speech disorders</u>.—There are great discrepancies reported in incidence of speech disorders in delinquent populations. Widely variant findings may result, in part, from vastly differing criteria for

defining and judging speech defects and from great differences in ethnic derivation between populations tested.

Anderson (1) conducted a survey of 258 juveniles at the Dallas County Detention Home to determine the incidence of speech disorders. Subjects included 188 boys and 70 girls who ranged in age from 10 to 18 years. Conversational speech was elicited from each subject, and the Clark Picture Phonetic Inventory and the Leavell Analytical Oral Reading Test were the instruments used.

Defective speech was found in 26 subjects, or 10.1 per cent of the population tested. This incidence is greater than the five per cent quoted for the general population by the Midcentury White House Conference on Children and Youth (1, p. 57).

The 10.1 per cent incidence, however, is considerably smaller than that found by Cozad and Rousey (16) in their survey of speech disorders among 300 delinquent youth in two Kansas industrial schools. Their subjects, 212 boys and 88 girls, ranged in age from 10 to 18 years. Using the Templin-Darley Screening Test of Articulation, they obtained results indicating that 58.3 per cent of the population presented speech disorders.

Behavioral characteristics and other psychological correlates.--Glueck and Glueck, from their research on delinquency, proposed a five point causal law. According to this formulation, delinquents are distinguished from nondelinquents in the following ways:

> (1) physically, in being essentially mesomorphic; (2) temperamentally, in being restless, impulsive, aggressive, destructive; (3) emotionally, in being hostile, defiant, resentful, assertive, nonsubmissive; (4) psychologically, in being direct concrete learners; (5) socioculturally, in being reared by unfit parents (18, p. 281).

Pati (36) administered the Rorschach Test to 75 delinquents and 75 nondelinquents. Analysis showed that most of the delinquents - 66 per cent of the first offenders, 88 per cent of recidivists, and 60 per cent of murderers - appear to manifest tendencies for unstable, neurotic, psychotic, and psychopathic personality.

Wirt and Briggs (48) compared 274 nondelinquent with 129 delinquent boys. They report that delinquents are involved in more sexual promiscuity, conflict at school, and fights. They describe them as being deceitful, critical, nonconforming, self-indulgent, extrapunitive, and inclined to act out.

Quay (40) conducted a longitudinal study on the relationship of personality characteristics to juvenile delinquency. Using the Minnesota Multiphasic Personality Inventory, he tested ninth grade subjects and did follow-ups at two, four, and five year intervals. Quay reported the most outstanding personality characteristics related to delinquency are those of aggression, hyperactivity, hostility, and individualistic activity.

Blimes (6) disputes traditional theories of conscience deficiency or defect in the delinquent. He maintains that the delinquent does have a conscience, and it is because he feels inadequate to its demands that he tries to elude it. The delinquent, according to Blimes, gains relief from fastening a sense of guilt on something physical and immediate.

Hearing Loss Among Juvenile Delinquents

There have been two studies conducted primarily to determine the incidence of hearing loss among juvenile-delinquent populations. Cozad and Rousey (16) surveyed the hearing of 300 students in two Kansas institutions for delinquent youth. Screening was done at 10 dB (ASA) re: hearing loss dial of the audiometer at frequencies of 250, 500, 1000, 2000, 4000, 6000 and 8000 cycles per second. A child was judged to have failed the screening if he failed to hear the 10 dB level at 1000, 2000, or 6000 or if he failed to hear the 4000 cycle tone at 20 dB in either ear. Those failing the initial screen were re-screened, and students failing a second time were given air and bone conduction threshold tests.

Of the 300 students screened, 212 were boys and 88 were girls who ranged in age between 10 and 18 years. Combined data from the hearing survey show that 24 per cent of the entire group failed the screening tests and were later found to have hearing impairments. Approximately 29 per cent of the boys and 12.5 per cent of the girls showed deficient hearing.

The majority of the losses were sensorineural in nature; a few were of the mixed type, part conductive and part sensorineural, but no purely conductive losses were observed. The examiners apparently did not attempt to detect nonorganic hearing problems in their subjects. They found almost five times the expected incidence of hearing loss in the age-group surveyed.

To point out the difference in hearing behavior between juvenile delinquents and "normal" school children, Kodman and others (29) conducted a pure tone hearing survey of 306 delinquents who ranged in age from 10 to 20 years. Subjects were screened at 15 dB (ASA) at frequencies of 125, 250, 500, 1000, 2000, 4000, and 8000 Hz. Those who failed the screening at any frequency were given threshold tests.

Hearing loss was defined as failure to meet a criterion at one or more frequencies in either ear. Two separate criteria were used: a loss of 15 dB or more at one or more frequencies in either ear and a loss of

30 dB or greater at any frequency in either ear. By the 15 dB criterion, 74 cases (24 per cent) of hearing loss were found. By the 30 dB criterion, 55 subjects (18 per cent) were found to have hearing loss.

