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Title: THE EFFECTS OF PHONOCARDIOSCAN SCREENING AND
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CARDIAC PATIENTS AMONG SCHOOL AGE CHILDREN

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The purpose of this study was three-fold: to determine how the false assumption of an abnormal heart condition affected the lives of false-positive students; the effects of phonocardiogram screening and cardiologist follow-up procedures on delabeled school children; and the effectiveness of the follow-up procedures used in delabeling the false-positive students. A questionnaire was mailed to the parents and teachers of 137 fourth-grade students living in the greater Portland area. These students were classified false-positive through the phonocardiogram screening program conducted as a demonstration project by the Oregon Heart Association during the school year 1969-70. Questionnaires were returned by 74.5 percent of the parents and 80.9 percent of the teachers.

Statistical procedures utilized to analyze the data included parameter analyses to determine common properties descriptive of the population studied; Chi² analyses to determine applicable levels of confidence; and item analyses comparing teacher and parent-child responses within comparable areas. The major findings of this study are summarized in the following paragraphs.

Of the total parent-child respondents, 9.18 percent were restricted in their activities; 66.32 percent were not restricted but had been delabeled as a result of the screening program; and 24.5 percent had been delabeled prior to screening and had not been restricted.

Following delabeling, 77.8 percent of the restricted group were removed from the restricted category, while 22.2 percent were still restricted. The high percent of delabeled students indicates the tremendous benefit derived from the screening program.

Among the restricted group an improvement in academic achievement was noted following delabeling. Of great interest was the fact that 22.2 percent of the respondents indicated that their improvement in academic achievement had occurred following delabeling.

Prior to delabeling 22.2 percent of the restricted group were below average in social acceptance, whereas following the delabeling process all were average or above in this category.

The majority of respondents indicated that the students' school health records did not accurately reflect the current health status of their hearts. Furthermore, 88.9 percent of the delabeled respondents and 55.6 percent of the nondelabeled respondents indicated that the students' health records had not been changed following delabeling. These data reveal a critical need for maintaining more accurate and current school health records.

Although a great diversity of personnel were involved in the follow-up procedure, well over 50 percent of the participating parent-child and teacher respondents indicated that they had not been informed of the screening results. This emphasizes the need for a systematic, organized, follow-up program.

The Effects of Phonocardioscan Screening and
Cardiologist Follow-up Procedures on Delabeled
Cardiac Patients Among School-Age Children

by

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THE EFFECTS OF PHONOCARDIOSCAN SCREENING AND CARDIOLOGIST FOLLOW-UP PROCEDURES ON DELABELED CARDIAC PATIENTS AMONG SCHOOL-AGE CHILDREN

CHAPTER I

INTRODUCTION

The total school health program is commonly divided into three main categories: school health services, school health instruction and healthful school living. These divisions are artificial inasmuch as each aspect is part of the whole and each contributes to the other parts.

In actual practice the various parts merge: school health services contribute to health education and healthful school living; healthful school living becomes possible when school health services provide a healthful environment; health education encourages healthful living and utilizes school health services for educational purposes (21, p. 3).

School health services consist of all those procedures carried out by physicians, nurses, dentists, school administrators, teachers and others to appraise, protect and promote the health of students. Among the specific objectives of the school health services program set forth by the Joint Committee on Health Problems in Education of the National Education Association and the Medical Association, the two most relevant to this study are:

1. To appraise the health status of pupils.

2. To counsel pupils, teachers, parents and others for the purpose of helping pupils obtain needed treatment or for arranging school programs in keeping with their abilities (21, p. 3).

Two procedures basic to health appraisal of school children are the medical examination and various school screening tests which serve as a basis for referral for medical attention. Utilizing the findings of these procedures, health counseling complements and supplements health appraisal and helps pupils and their parents formulate a plan of action which will lead to the solution of a problem.

If the school is to meet its responsibilities, it must be kept informed of health conditions which interfere with the education and total development of the child and the degree to which such conditions obstruct progress. The Educational Policies Commission, in its report of "The Central Purposes of Education", stressed that the school is responsible for maintaining conditions which will allow optimal development of the child. A sick pupil is hampered in learning; therefore, an adequate physical basis for intellectual life must be assured (10).

Origin of the Problem

One of the conditions which may adversely affect the student and his learning ability is an abnormal condition of his heart which imposes upon him a regimen of restricted activity. The American Heart Association suggests that the school has more than a passing

interest in knowing about children who have heart disease, because heart disease has a direct bearing on the learning ability of the child and presents the teacher with unique challenges (27).

When an abnormal heart condition has been medically confirmed and is found to be nonremedial, school programs must be arranged in relation to the student's disability. However, school medical records all too frequently have indicated that certain children have an abnormal heart condition, but medical examination has revealed that the condition is not manifest and, in fact, no longer exists. Such students, erroneously labeled as cardiac cripples, may needlessly have been subjected to a reduced schedule of physical, social and extra-curricular activities. Therefore, the health appraisal aspects of the school health services program must be concerned not only with discovering undetected heart abnormalities among school children, but must be equally concerned with the detection of normal heart conditions among children labeled cardiac cripples. The problem then becomes one of delabeling the child as a cardiac-handicapped individual and restoring him to a normal regimen of physical activity.

Louis DeBoer, in his discussion of the "Application of Screening Methods for the Detection of Heart Disease in Children" states:

As the program progressed, it became apparent that case finding in heart disease offered a second area of service: the identification of the child who has been labeled a cardiac cripple and who is found on second screening to have no detectable evidence

of heart disease. In some cases, the erroneous labeling of a child may result from a misdiagnosis which, unfortunately, stagnates the child. In other cases, it may have come about where a child was stricken with acute rheumatic fever accompanied by an inflammation of the heart, or carditis. At the time of the acute phase of the illness, a murmur may actually have existed. Often after the acute phase subsides the carditis disappears and with it goes the murmur (7, p. 45).

Screening tests, although not diagnostic, provide a preliminary evaluation of the state of development of functioning of various body organs as a basis for referral to a physician for medical evaluation and treatment if indicated. Such tests have become routine procedures in the health appraisal aspects of most school health service programs. Screening tests are regarded to be beneficial in that they may uncover health problems not identified by observation of pupil appearance and behavior; they may be administered in the interim between medical examinations, which, in some cases, is a matter of years; they may be administered to large groups of children in a relatively short period of time; and they may be administered by teachers, nurses, parents or technicians, thus saving the limited time of the physician.