The investigators compared the 18 per cent who showed a 30 dB or greater loss with the five per cent national estimate for public school children. They offer the point of view that defective hearing may be a byproduct of the influences that affect the delinquent.

At the conclusion of the report of their study, Kodman and others did consider the etiology of the hearing losses and found indications that approximately 21 per cent involved nonorganic hearing problems. They were alerted to this by finding a discrepancy between the average pure tone loss for 500, 1000, and 2000 Hz and the speech reception threshold. They emphasize the need for further study primarily directed toward determining the extent of nonorganic hearing problems among juvenile delinquents.

Summary

The problem of nonorganic hearing losses in school-age children is generally recognized by audiologists and otologists. Most investigators report a two or three per cent incidence of nonorganic problems among the estimated five per cent of the students identified as having hearing losses which require furthur investigation and treatment.

Two research teams have reported unusually high incidences of hearing loss in juvenile-delinquent populations. Only one study included a report of an attempt to identify nonorganic hearing problems among their delinquent sample, and it was reported as an incidental finding rather than the primary purpose of the investigation. A nonorganic incidence of 21 per cent was indicated in the 18 per cent of the test population who demonstrated hearing loss.

This study was conducted to screen the hearing of 100 youths classified as delinquent, and to determine the nature, severity, and incidence of hearing loss for the ultimate and primary purpose of determining incidence of nonorganic etiology or overlay. The literature reviewed in preparation for making the investigation includes studies of nonorganic hearing problems in children, tests and techniques for identifying such problems, and research on juvenile delinquency related to this study.

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CHAPTER II

PROCEDURE

A pure tone hearing study was conducted at the Dallas County Juvenile Detention Home to find the incidence of hearing loss in a juvenile-delinquent population and to determine the incidence of nonorganic involvement among those demonstrating hearing loss. Individual audiometric screening tests were performed with 100 children held in detention during the months of July and August, 1968. Those who failed the screening were subsequently given individual pure tone air and bone conduction threshold tests.

Description of Subjects

In the test sample of 100 subjects, there were 71 males and 29 females. Ages ranged from 11 to 17 years with an arithmetic mean of 14.6 and a median age of 15 years and 3 months. The boys ranged in age from 11 to 17, with a mean age of 14.4 and a median of 14 years and 11 months. The ages of the girls varied from 12 to 17, with a mean of 15.1 and a median of 15 years and 9 months.

According to Texas statute, the age of a delinquent child may range from 10 to 18 years (7). Coincidentally, neither of the two extremes of this span is represented in the test sample. Among the population were 62 white, 30 Negro, and 8 Latin American children. These racial or socio-cultural designations are those made by the detention home and were taken from their intake reports. Differences within the group with respect to age, sex, and race are summarized in Table I. The reader will note that the males outnumbered the females by more than two to one and that there

TABLE I

SUMMARY OF THE POPULATION TESTED AT THE DALLAS COUNTY JUVENILE DETENTION HOME

	White		Negro		Latin American		
	M*	F	M	F	M	F	Total
11 years	2	..	..	..	1	..	3
12 years	3	1	2	..	..	..	6
13 years	6	1	5	..	2	..	14
14 years	12	4	2	..	..	1	19
15 years	5	10	9	..	1	..	25
16 years	10	6	6	2	1	1	26
17 years	..	2	4	..	..	1	7
Total	38	24	28	2	5	3	100

* "M"—male, "F"—female

were more white subjects than Negro and Latin American combined.

Subjects were selected from the daily intake rolls of the Dallas County Juvenile Detention Home by a fixed-interval sampling process. Every third name on the roll and all new admissions for the day were examined during ten sessions at the home in late July and early August, 1968.

All subjects were admitted to the detention home after being apprehended for violation of civil or criminal law in Dallas County. Their violations included juvenile offenses, misdemeandors, and felonies ranging in classified severity from runaway to homicide. A summary of the test population with respect to their offenses is included in the Appendix.

Testing Equipment and Facilities

A portable Maico 2 B pure tone audiometer was used for individual screening of the subjects and for the follow-up threshold tests. Calibration of the audiometer was checked two days prior to the beginning of the investigation with a Bruel and Kjaer, Model 2203, Sound Level Meter coupled to a Model 1613 Octave Filter. Specifications of the 1964 International Standards Organization (ISO) were used in the calibration assessment.

The examinations were conducted in the library of the detention home. Although ambient noise could not be completely controlled or eliminated, this room was judged to be the best one available for auditory testing, since it was located away from the cafeteria and recreation rooms and not adjacent to the visitors parlor. Testing was done during the evening when the room's noise level was least disturbed by sudden changes.

Subjects were seated beside a desk upon which the audiometer was placed. They were positioned at an angle which prevented their seeing the operation of the instrument controls but which allowed the examiner to view their faces and their hands raised in response to tonal stimuli.

Experimental Procedure

A detention home assistant superintendent escorted the subjects to the testing room in groups of six at a time. The examiner introduced the group to the task by instructing them in the procedures to be followed during the auditory screening tests. Following group instruction, five subjects were dismissed from the room while one remained to be examined. Immediately after completion of his test, a second subject was brought in, and such procedure was continued until all six had been screened.

The screening was conducted in accordance with recommendations of the 1960 National Conference on Identification Audiometry (6, p. 12), with situationally required modifications. The standard used for audiometric zero was that of the ISO (4). Subjects were screened at the frequencies 1000 and 2000 Hz at a level of 20 dB, 4000 Hz at 30 dB, and 500 Hz at 20 dB in that order. Criterion for failure was an absence of response at any two frequencies in one or both ears.

Subjects who did not pass the screening were rescreened. Those failing the second screening were given pure tone air and bone conduction threshold tests with the same criterion for failure. Threshold tests were conducted, whenever possible, on the same evening as the screening to avoid the possibility of "losing" a subject through dismissal from the detention home. Retests were conducted one to two days later when the examiner could be advised that the subject would still be available.

Procedures used in obtaining air and bone conduction thresholds were those recommended by Carhart and Jerger (2), who followed essentially the Hughson-Westlake method. To be identified as showing evidence of a non-organic hearing problem, a subject was required to meet the following two criteria: (1) a test-retest difference of at least 10 dB for voluntary thresholds at 1000 Hz; and (2) positive results on the Harris Test. Test-retest reliability at 1000 Hz for the normal ear is no greater than plus or minus 5 dB (3, p. 91).

Procedures employed in the Harris Test closely followed those recommended by its originator (5). Air conduction thresholds at 500, 1000, and 2000 Hz were determined first through an ascending series of intensity presentations of the stimulus tone. Each series was begun at the lowest level on the audiometer intensity indicator and was increased in 10 dB steps until the subject responded to the tone. The intensity was then decreased in 5 dB steps and increased by the same amount until threshold was established.

The same three stimulus tones, 500, 1000, and 2000 Hz, were then presented at a level of 90 dB and reduced in 10 dB steps until the subject failed to respond. Intensity was then increased in 5 dB steps to establish the threshold. "A difference of 10 dB or greater between the two thresholds is highly indicative of nonorganic involvement" (5, p. 760).

Following indications of nonorganic hearing problems, subjects were counseled and retested in an effort to obtain reliable organic threshold measurements. Prior to retesting, subjects were examined otoscopically for any obvious signs of canal obstructions or occlusions. At no time during the testing procedure were subjects asked to identify their "good" or "better" ear in accordance with Campanelli's caution that this might be too suggestive to the potentially nonorganic patient (1).

Counseling during and between threshold tests involved the examiner's accepting the responsibility for any inconsistencies in the subject's responses, and a fair amount of coaxing was used. At no time were overt doubts cast on the integrity or intent of the subject. Suggestions, such as lack of clear instructions, improperly fitted earphones, and noisy environment, were offered to the subject as reasons for questionable or spurious responses.

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CHAPTER III

RESULTS

A sample of 100 boys and girls, who were detained at the Dallas County Juvenile Detention Home during July and August, 1968, served as subjects in a pure tone hearing study designed to determine the incidence of hearing loss and, especially, of nonorganic hearing problems in a delinquent population. The 71 male and 29 female subjects ranged in age from 11 to 17 years, with a mean of 14.6 and a median age of 14 years and 11 months. The group was comprised of 62 white, 30 Negro, and 8 Latin American youths.

Subjects were individually screened for hearing loss. Rescreening and individual air and bone conduction threshold tests were conducted with those who failed the screening. The Harris Test, designed for rapid detection of nonorganic hearing problems, was routinely administered to all hearing loss subjects immediately following threshold examination. At least one threshold retest was conducted with each subject who demonstrated a hearing impairment.

Of the total population, thirteen failed the initial screening, and twelve failed the second screening test. These twelve subjects subsequently demonstrated hearing losses on the follow-up threshold examinations. The twelve cases of hearing loss constituted twelve per cent of the total sample of 100 youths tested.

Table II presents a summary of the hearing loss subjects grouped according to age, sex, and race. There were nine boys and three girls

TABLE II

HEARING LOSS SUBJECTS
GROUPED ACCORDING TO
AGE, SEX, AND RACE

	White		Negro		
	M*	F	M	F	Total
11 years	1	..	..	..	1
12 years	2	..	2	..	4
13 years	..	1	..	..	1
14 years	2	..	..	..	2
15 years	1	1	..	..	2
16 years	1	1	..	..	2
Total	7	3	2		12

*"M"—male, "F"—female

in the group of ten white and two Negro youths. Their ages ranged from 11 years and 11 months to 16 years and 8 months, with a mean age of 13.5 and a median of 14.1.