While there is no substitute for an adequate medical examination, increasing demands upon physicians' services leave less time for adequate medical examination. With the steadily increasing patient-physician ratio, the need to find new methods for relieving the physician of time-consuming programs becomes more acute. In

addition, many school children live in small towns and rural areas where the services of a specialist, such as a cardiologist, are not conveniently available. Even in more urban areas where a cardiologist is more likely to be available for mass screening of large groups of school children, the length of continuous time he can devote to cardiac auscultation is limited by auditory fatigue.

One of the means of conserving the physician's time is the computerized mass screening of the heart by a trained technician using an electronic device called the phonocardioscan described in Chapter II.

Phonocardioscan screening has two major objectives: 1) to discover heart abnormalities previously undetected; and 2) to identify those children whose school health records indicate they have a heart abnormality when in reality no such condition is manifest. Such children are referred to as false-positives.

It is emphasized that the phonocardioscan is merely a screening device. Confirmation of the presence or absence of a heart abnormality is the province of the cardiologist in the follow-up procedures subsequent to mass screening.

The Need and Purpose of This Study

A review of the literature has revealed several articles pertaining to phonocardiogram screening programs in various schools, but little has been studied relative to the inverse benefits of mass heart screening. Inverse benefits refer to delabeling the false-positive cases; i. e., children whose school medical records indicate an abnormal heart condition, but neither the phonocardiogram screening nor the cardiologist follow-up examination revealed the presence of such condition. These false-positive children may go through life being treated as a cardiac handicap when in reality they should be exposed to the full activity pattern characteristic for their age group from childhood through the adult years. The limitation placed upon some children may be small; nevertheless, it is a restriction placed upon them needlessly.

Emphasis has been placed upon the constructive use of physical activity to enhance physical and mental growth and development. It is difficult to place a value on the benefits to be derived from restoring a previously restricted child to the realm of normal and allowing him to become exposed to the full benefits of a rigorous schedule of physical activity. Dr. Charlotte Ferencak stated:

At a time when the beneficial circulatory effect of exercise is emphasized again and again by the internists, the tendency to correlate and associate cardiac evaluation of the children with restriction

of physical activity is to be regretted. Pediatric cardiologists have always taken the lead in emphasizing the rarity in the pediatric age group of cardiac disorders in which strenuous activity may indeed be harmful (14, p. 483).

During the school year 1969-1971, the Oregon Heart Association, in cooperation with a noted cardiologist in the Pacific Northwest, conducted phonocardioscan screening and cardiologist follow-up programs on a demonstration basis in selected areas throughout the state. One such program was conducted in Portland, Oregon, where 5000 fourth-grade students from 55 schools were screened and subsequently examined by the cardiologist. Among the 5000 participating subjects, 153 students were classified as false-positive cases following phonocardioscan screening and cardiologist follow up.

The Oregon Heart Association is concerned about how the false assumption of a heart condition has affected the lives of these students as well as the effects on these children of the delabeling aspects of the program in restoring them to a full program of physical, social and extra-curricular activities. Although published reports of phonocardioscan screening and cardiologist follow-up programs in schools make reference to the inverse benefits, no research has been carried out to study the effects of these procedures on delabeled cardiac patients among school-age children. It cannot be assumed that merely being informed that a heart condition does

not exist will suffice to bring about acceptance of the fact and the restoration of the child's regimen to one of normal activity. Many factors must be explored and many questions must be answered before such an assessment can be made. For example:

1. How has the false assumption of a heart condition affected the lives of the false-positive students?
2. What limitations had been placed on the child's physical, social and extra-curricular activities in the home and in the school? How were these limitations supervised?
3. What methods were used to inform the child and the parent that no heart abnormalities were now present? Which of these methods was most effective?
4. How has the delabeling information been received by the false-positive students, their parents, teachers and peers?
5. What school adjustments have been made relative to the child's physical, social and extra-curricular activities since the delabeling occurred? How have these adjustments affected the lives of the delabeled students?

6. What measures have been taken by the school to help bring about resumption of normal activity for the delabeled children?

Statement of Problem

The purpose of this research study is three-fold:

1. To determine how the false assumption of a heart condition affected the lives of the false-positive students.
2. To determine the effects of phonocardiogram screening and cardiologist follow-up procedures on delabeled cardiac patients among school-age children.
3. To determine the effectiveness of follow-up procedures used in delabeling the false-positive students and the relative effectiveness of the various methods.

Limitations of This Study

The subjects for this study are limited to 153 fourth-grade students from 55 schools in the Portland, Oregon, area who were classified as false-positive cardiac cases following phonocardiogram screening and cardiologist follow-up. The false-positive students

were screened from a total of 5000 fourth-grade children who participated in the program.

Basic Assumptions

It is assumed that:

1. The fourth-grade students in the Portland, Oregon, area are representative of this age group throughout the country.
2. The 55 schools involved in this study were adhering to the school policies relative to physical education activities recommended by the Oregon State Board of Education.
3. Data gathered from parents, teachers, and children reflected the true experiences and activities of the student.
4. The abnormal heart condition of the false-positive students had been reported to the school and that the teachers directly responsible for these students had been adequately informed.
5. The students labeled false-positive had been limited to some degree, prior to the phonocardiogram screening, in their participation in physical, social and extra-curricular activities.

6. The results of the phonocardioscan screening and cardiologist follow up had been made available to the child, his parents, teachers and other school personnel.
7. A program of reactivity has been instigated to involve the false-positive students in a normal pattern of activity at school as well as in the home.

Sources of Data

Oregon Heart Association

The Oregon Heart Association provided the following data obtained during its 1969-70 phonocardioscan screening and cardiologist follow-up demonstration program in the Portland, Oregon, area:

1. The names and addresses of the 153 false-positive students and their parents.
2. The names of the schools attended by these false-positive students along with the names of the respective students' fourth-grade teacher.

An outline of the mass heart-sound screening demonstration project of the Oregon Heart Association which provided the basis for this study is presented in its entirety in Appendix E. This material outlines the purpose and objectives of the project; the

procedures used, and the responsibilities of the cooperating agencies and professional groups.

Oregon State Board of Education

As a basis for the development of the questionnaire, a guide developed by the Oregon State Board of Education was used which recommends the kinds of activities appropriate for a particular degree of exertion; i. e., no exertion, mild exertion, moderate exertion, and vigorous exertion (30).

Questionnaire Instrument

Data for analysis were obtained by use of a questionnaire (Appendix D), a copy of which was completed by the child and parent and another by the student's teacher.

Procedure for Collection of Data

Step One. A pilot study was conducted involving 20 students, ten of whom were personally interviewed and ten who received the questionnaire by mail. The completed questionnaires from these two groups were studied and compared to help in the refinement of the questionnaire.

Step Two: One copy of the refined questionnaire was mailed to the remaining false-positive children and their parents for completion, and another to the student's teacher. The cover letter

accompanying the questionnaire was prepared in cooperation with the Oregon Heart Association to indicate this agency's endorsement of the study and urging prospective respondents to participate.

Step Three. A follow-up letter, also prepared in cooperation with the Oregon Heart Association, was sent at the end of the second week following the initial mailing to those who had not responded to the questionnaire.

Definition of Terms

In order to facilitate a better understanding of the terminology contained within this study, the following terms have been defined:

1. School health program - This program is commonly divided into three interrelated parts; health education, healthful school living and school health services.
2. School health services - Procedures carried out by physicians, nurses, dentists, teachers, and others to appraise, protect and promote the health of students and school personnel.
3. School health instruction - The process of providing learning experiences which favorably influence understanding, attitudes and conduct relating to individual and community health.

4. Healthful school living - A phrase that embraces all efforts of the school to provide physical, emotional, and social conditions which are beneficial to the health and safety of pupils.
5. Health counseling - The procedure by which physicians, nurses, counselors, teachers and others interpret to pupils or parents the nature and significance of a health problem.
6. Health appraisal - The process of determining the total health status of a pupil (21, p. 9).
7. Restricted activity - A confinement or limitation imposed to reduce the child's participation.
8. Nonremedial - Not subject to complete correction or restoration.
9. Cardiac cripples - Students subjected to a reduced schedule of activity as a result of an abnormal cardiac condition.
10. Delabeling - Removing any imposed restrictions or limitations placed on a student presumed to have an abnormal heart condition and exposing him to a full schedule of activity.
11. Cardiologist - A person specializing in the diagnosis and treatment of abnormal heart conditions.

12. Phonocardioscan - A computerized, portable, analog, digital, heart-sound screening machine which analyzes the precordial sounds of the standard auscultatory areas of the chest.
13. False positives - Children whose school health records indicate they have a heart abnormality when in reality no such condition is manifest.
14. Cardiac auscultation - The act of listening for sounds within the upper body in order to determine the condition of the heart.

CHAPTER II

REVIEW OF THE LITERATURE

The effects of phonocardiogram screening on delabeled cardiac students must be considered in relation to all other parts of the total school health services program, particularly the methods for health appraisal, the policies and procedures for follow up of the appraisal findings, and the maintenance and use of current school health records. Therefore, in reviewing the professional literature, attention was given not only to phonocardiogram screening in particular, but also to these aspects of the school health service program in general.

Importance of Heart Screening and Delabeling

National groups concerned with both health and education, such as the Educational Policies Commission (10), the Joint Committee on Education of the American Medical Association and the National Education Association (21) and others (22), have long recognized the need for good health if the student is to reap the full benefits of an educational program.

Basic to good physical health is the development and functioning of the heart which, in turn, significantly influences physical, social, emotional and intellectual development. It is imperative, therefore,

that parents and school personnel be aware of any abnormal heart conditions among children and take such knowledge into account in planning educational programs. Likewise, it is equally important for parents and school personnel to know which children are falsely labeled as having an abnormal heart condition. Such children are needlessly deprived of exposure to the fullest regimen of activity for optimal growth and development. In this regard it is well documented that many school children have, at some time in their lives, been diagnosed to have a heart murmur. In many cases the murmur is regarded as innocent or insignificant. Feinberg stated that:

Murmurs may be due to (1) congenital defects, (2) rheumatic fever and, (3) no disease: murmurs with no apparent disease are referred to as insignificant, functional or innocent.

(1) Congenital defects. Usually, early in the child's life, parents learn that there is a congenital malformation of the heart. The so-called "blue baby" has a congenital defect in his circulatory system. Because of the defect, much of the blue blood from the right side of the heart mixes directly with the bright red blood from the left side of the heart, without first becoming pink as it would have, had it circulated promptly through the oxygen-filled lungs. This is a serious and disabling defect. But thanks to modern heart surgery, many "blue babies" can now be completely cured. Others are helped to the extent that, with few or no restrictions, they can attend school. Many youngsters who are not "blue babies" but who do have other congenital defects, are not as seriously disabled. Their school routine must be adapted to the nature and severity of the heart condition; very often an almost normal school program can be followed.

(2) Rheumatic fever, which attacks most frequently those in the four-to-fifteen-years age group, is the most common cause of heart disease in childhood

and adolescence. As a rule, parents know if there has been any heart involvement. Many rheumatic fever patients recover fully. In the past fifteen years, it has been my happy experience to find apparently normal hearts-without-murmurs in many children who have had rheumatic fever with significant murmurs two or three years earlier. Often, murmurs which persist have normal findings and are compatible with normal activity, including competitive sports.

(3) The third, and by far the largest group of heart murmurs, is often referred to as potential heart disease or possible heart disease. Most of the children in this group have normal hearts. Numerous medical studies indicate that 40-50% of normal children have, at one time or another, innocent or insignificant murmurs (13, p. 140).

Thus, it is apparent that a great many students in the general school population may benefit from mass heart screening.

In addition to detecting abnormal heart conditions not previously diagnosed and continuously evaluating those who are confirmed heart patients, heart screening is of value to the greatest number of students in that it permits identification and delabeling of those whose health records indicate the presence of an abnormal heart condition when in reality no such condition exists. It is imperative that the 40 to 50 percent of the school children referred to by Feinberg be identified, delabeled and restored to a normal regimen.