Audiological findings revealed that nine of the twelve hearing loss subjects appeared to have true organic losses. This number represents nine per cent of the total population tested. Three subjects, twenty-five per cent of the hearing loss group, showed evidence of nonorganic hearing problems.

Subjects Showing Organic Hearing Loss

Seven of the nine subjects, who showed no indications of nonorganic involvement, demonstrated sensorineural or mixed (sensorineural and conductive) impairments. Only two revealed purely conductive hearing defects. Their audiograms and Harris Test results are presented in the Appendix. Table III summarizes the subjects with respect to age, sex, race, type of loss, and type of offense.

TABLE III

AGE, RACE, SEX, TYPE OF LOSS, AND TYPE OF OFFENSE
OF JUVENILES SHOWING ORGANIC HEARING LOSS

		Sensorineural			Conductive			Mixed		
		12 to 13	14 to 15	16 to 17	12 to 13	14 to 15	16 to 17	12 to 13	14 to 15	16 to 17
Theft and Auto Theft	W**	F* / M							M: 1	F: 1
	N									
Burglary	W			M: 1						
	N	M: 1								
Runaway	W		F: 1		F: 1	M: 1			M: 1	
	N									
Interference with Arrest	W	M: 1								
	N									
Total		M: 2	F: 1	M: 1	F: 1	M: 1			M: 2	F: 1

*"F"--female, represented in the upper right corner of the slashed squares; "M"--male, represented in the lower left corner of the slashed squares.

**"W"--white; "N"--Negro

The ages of the six boys and three girls ranged from 12 years and three months to 16 years and 8 months, with a mean of 14.1 and a median of 14 years and 7 months. One subject was a Negro male; the other eight were white. According to the classification of offenses shown in the Appendix, four of the subjects were charged with juvenile offenses, one with a misdemeanor, and four with felonies.

Subjects Showing Nonorganic Hearing Loss

Three subjects showed evidence of nonorganic hearing problems by meeting the two criteria of a test-retest difference of at least 10 dB for voluntary thresholds at 1000 Hz and positive results on the Harris Test. They represent 25 per cent of the hearing loss population. The three were boys, two white and one Negro, whose ages were 11.11, 12.0, and 12.0. Their violations included destruction of private property (a misdemeanor), runaway, and incorrigibility (juvenile offenses).

Two of the boys manifested bilateral hearing losses, and one showed a unilateral loss. Otoscopic findings were negative; there were no apparent obstructions, occlusions, or active pathologies, even though one subject reported having a pencil jammed in his ear. This same subject demonstrated a bilateral hearing loss.

Pure tone averages (500, 1000, and 2000 Hz) obtained on the initial and final audiograms of each subject are shown in Table IV. These averages reveal that the subjects had test-retest differences varying from 12 to 57 dB in the speech frequencies. The first subject showed a pure tone average (PTA) improvement of 40 dB in the right ear and 57 dB in the left ear from initial to final audiograms. The second subject, who

TABLE IV

PURE TONE AVERAGES OF THE NONORGANIC HEARING LOSS SUBJECTS

	Subject 1		Subject 2		Subject 3	
	AD*	AS	AD	AS	AD	AS
Initial Audiogram	53dB	65	40		45	38
Final Audiogram	13	8	5		23	26
Difference	40	57	35		22	12

*"AD"--right ear, "AS"--left ear

demonstrated a unilateral hearing loss, had a 35 dB better threshold average on the final test. An improved PTA difference of 22 dB in the right and 12 dB in the left ear was demonstrated by the third subject.

Each boy's audiogram, included in the Appendix, reveals at least a 10 dB test-retest difference at 1000 Hz in one or both ears. Configurations tend to be relatively flat with initial thresholds of the three subjects ranging from 30 to 70 dB. Two of the boys were later found to have hearing within normal limits. The third showed improvement in threshold responses on repeated tests but was dismissed from detention before retesting was completed, and reliable organic thresholds were not established.

The Harris Test results of the three subjects are shown in Table V. Comparing these results with those of the nine subjects who showed no evidence of nonorganic hearing loss, far greater discrepancies in ascending and descending threshold responses are observed. The test's criterion of a 10 dB difference at 1000 Hz for indication of nonorganic involvement was met by each of the three subjects.