The importance of people understanding the term innocent murmur and properly conveying this understanding to their children and others associated with them is stressed by Walker. He stated:

. . . a cardiac murmur, no matter how innocent it may prove to be, has considerable importance in the mind of the patient, his family, or both. It is the duty of physicians to provide an adequate explanation for the murmur or to reach a decision as to its benignity. If this is not possible, the parents should be reassured that nothing will be lost by delaying further investigation and clarification of this finding. If this reassurance cannot in all fairness be given, then it is advisable for everyone's peace of mind to seek further opinion and possibly request more detailed investigation. It is surely a greater error to diagnose cardiovascular abnormality in the presence of a normal cardiovascular system than it is to call an abnormal heart normal. If this attitude of mind prevails, much unnecessary suffering and worry can be avoided (32, p. 201).

The reassurance emphasized by Walker can be of vital importance particularly to those children labeled as heart disease patients when the abnormal condition no longer exists.

The importance of identifying and restoring these falsely-labeled children to the role of the normal child is further strengthened by statistical information provided by Abrams. He stated:

While many cases of innocent murmurs are being diagnosed as organic, when in fact restrictions and prophylaxis are unnecessary, physicians are becoming increasingly more skilled in this aspect. This is a large problem. De-labelling (SIC) is one of the aims of accurate diagnosis. Friedman and Wells selected 4599 children 6-18 years who had been examined by school doctors and private doctors. Of these, 1464 were diagnosed by the doctors as having organic heart disease or questionable heart disease. On re-examination by a cardiologist and drawing on a past history and some parent interviews, and on blood pressures, only 25.9 percent were found to have heart disease. There was an overdiagnosis of 4 to 1 (1, p. 62).

Need For Mass Heart Screening

According to Heinkoff, the need for screening school children to detect heart disease has been recognized since 1915. It was in that year the Association for the Prevention and Relief of Heart Disease was organized. This organization enlisted the cooperation of the New York City Board of Education to study the problems of heart disease in school children. The primary screening was done by the principals and teachers and children suspected of having any cardiac defects were referred to the examining physician (9). Recognizing the many responsibilities placed upon teachers and administrators, it is highly impractical to assign this task to educational personnel.

Since 1915 it has become increasingly impractical for the physician to perform the initial screening for thousands of apparently well school children. While there is no substitute for an adequate medical examination, increasing demands upon physicians' services leaves less time for adequate medical examinations. With the steadily increasing patient-physician ratio, the need to find new methods for relieving the physician of time-consuming programs becomes more acute. In addition, many school children live in small towns and rural areas where the services of a specialist, such as a cardiologist, are not conveniently available. Even in more urban areas where a cardiologist is more likely to be available for mass screening

of large groups of school children, the length of continuous time he can devote to cardiac auscultation is limited by auditory fatigue. One of the means of conserving physicians' time is the computerized mass screening of the heart by a trained technician using the phonocardiogram.

The Phonocardiogram Screening Device and Procedure

Mass heart-sound screening is conducted by a trained technician through the use of a portable, analog, digital computer referred to as the phonocardiogram (8). This instrument is designed to analyze heart beats to differentiate normal from abnormal heart sounds and intervals. Through the use of this machine instant visual readouts of suspicious sounds in excess of the prescribed limits can be received. Judge described the instrument as follows:

The phonocardiogram is a heart sound screening aid weighing about 18 pounds and housed in an aluminum package roughly about the size of an attache case.

This unit analyzes the precordial sounds through a microphone placed sequentially on the standard auscultatory areas of the chest. An electrocardiogram (ECG) lead is used for timing and the sounds are examined on the beat-by-beat basis for pathologic systolic and diastolic murmurs and widely split second heart sounds.

All information is presented in digital form by means of miniature counters. No interpretation is required on the part of the operator. A patient can be examined in two to three minutes (23, p. 21).

The screening, carried out in reasonably quiet and private quarters, is conducted by a trained technician. The technician places the microphone on the chest of the child in the supine position, waits while the phonocardioscan audits the selected number of cardiac cycles at the four successive precordial locations, and notes whether or not the phonocardioscan rejects the student's heart sounds at any of the four precordial recording sites: 1) the apex or point of maximal impulse, or if not visible or palpable, the fifth left intercostal space in line with the left nipple; 2) the fourth left intercostal space; 3) the third left intercostal space; and 4) the second left intercostal space (24).

Merits of Phonocardioscan Screening

The phonocardioscan method for the detection of abnormal heart conditions has a number of advantages to recommend it. First, with the ever-increasing patient-physician ratio, it becomes imperative to alleviate the physician of duties that can be performed by a less-trained person. In fact "the heavily-burdened schedules of presently available medical personnel and the costs involved for trained physicians . . . precludes detection by auscultation of large populations." (24) Caceres stated that:

If a computer can provide service to a physician, it will reduce the number of training hours necessary for proper use of observer instruments. It will permit

the physician to examine more information more intensively and with a degree of uniformity. It is also practical to suggest that use of a computer in this fashion to process selected objective data can sharpen the physician's diagnostic capabilities and result in better care for his patients (3, p. 592).

In addition, since a large majority of school children are found to be within normal limits by use of the phonocardioscan, only a small percent would need to be examined by the physician for final diagnosis and confirmation of the screening results. Another advantage of phonocardioscan screening is that the instrument used may be operated by a trained technician with no particular training or background in the medical or nursing disciplines. This would be invaluable in the less urban areas where the services of a cardiologist are not conveniently available. In such cases, an alternative would be to conduct the phonocardioscan screening and refer those children who need medical evaluation to a cardiologist or arrange for the heart specialist to schedule a clinic accessible to the children.

Dennison describes the groups of children who would be benefitted by the heart sound screening. He stated:

The incidence of heart problems in school children, approximately 10 cases per 1,000 children, underlines the need and importance of mass heart screening programs in our schools. A major objective of such a program is to identify previously undetected cases of heart disease. Studies indicate that about 40% of referred case findings are new cases. Other objectives of heart screening programs are to locate children who have had a heart disease and have strayed from appropriate medical care and to identify children

that were falsely diagnosed as having heart disease. In order to fulfill these objectives a coordinated community effort is needed (8, p. 348).