TABLE V

HARRIS TEST RESULTS OF THE NONORGANIC
HEARING LOSS SUBJECTS

		AD***			AS		
		500*	1000	2000	500	1000	2000
Subject 1	A**	45dB	50	45	55	50	50
	D	60	60	50	65	65	55
Subject 2	A	25	30	35			
	D	35	40	40			
Subject 3	A	40	40	60	45	50	50
	D	55	60	65	60	65	65

*Numbers refer to frequencies
**"A"—ascending threshold, "D"—descending threshold
***"AD"—right ear, "AS"—left ear

CHAPTER IV

SUMMARY, DISCUSSION, AND CONCLUSIONS

A pure tone hearing study was conducted to determine the incidence of hearing loss and, especially, of nonorganic hearing problems in a juvenile-delinquent population. A randomly selected sample of 100 boys and girls, detained at the Dallas County Juvenile Detention Home, Dallas, Texas, during July and August, 1968, served as subjects for the investigation.

Subjects were individually screened for hearing loss. Those who failed were rescreened, and follow-up air and bone conduction threshold tests were performed with those who failed the second screening. Intratest and intertest inconsistencies suggested the possibility of nonorganic hearing involvement, with a test-retest difference of 10 dB at 1000 Hz lending high indication. In each case, the Harris Test provided a reasonable indication of whether or not nonorganic hearing problems were present.

Hearing loss was identified in twelve subjects, constituting twelve per cent of the total population tested. Audiological findings revealed that nine of these twelve subjects appeared to have genuine organic losses. One was a Negro male; the other eight were white. The majority of the losses demonstrated by the six boys and three girls in this group were sensorineural or mixed in nature. Only two losses were of the purely conductive type. Organic hearing loss was found in 10.3 per cent of the girls and in 8.3 per cent of the boys tested.

Three of the twelve subjects identified as having impaired hearing showed evidence of nonorganic hearing problems. They represent twenty-five per cent of the total hearing loss group. Two of these three male subjects were white; the other was Negro. Two manifested bilateral hearing losses, and one showed a unilateral loss.

Discussion

The incidence of twelve per cent hearing loss among the delinquent population tested is greater than the five per cent expected in a general school-age population (6). Although implications of cause were not considered within the scope of this study, it seems possible that low socio-economic status resulting in inadequate medical care or personality problems possibly manifested in poor cooperation might be operant in the higher incidence found.

The twelve per cent figure, however, is only half as great as the twenty-four per cent reported by Cozad and Rousey (3) in their hearing study of juvenile delinquents. It is also considerably smaller than the eighteen per cent reported by Kodman and others (4). Variation in findings might result, in part, from size and type of populations tested and from differences in screening methods and criteria set for failure. The two previously reviewed studies were each conducted with approximately 300 institutionalized juvenile delinquents, while this investigation was performed with 100 subjects classified as delinquent only after apprehension and detention but before formal sentencing to correctional homes. More lenient criteria for screening test and threshold test failure were employed in the other two studies. Criteria used in this investigation were essentially those recommended for standardization of methodology by the 1960 Conference on Identification Audiometry (5). These different criteria used make comparison of results between the studies of questionable value.

Another contributing factor to the higher-than-expected incidence of hearing loss in the age group studied, and one more pertinent to the major purpose of this thesis, is that of nonorganic hearing problems. Of the twelve subjects demonstrating hearing loss, only nine showed evidence of having true organic impairment. Three of the twelve subjects, twenty-five per cent, showed positive indications of nonorganic involvement. This twenty-five per cent incidence figure is unquestionably greater than the two or three per cent of nonorganics reported by researchers of hearing loss in school-age populations. However, it closely approximates the twenty-one per cent of the juvenile-delinquent hearing loss group found to show indications of nonorganic hearing components by the Kodman team (4).

The first indication of possible nonorganic hearing loss was a lack of intratest reliability demonstrated by each of the three subjects. Test-retest discrepancies shown by the three suggested a lack of reliability in the threshold responses. Positive results on the Harris Test provided further evidence of nonorganic problems, and the final establishment of thresholds within the normal range of hearing confirmed the diagnosis in two of the subjects. The third was dismissed from the detention home before reliable organic thresholds could be obtained, but he met the criteria of a test-retest difference of 10 dB at 1000 Hz and positive Harris scores as evidence of a nonorganic factor.

The three subjects identified as having nonorganic hearing problems were boys. This finding is in contrast to those observed in the non-delinquent populations, where girls tend to show a higher incidence of nonorganic hearing problems than boys by a factor of three to one (2). Two demonstrated bilateral hearing losses, and one showed a unilateral loss. The manifestation of a nonorganic hearing loss appears to be atypical according to findings reported by other investigators (1).

As Table IV shows, the test-retest PTAs of the three subjects varied as much as 57 dB with an average of 33 dB. After demonstrating at least a 10 dB difference between ascending and descending thresholds at 1000 Hz (as shown by results of the Harris Test summarized in Table V), the boys were counseled and encouraged to listen more closely before retesting was initiated. Without letting the subject know that a nonorganic loss of hearing was suspected, his responses were accepted as valid, but surprise was expressed at the results. It was made clear that something was obviously amiss and that the results were definitely unacceptable. Conditions of testing or of the environment were suggested to the subject as reasons for discrepancies, so that he was given a face-saving device and was allowed to surrender any auditory inhibitions without loss of self-respect. One subject responded readily to this routine and presented thresholds within normal limits on the second test. With another, it took considerable time and patience to arrive at normal organic thresholds. The third showed improvement upon retesting but was the one who was "lost" before it was possible to obtain an audiogram which represented his actual hearing levels.