The benefit of detection and removal of any stigma needlessly carried about by a falsely-labeled child is further supported by Heinkoff. He stated that the screening device can be designed to identify children who carry a false diagnosis of heart disease which allows for delabeling of such children and rehabilitation both physically and psychologically. He further stated that "the number of such children delabeled by some programs has equalled or surpassed undetected organic disease identified by the same program" (19, p. 380).

All too frequently, the full value of screening tests are overlooked. As Eisner stated:

A single test can have four (4) outcomes, depending on whether the test itself is positive or negative, and whether the person examined has or does not have the condition for which he or she is examined. First, the test may be positive in a person who actually has the condition. Second, the test may be negative in a person who does not have the condition. In both situations, the test has given a correct answer. In two other outcomes, the test does not give the correct answer. One type of error is the false positive test in a person who does not really have the condition, the other is the false negative test in a person who does have it (11, p. 241).

Studies Supportive of Phonocardiogram Screening

Although the literature reports descriptive programs of phonocardiogram screening in schools and the benefits to be derived therefrom, no research has been reported which deals with either the follow up of phonocardiogram screening programs or the effects of the delabeling process upon school-age children. With reference to one such study conducted in the Sacramento Unified School District, Gaylor stated that:

During the 1967-68 school year, 3,518 fourth-grade children in the Sacramento Unified School District were screened for heart disease with use of the phonocardiogram, a portable analog-digital computer. Machine positive, a technically unsatisfactory result occurred for 475 children and false negative results for two.

Of 161 children for whom a history of rheumatic fever, heart disease or murmur had been reported, 145 were found to have no present evidence of these conditions. In an effort to "delabel" the children with "nondisease", a letter was sent to the family physicians which pointed up the value of removing the stigma of falsely labeling the child with heart disease (17, p. 479).

In a similar study, also conducted in Sacramento, it was found that 302 children no longer had heart conditions which could curtail their activities. This prompted school officials to conclude that:

An inverse benefit of mass screening is that many children thought to have heart diseases are freed from worry. These youngsters either had been diagnosed incorrectly as having a heart disease or as having a heart condition that was

present earlier but no longer exists. Many children assumed to have heart disease are forced to live according to a restricted routine when they could be leading the normal wear-and-tear life of childhood (20, p. 27).

The number of delabeled persons varies among different studies. However, regardless of the number, the fact that a person had been alleviated from the suspicion of an abnormal heart condition is of great value. Durnin found an interesting contrast to the two Sacramento studies referred to above. He stated that:

Of 3,797 school children analyzed by a new portable analog digital computer, one girl in this study is in the process of being delabeled. This youngster has a history of rheumatic fever but has no evidence of rheumatic heart disease and in the past she had been restricted in her activities (9, p. 115).

In summary, the review of literature indicated that the need for cardiac evaluation of school children is recognized by both medical and educational professions. With limited medical personnel, particularly cardiologists, mass-heart screening utilizing the technician-operated, phonocardioscan device has many advantages to recommend it. While such a device detects abnormal heart conditions, its greatest value, in terms of numbers of children, is in locating students who are falsely labeled as cardiac patients. These students need to be identified, delabeled and restored to a normal regimen.

Other Aspects of School Health Services

Since heart screening and follow-up programs represent only one aspect of the school health services, the review of literature was expanded to include school health examinations, health records and general follow-up procedures. Of particular interest were the values, the effectiveness and the problems associated with these aspects of the school health service programs.

School Physical Examination

With reference to the physical examination, Eisner stated that studies show that school physicians spend most of their time examining children without finding previously undiscovered illness (12). In support of this, Wagner and his co-workers found that doctors spent two-thirds to three-fourths of their time doing routine physical examinations, but only five to ten minutes were spent on each child (11). Eisner stated that physicians in private practice tend to consider the routine, required school examination as an unimportant bureaucratic requirement. Other deficiencies in the school physical examination program discussed by Eisner are that parents are rarely present; consequently, histories are not taken. He also indicated that medical examinations are an ineffective, case-finding mechanism and a dubious educational experience. Eisner concluded that:

Medical examinations of elementary school children is an effective case finding mechanism, and a dubious educational experience.

The price of detection of a rare disease by this method is high -- too high for the school program -- in relationship to the small and questionable advantage . . . The routine periodic physical appraisal has definite limitations with respect to detecting serious disease, as a method for giving health education and as a means for effective detection of mental health problems. This should not imply that the physical health appraisal is without value, but that it is used inappropriately (11, p. 20).

It is evident that a re-evaluation of the health examination process is necessary and that some of the age-old concepts taught in health classes for prospective teachers be re-examined in light of their value as an educational experience.

Without parents present to provide information it becomes impossible to complete the case history. A cursory and inadequate examination can create within a person a false sense of security since an abnormality may have been present but not discovered. The fact that the student has just undergone an examination may lead him to believe that nothing is wrong, and therefore he need not pursue the matter further.

In support of these inadequacies, Frary writes that, in effect, the examinations may not be serving all of the purposes for which they have been given lip service these many years. She indicated that little support had been provided for some of the time-honored approaches to school health. Among these are the following: that

health impairments adversely affect scholastic performance; that teachers are best able to estimate the health status of the child; that failure of parents to seek medical aid for their children is largely a product of insufficient medical facilities and service; and that because health records contain medical information they must be examined only by professional health personnel. Frary concluded that:

One hundred years after periodic examinations were first recommended as a means to uncover causes of ill health, doctors are still not in complete agreement as to their value, except perhaps in the early detection of disease. The periodic examination as practiced by many institutions may be a waste of physician's time, may produce a false sense of security and accomplishments, and may when ineffective, produce only a volume of statistics (15, p. 209).

In support of Frary's comments regarding the possibility that health records may become only a volume of statistics, Bruyan stated:

I am convinced that all health professionals and educators must understand that as the trust of the individual in the confidential nature of his relationships to his medical resources deteriorates, so also will the quality of the information. The judgment of the professional and eventually the health program itself will become a meaningless flow of paper and ink, aimlessly drifting back and forth between frustrated, conscientious people, who have ceased to be effective in relating health to the educational process (2, p. 166).

It is evident that to prevent further deterioration of the health examination, as well as the inadequacy of health records, a much closer look must be taken at the health program to more fully meet the goal for which it was intended and reverse any effect of deterioration which is now apparent.

School Health Records

Another problem prevalent in school health services is the incompleteness, the lack of currency, and the ineffective use of school health records. Appropriate use of school health records is being affected by many of the same problems which are confronting other areas of the educational system. Among these are lack of educational and health service personnel, inadequate financial support, and increased responsibilities of administrators and teachers. To help alleviate these problems, a broad base of public understanding and support is needed. Schneeweis, recognizing the pressure of today's educational problems, made reference to the stacks of health records piled high in the basement of schools. He stated:

At a time when our nation's educational need is at its greatest, when we are doubling class sizes, tripling school sessions and making gallant efforts to upgrade education on all levels, there stands a testimony to the waste of valuable time. Skilled teachers, school doctors, school nurses, clerical help and large sums of money were invested in an effort which did not provide a full return for the investment made (28, p. 349).

Another problem relative to health records is the fact that they do not accompany the student from one school to another. Rosner stated that, as a result, a new medical record is initiated which may be seriously lacking in previously collected, accurate information (26).

For maximum efficiency, school health records must be complete, current and available for use by authorized personnel. The need exists for assignment of individual responsibilities for the maintenance of current school health records.

General Follow-up Procedures

Referral and follow up are two aspects of the screening program which show great need for improvement. The program is of little or no value if people concerned with the growth and development of the child are not aware of the findings. If the screening does not result in rehabilitation, or correction, when necessary, the total program becomes a waste of time for all involved.

According to Ratcliff, the follow up usually takes place after a doctor's physical examination of the child, a screening program or an observation by the school nurse or teacher. This follow up involves discussing the results with the parent and child and arriving at alternatives for courses of action which lead to correction of existing problems (25). The best way to insure an adequate follow

up is through preplanning the necessary procedures prior to program implementation.

An important aspect of the follow up is a conference of those persons responsible for the health of the student. Essentially, the conference is a guidance procedure in which the counselor, teacher, nurse or other person serving in this capacity is responsible for bringing about an interchange of ideas and helping to formulate them into a purposeful course of action. According to the Joint Committee on Health Problems in Education of The National Education Association and the American Medical Association, follow-up procedures should be designed to achieve the following purposes:

1. To give pupils as much information about their health status, as revealed by health appraisal, as they can use to good advantage.
2. To interpret to parents the significance of health conditions and to encourage them to obtain needed care for their children.
3. To motivate pupils and their parents to seek needed treatment and to accept desirable modifications of their school programs.
4. To promote each pupil's acceptance of responsibility for his own health, in keeping with his stage of maturity.
5. To encourage pupils and their parents to utilize available resources for medical and dental care to the best possible advantage.
6. To encourage, if necessary, the establishment or enlargement of treatment facilities for pupils from needy families.

7. To contribute to the health education of pupils and parents.
8. To obtain for exceptional pupils educational programs adapted to their individual needs and abilities. (21, p. 111).

It is stated in the manual of health services developed by the Oregon State Board of Education and the Oregon State Board of Health that:

The ultimate objective of health appraisal is twofold- to secure correction of defects insofar as possible and to provide an educational experience. The success of such a program may be gauged by the pupil's use of health knowledge as well as by its direct value in protecting and promoting health. Diagnosis that is not followed by remedial action is a clear indication of failure to protect and promote the health of the school child. Therefore, to secure maximum benefit there must be an effective plan for follow-up (22, p. 18).

As in most other aspects of the total educational program, school health programs are seldom ideal and sometimes fall short of the desired goals. This, all too frequently, is the case with the school health referral and follow-up program. With reference to this inadequacy, Gibson stated:

The annual reports of health services often indicate "5000 children screened 100 referred ...". This is frequently where the information ends. Shouldn't there be information regarding the number of these children who receive the necessary treatment (18, p. 431).

Another aspect which should indeed be recorded on the health record is the possible need for a periodic re-evaluation of the student. This can be of great value and benefit in the continuous assessment

of the health status of a child known to have a health problem.

The failure of parents to act upon the referrals has caused concern among persons involved in the school health program. Cauffman has done a considerable amount of study related to factors which affect the outcome of referrals. He determined that children whose parents were in the higher social ranks were more likely to receive attention. Other conditions cited by Cauffman relating to whether or not student receive treatment are age of parent, urgency of care, and method of referral used. He found that older parents provided more care for their children; children receiving high urgency ratings received more care than others; and parents contacted by more than one referral technique were more likely to secure treatment for their children. Also, insurance seemed to be a factor. Thirty-eight percent of uninsured children received treatment compared to 52 percent of insured children (14). In support of this study, further research by Cauffman and others reported that 72.9 percent of the parents contacted by telephone obtained professional care for their children. Of parents being informed by personal visitation, 66.6 percent obtained professional care, while only 27.0 percent of those parents notified by written notices secured help for their child (15). No apparent reason was given as to why the telephone seemed superior by 6.3 percent to the personal visitation; however, both displayed great superiority

over the written notice.

In a third study, Cauffman and others determined that there are several factors which determine the degree to which follow up of students is carried out. Some of their findings support their earlier research in that a higher percent of treatment was received by the child if the parents were notified by more than one notification; if parents were motivated by more than one person; and if the parents were notified by more than one contact technique (16).

Gabrielson also conducted a study on school health follow up and found that:

Fathers and mothers who were surprised or worried, alarmed or frightened, curious or impressed by the school's efficiency, were somewhat more likely to seek help than those "annoyed by the school's interference", or "not interested because I already know about the problem". Also when parents agreed as to what should be done, it was more likely that professional help would be obtained. Health action was taken 81.3 percent of the time with agreement and only 56.2 percent without agreement (13, p. 51).

In summary, the literature review reveals a great need for more thorough physical examinations in the health appraisal of school children to prevent the feeling of false security, to relieve unnecessary anxiety and to prevent further deterioration of the school health program. Improvement of school physical examinations is futile unless policies and procedures are established to assure accurate maintenance and profitable use of school health

records. Health records, in turn, are of little value unless the information obtained is appropriately used as a basis for assessing health status and directing the concerned individuals to sources for alleviating the problem where indicated.