Table II shows that the ages of the twelve subjects found to have hearing impairments ranged from 11 years and 11 months to 16 years and 8 months. The three subjects in the nonorganic group were 11.11, 12.0, and 12.0. The finding of nonorganic hearing problems in the relatively young end of the age span tested concurs with a factor reported in a pattern emerging from Berger's review of nonorganic hearing loss studies; that is, that the child is usually in the upper elementary grades or junior high school, with an age ranging from 8 to 14 years (1).

As shown in the Appendix, the most common type of offense committed by the population in this study was felony followed by juvenile offense and misdemeanor. The most common specific offenses were runaway, auto theft, and burglary in that order. Table III, including a summary of the offenses committed by the subjects showing organic hearing losses, shows the same specific offense incidence pattern as found in the total population tested. None of the three nonorganic subjects was charged with a felonious offense; their violations included destruction of private property (a misdemeanor), runaway, and incorrigibility (juvenile offenses). From the scattered pattern of these findings, there is no indication of a relationship existing between hearing loss and type of offense.

All of the children tested were cooperative. Although some demonstrated attitudes of indifference, none showed signs of irritation or truculence while participating in the task of the investigation.

Conclusions

The conclusions that can be drawn from this study are the following:

1. A greater incidence of hearing loss is found in a juvenile-delinquent population than in a general school-age population.

2. A greater incidence of nonorganic hearing problems than is expected in a nondelinquent population appears to be a factor contributing to the high incidence of hearing loss found.

3. The majority of the hearing losses are of the sensorineural or mixed type.

4. Nonorganic hearing problems occur more among younger than older delinquent children in the population of this study.

A limitation of this thesis must be recognized. In view of the small number of subjects found to have nonorganic hearing problems (three of the twelve showing hearing loss), the large percentage yielded may be misleading. In support of the scope of this study, however, is the fact that the 100 subjects studied were chosen on a purely random basis. There is no indication that the addition of greater numbers would materially change the outcome of hearing loss identified, although one could wish for more nonorganic losses to study.

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APPENDIX 1

TEST POPULATION CLASSIFIED ACCORDING TO INCIDENCE OF FELONY, MISDEMEANOR, AND JUVENILE OFFENSE

Felony

Auto theft	15
Breaking and entering a motor vehicle	1
Burglary	11
Child molesting	1
Fondling	1
Forgery	1
Murder	1
Robbery	2
Sodomy	1
Theft	7
Total	41

Juvenile Offense

Incorrigible	9
Indecent exposure	1
Runaway	28
Traffic violations	1
Total	39

Misdemeanor

Aggravated assault	2
Assault	5
Destroying private property	1
Disturbing the peace	6
Interference with arrest	1
Loitering	2
Purse snatching	1
Shoplifting	2
Total	20

APPENDIX 2

PURE TONE AUDIOMETRIC ASSESSMENT
OF SUBJECTS SHOWING ORGANIC
HEARING LOSS

Subject O. L. Age 13-11 Birthdate 9-13-54

Offense Runaway Sex F Race W

	AIR CONDUCTION											
	RIGHT						LEFT					
Date	250	500	1000	2000	4000	8000	250	500	1000	2000	4000	8000
7-31-68	30	30	25	30	35	20	10	5	5	0	5	0
		30	25	30				5	0	0		
8-1-68	35	30	25	30	35	25						
Masking op. ear												
	BONE CONDUCTION											
	RIGHT						LEFT					
	250	500	1000	2000	4000		250	500	1000	2000	4000	
	5	0	0	5	0		5	0	0	0	5	
Masking op. ear	*50	50	60	70	70							
		HARRIS TEST										
		RIGHT						LEFT				
		500	1000	2000				500	1000	2000		
Ascending		30	25	30								
Descending		30	25	30								

*Maximum masking levels were recorded on all test blanks.