CHAPTER III

PRESENTATION AND ANALYSIS OF RESULTS

In analyzing the data of this study, the following statistical procedures were used: one, the tabulation of responses is given in a parameter analysis to determine common properties descriptive of the population studied; second, χ^2 analysis was calculated within applicable areas in order to determine levels of significance in conditions of change or alteration; and third, an item analysis comparing teacher and parent-child responses within comparable areas. All data pertaining to this study were obtained from the three-section questionnaire presented in Appendix D.

Results of The SurveyOverall Responses to The Questionnaire

Of the 153 students classified by the Oregon Heart Association as being false-positive, 137 were found to be still residing in the greater Portland area at the time the study was conducted. All 137 students and their parents received the questionnaire. One hundred and two, or 74.5 percent, returned the questionnaire. Of these, four were not completed but were accompanied with a note stating that their child did not have an abnormal heart condition and that a mistake in the records must have been made, either by the school

or the Oregon Heart Association. However, the overall result of the parent-child questionnaire return was excellent and indicated a concern from this special interest group.

The false-positive students were dispersed throughout schools in the greater Portland area and involved 69 teachers in charge of the participating students during the time the screening program was being conducted. Each of the 69 teachers received a questionnaire. Fifty-four, or 80.9 percent, of the teachers returned the completed questionnaire. The overall result of the teacher questionnaire was excellent and indicated a concern from the teacher regarding the health of the students.

A questionnaire was also sent to each school nurse serving the 55 schools. Practically no information was received from these nurses. Some indicated they were not involved in the study and could not provide information in addition to that which the teacher had already provided; others stated that they were new to the school system; and still others indicated that the records apparently had been transferred with the children to other schools.

Restriction of The False-Positive Students

The pilot study revealed that a high percentage of the false-positive students had not been limited in their physical activity. Some of the students in the pilot study also indicated that even though

they had undergone the screening program, they had been diagnosed previously as having no abnormal heart condition of any nature. In order to clarify this issue an additional question was included in the questionnaire to determine if, in fact, the student had ever been informed by his physician prior to the screening program that no abnormal condition was present.

Of the 102 questionnaires returned, four were not completed leaving 98 to be tabulated and analyzed. Of the 98 involved in the study, nine of the parent-child respondents, or 9.18 percent, indicated they had been restricted in their physical activity. Sixty-five, or 66.32 percent, indicated that they had, in fact, been delabeled through the screening program. Twenty-four, or 24.5 percent, of the parent-child respondents indicated they had been examined previously and were found to have no abnormal heart condition. These were not delabeled through phonocardioscan screening. The total respondents, tabulated in Table I, were divided into the following groups: group one (delabeled-restricted), composed of students who had a history of an abnormal heart condition and had restrictions placed upon them; group two (delabeled-nonrestricted), composed of students who had a history of an abnormal heart condition but had no restrictions placed upon them; and group three (nondelabeled-nonrestricted), composed of students who had a history of an abnormal heart condition but who were delabeled, or diagnosed as cured, and

TABLE I. Category of Respondents on the Basis of Restrictions and Delabeling.

Category	Respondents	Percent
Delabeled-Restricted	9	9.18
Delabeled-Nonrestricted	65	66.32
Nondelabeled-Nonrestricted	24	24.5

had no restrictions prior to the screening program. Throughout this study the subjects will be referred to as group one (delabeled-restricted); group two (delabeled-nonrestricted); and group three (nondelabeled-nonrestricted).

Inasmuch as the questionnaire was designed to determine the condition of the child prior to and following the screening, it was structured into three sections: section one was concerned with the activity of the child prior to the screening; section two pertained to the child's condition following screening; and section three dealt with follow up and general information. For the sake of clarity the sections will be referred to hereafter as one, two and three.

Section One of The Questionnaire - Prior to Delabeling

Questions 1 through 4 were concerned with the physical activity of the student during school hours. All nine respondents of group one indicated they were restricted, whereas none of the respondents of groups two or three was restricted. The degree of restriction is shown in Table II.

TABLE II. Degree of Restriction in General Play and Physical Education.

Exertion allowed in general play	Percent	Exertion allowed in physical education	Percent
No exertion	11.1	No Exertion	11.1
Mild Exertion	44.4	Mild Exertion	55.6
Moderate Exertion	33.3	Moderate Exertion	22.2
Vigorous Exertion	11.1	Vigorous Exertion	11.1

In both general play and physical education it is evident that the majority of the students were restricted to mild exertion and a high percent were limited to moderate exertion. It is also interesting that 11.1 percent, although restricted, were allowed to participate in vigorous activity.

Questions 5 and 6 were concerned with the student's activity. Of the nine respondents of group one, 66.7 percent indicated they were restricted, but 33.3 percent indicated no restrictions. Neither groups two (delabeled-nonrestricted) nor three (nondelabeled-nonrestricted) indicated any restrictions. Table III indicates the activities from which the students were restricted.

Eleven and one-tenth percent failed to answer this question. Part of group one (delabeled-restricted) completed more than one answer with 11.1 percent indicating they were also restricted from

TABLE III. Type of Activities From Which the Restricted Students was Limited and a Percent Analysis.

School Activities	Percent
Climbing Stairs	11.1
Dancing	22.2
Field Hikes	11.1
Other	44.4

field hikes and another 11.1 percent being restricted from "other". An item analysis indicated that "other" was filled in as walking or running long distances, with some vague references to physical education activities. The above information indicated that most students were restricted in those school activities involving stress situations such as long distance walking or running, while 22.2 percent were restricted in dancing.

Questions 7 and 8 were concerned with cautioning the student to refrain from school and physical activities. One hundred percent of group one (delabeled-restricted) indicated caution. None of groups two (delabeled-nonrestricted) or three (nondelabeled-nonrestricted) was cautioned. Table IV indicates the percent of students cautioned and the individuals providing caution.

TABLE IV. Percent of Students Cautioned and Person or Persons Providing Caution.

Cautioned By	Percent
Physician	22.2
Parent or Guardian	22.2
Physician and Parent	55.6

From the above information it is evident that the majority of the restricted respondents were cautioned by the physician and parent, while only 22.2 percent were cautioned by the parent and/or physician individually.

In order to determine if restrictions due to abnormal heart conditions had any effect upon classroom participation, academic achievement or social acceptance, an item analysis was carried out for each of these categories for group one (delabeled-restricted). Students in groups two (delabeled-nonrestricted) and three (non-delabeled-nonrestricted) displayed no limitations in these categories, thus no comparison could be made in the above-mentioned areas.