APPENDIX 2 --Continued

Subject M. A. Age 15-11 Birthdate 9-4-52

Offense Runaway Sex F Race W

	AIR CONDUCTION											
		RIGHT					LEFT					
Date	250	500	1000	2000	4000	8000	250	500	1000	2000	4000	8000
7-24-68	5	0	0	5	5	0	15	20	25	30	45	50
		0	0	5				20	25	30		
7-26-68	0	0	5	5	5	0	15	20	30	30	45	50
Masking op. ear												60
	BONE CONDUCTION											
		RIGHT					LEFT					
	250	500	1000	2000	4000		250	500	1000	2000	4000	
	0	0	0	5	5		0	0	0	15	30	
							15	20	25	30	45	
Masking op. ear							50	55	60	65	65	
		HARRIS TEST										
		RIGHT						LEFT				
		500	1000	2000				500	1000	2000		
Ascending								20	25	30		
Descending								20	25	30		

APPENDIX 2 --Continued

Subject S. S. Age 16.8 Birthdate 12-31-51

Offense Theft Sex F Race W

	AIR CONDUCTION											
	RIGHT						LEFT					
Date	250	500	1000	2000	4000	8000	250	500	1000	2000	4000	8000
7-26-68	20	15	20	25	35	30	20	25	30	45	60	35
		15	20	25				25	25	45		
7-28-68	15	15	20	25	30	25	20	25	25	40	55	35
Masking op. ear												
	BONE CONDUCTION											
	RIGHT						LEFT					
	250	500	1000	2000	4000		250	500	1000	2000	4000	
	0	0	5	10	15		0	5	5	25	35	
Masking op. ear	55	65	70	80	80		50	55	65	70	80	
		HARRIS TEST										
		RIGHT						LEFT				
		500	1000	2000				500	1000	2000		
Ascending		15	20	25				25	25	45		
Descending		20	20	25				25	25	45		

APPENDIX 2 --Continued

Subject S. W. Age 12-3 Birthdate 4-15-56

Offense Burglary Sex M Race N

	AIR CONDUCTION											
	RIGHT						LEFT					
Date	250	500	1000	2000	4000	8000	250	500	1000	2000	4000	8000
7-31-68	10	20	35	45	60	60	5	0	0	5	10	5
		20	35	45		70		0	0	5		
8-1-68	10	20	35	45	65	70						
Masking op. ear				70	70	80						
	BONE CONDUCTION											
	RIGHT						LEFT					
	250	500	1000	2000	4000		250	500	1000	2000	4000	
	0	0	5	15	25		0	0	0	5	10	
	10	20	35	45	60							
Masking op. ear	55	65	65	70	70							
		HARRIS TEST										
		RIGHT						LEFT				
		500	1000	2000				500	1000	2000		
Ascending		20	35	45								
Descending		20	35	45								

APPENDIX 2 --Continued

Subject D. D. Age 14-7 Birthdate 12-25-53

Offense Auto theft Sex M Race W

Date	AIR CONDUCTION											
	RIGHT						LEFT					
	250	500	1000	2000	4000	8000	250	500	1000	2000	4000	8000
7-29-68	20	30	30	40	65	35	25	20	25	30	55	30
		30	30	40				20	25	30		
7-30-68	25	30	30	40	65	40	25	20	25	30	55	30
Masking op. ear												
	BONE CONDUCTION											
	RIGHT						LEFT					
	250	500	1000	2000	4000		250	500	1000	2000	4000	
	0	5	5	15	60		5	0	0	10	50	
Masking op. ear	60	60	65	75	80		55	65	65	80	80	

	HARRIS TEST						
	RIGHT				LEFT		
	500	1000	2000		500	1000	2000
Ascending	30	30	40		20	25	30
Descending	30	30	40		20	25	30

APPENDIX 2 --Continued

Subject S. V. Age 12-9 Birthdate 11-3-55

Offense Interference with arrest Sex M Race W

	AIR CONDUCTION											
	RIGHT						LEFT					
Date	250	500	1000	2000	4000	8000	250	500	1000	2000	4000	8000
7-24-68	10	15	15	35	50	5	5	10	10	25	40	0
		15	15	35				10	10	25		
7-26-68	15	15	20	35	50	10	5	10	10	30	40	5
Masking op. ear												
	BONE CONDUCTION											
	RIGHT						LEFT					
	250	500	1000	2000	4000		250	500	1000	2000	4000	
	10	15	15	35	50		5	10	10	30	40	
Masking op. ear												
		HARRIS TEST										
		RIGHT						LEFT				
		500	1000	2000				500	1000	2000		
Ascending		15	15	35				10	10	25		
Descending		15	15	35				10	10	25		

APPENDIX 2 --Continued

Subject D. C. Age 16-8 Birthdate 12-6-51

Offense Burglary Sex M Race W

	AIR CONDUCTION											
	RIGHT						LEFT					
Date	250	500	1000	2000	4000	8000	250	500	1000	2000	4000	8000
7-30-68	10	20	25	35	60	25	15	20	20	30	55	20
		20	25	35				20	20	30		
7-31-68	15	20	25	35	60	30	20	20	20	30	55	20
Masking op. ear												

	BONE CONDUCTION											
	RIGHT						LEFT					
	250	500	1000	2000	4000		250	500	1000	2000	4000	
	10	20	25	35	50		15	20	20	30	50	
Masking op. ear					80							

	HARRIS TEST					
	RIGHT			LEFT		
	500	1000	2000	500	1000	2000
Ascending	20	25	35	20	20	30
Descending	20	25	35	20	20	30

APPENDIX 2 --Continued

Subject J. M. Age 15.2 Birthdate 5-17-53

Offense Runaway Sex M Race W

	AIR CONDUCTION											
	RIGHT						LEFT					
Date	250	500	1000	2000	4000	8000	250	500	1000	2000	4000	8000
7-31-68	20	30	45	55	60	55	15	25	40	50	60	70
		30	45	55				25	40	55		
8-1-68	20	30	45	55	60	60	15	25	40	50	60	70
Masking op. ear												
	BONE CONDUCTION											
	RIGHT						LEFT					
	250	500	1000	2000	4000		250	500	1000	2000	4000	
	15	20	30	35	35		10	20	30	40	40	
Masking op. ear	55	65	80	80	80		60	70	80	80	80	
		HARRIS TEST										
		RIGHT						LEFT				
		500	1000	2000				500	1000	2000		
Ascending		30	45	55				25	40	50		
Descending		30	45	55				25	40	55		

APPENDIX 2 --Continued

Subject M. P. Age 14-4 Birthdate 3-5-54

Offense Runaway Sex M Race W

	AIR CONDUCTION											
	RIGHT						LEFT					
Date	250	500	1000	2000	4000	8000	250	500	1000	2000	4000	8000
8-1-68	10	10	5	5	0	0	35	25	20	10	10	0
		10	5	5				25	25	10		
8-2-68	10	10	5	0	0	0	35	25	20	10	5	0
Masking op. ear												

	BONE CONDUCTION											
	RIGHT						LEFT					
	250	500	1000	2000	4000		250	500	1000	2000	4000	
	5	5	5	0	0		5	5	0	5	5	
Masking op. ear							50	50	55			

	HARRIS TEST					
	RIGHT			LEFT		
	500	1000	2000	500	1000	2000
Ascending				25	20	10
Descending				25	20	10

APPENDIX 3

PURE TONE AUDIOMETRIC ASSESSMENT
OF SUBJECTS SHOWING NONORGANIC
HEARING LOSS

Subject J. W. Age 11-11 Birthdate 8-17-56

Offense Destruction - private property Sex M Race W

	AIR CONDUCTION											
	RIGHT						LEFT					
Date	250	500	1000	2000	4000	8000	250	500	1000	2000	4000	8000
7-25-68	50	60	50	50	60	70	60	65	65	65	70	NR
		50	40	55				50	45	50		
7-27-68	10	15	15	10	15	10	15	15	5	5	15	10
Masking op. ear												
	BONE CONDUCTION											
	RIGHT						LEFT					
	250	500	1000	2000	4000	8000	250	500	1000	2000	4000	8000
	10	10	10	10	15		10	10	5	5	10	
Masking op. ear												

	HARRIS TEST					
	RIGHT			LEFT		
	500	1000	2000	500	1000	2000
Ascending	45	50	45	55	50	50
Descending	50	65	55	65	65	55

APPENDIX 3 --Continued

Subject W. R. G. Age 12-0 Birthdate 7-8-56

Offense Incorrigible Sex M Race N

	AIR CONDUCTION											
	RIGHT						LEFT					
Date	250	500	1000	2000	4000	8000	250	500	1000	2000	4000	8000
7-24-68	60	60	65	60	75	70	0	0	5	5	5	0
		50	50	45				0	5	5		
	0	0	5	0	5							
Masking op. ear												
	BONE CONDUCTION											
	RIGHT						LEFT					
	250	500	1000	2000	4000		250	500	1000	2000	4000	8000
	0	0	0	0	5		0	0	0	5	5	
Masking op. ear												

	HARRIS TEST					
	RIGHT			LEFT		
	500	1000	2000	500	1000	2000
Ascending	55	65	65			
Descending	65	80	75			

APPENDIX 3 --Continued

Subject J. D. Age 12-0 Birthdate 8-9-56

Offense Runaway Sex M Race W

	AIR CONDUCTION											
		RIGHT						LEFT				
Date	250	500	1000	2000	4000	8000	250	500	1000	2000	4000	8000
7-28-68	35	45	45	60	70	70	40	50	50	55	65	75
		40	35	30				25	30	35		
*	15	20	30	30	35	50	20	25	30	25	20	40
Masking op. ear												
	BONE CONDUCTION											
		RIGHT						LEFT				
	250	500	1000	2000	4000		250	500	1000	2000	4000	8000
Masking op. ear												
		HARRIS TEST										
		RIGHT						LEFT				
		500	1000	2000				500	1000	2000		
Ascending		40	40	50				45	55	50		
Descending		55	60	65				60	70	65		

*Threshold responses still unreliable. Subject was dismissed before actual hearing levels could be established.

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