Questions 9 and 10, concerned with the student's classroom participation, showed that the majority, or 77.8 percent, of group one (delabeled-restricted) perceived themselves as being average, while 22.2 percent responded above average. None of the respondents indicated he was below average.

Questions 11 and 12, concerned with the student's academic achievement, revealed that 77.8 percent indicated they were average, 11.1 percent above average, and 11.1 percent below average. However, in answering question 12, none of the respondents stated that an abnormal heart condition was responsible for his below average, scholastic achievement.

Questions 13 and 14 were concerned with the student's social acceptance. The respondents were spread over the four choices and are shown in Table V. While 22.2 percent were below average in popularity, only 11.1 percent indicated that they felt this was related to the abnormal heart condition.

TABLE V. The Student's Social Acceptance and Percent in Each.

Category	Percent
Highly Popular	22.2
Popular	11.1
Average	44.4
Below Average	22.2

It appears that the majority of the students were in the average or above category and that little social unpopularity can be attributed to an abnormal heart condition, inasmuch as only 11.1 percent attributed their below-average, social acceptance to an abnormal heart condition.

For question 15 the respondents indicated that, in the majority of cases, the student's health record indicated neither the current heart condition nor the type of restriction imposed upon the child. An item analysis was carried out on all three groups to indicate the currency of information in the school health records. This analysis is presented in Table VI.

TABLE VI. School Records Indicating Current Heart Condition and the Percent of Yes and No Responses.

Respondents	Yes	No
Group One (Delabeled-Restricted)	44.4	55.6
Group Two (Delabeled-Nonrestricted)	14.9	78.7
Group Three (Nondelabeled-Nonrestricted)	8.3	58.3

All of the respondents in group one (delabeled-restricted) answered the question pertaining to the school record. The percent of respondents in groups two (delabeled-nonrestricted) and three (nondelabeled-nonrestricted) who failed to respond to this question was 6.4 and 33.3, respectively. The failure of the latter two groups to fully respond to this question, plus the higher percent of negative responses, indicated the lack of concern on behalf of responsible parties when the abnormal heart condition is not current. A comparison of teacher responses on this question was possible only with group two (delabeled-nonrestricted) due to the

lack of corresponding parent-child and teacher returns. This comparison is presented later in this chapter.

Question 16 was concerned with the physical activity of the student. Instructions were included in the questionnaire to avoid confusion of physical with school-oriented activities. The responses indicated that 88.9 percent of group one (delabeled-nonrestricted) were restricted in physical activity. This is an extremely high percent of students needlessly restricted and consequently unable to enjoy the experience and development of physical activity. No restrictions were found in groups two (delabeled-nonrestricted) or three (nondelabeled-nonrestricted). Question 17 was an open response question allowing parent-child respondents to record their restricted activities. These are listed in Table VII.

TABLE VII. Restricted Physical Activity and Percent Limited.

Activity	Percent
Swimming	11.1
Hiking	11.1
Bicycle Riding	11.1
Rapid or Excessive Running	33.3
Active or Contact Sports	33.3

Rapid or excessive running included dash events such as 100 to 600 yard dashes and long distance running. The sports included football, basketball, baseball, trampoline and wrestling. The

greatest number of restrictions, or 33.3 percent, was found in the excessive running and the contact sports compared to 11.1 percent in such activities as swimming, hiking and bicycle riding.

Section Two of The Questionnaire - Following Delabeling

This section was completed primarily by group one (delabeled-restricted). If the student was not limited or restricted in section one, the persons filling out the questionnaire were instructed to omit section two and proceed to section three.

Questions 1 through 4 were concerned with the removal of restrictions placed upon the delabeled child. The respondents in group one (delabeled-restricted) indicated that 77.8 percent had their restrictions removed following the screening and delabeling, with the remaining 22.2 percent still restricted. None of the restricted respondents indicated the degree of his restriction. The fact that 77.8 percent of the restricted students were delabeled indicates the tremendous benefit derived from the screening program.

Questions 5 and 6 were concerned with the removal of restrictions placed upon the child's school activities. Chi² analysis calculated on question 5 in sections one and two indicated that a difference in the child's school activities prior to and following delabeling was not significant at the .05 level of confidence, with the difference being 3.04 compared to the difference of 3.84 required by

Fisher and Yates (29). The 22.2 percent of respondents who indicated that they were still restricted failed to stipulate the degree of limitation to which they were confined. While 77.8 percent of the restricted students were delabeled, 22.2 percent were not, indicating a possible failure to receive the screening results or a failure to accept them. Both possibilities indicate the need for greater investigation into the follow-up procedures of school health services.

Questions 7 and 8, concerned with the encouragement given the student to become active in physical activity, were completed by group one (delabeled-restricted) only. In contrast to section one in which 100 percent of the students were cautioned against physical activity, only 55.6 percent of them were encouraged to become more active. Forty-four and four-tenths percent received no encouragement. Question 8, regarding who had provided the encouragement, was designed to allow for more than one answer. An item analysis indicated that, at most, a maximum of three persons were involved among the following: physician, parent, school nurse, teacher, administrator, physical therapist and "other". The percent of individuals providing encouragement is presented in Table VIII.

TABLE VIII. Percent of Respondents' Indication of Encouragement Provided (Group One).

Group Responses	No Response	Physician	Parent	Nurse	Teacher
1	22.2	33.3	33.3	0	11.1
2	33.3	0	33.3	11.1	22.2
3	77.8	0	0	0	22.2

Of the total responses given, the physician and parent were credited with providing the greatest amount of encouragement. The teacher and school nurse were also involved in providing encouragement, but to a lesser degree. No respondents received encouragement from the school administrator, physical therapist or other persons. Twenty-two and two-tenths percent of the respondents indicated that three persons provided encouragement. Forty-four and four-tenths percent indicated that two persons provided encouragement. The fact that only 55.6 percent of the restricted students were encouraged to become more physically active may indicate a failure of the screening information to reach responsible parties or a failure to accept the information.

Questions 9 and 10 in both sections one and two of the questionnaire were designed to measure the student's perception of his degree of classroom participation before and after delabeling and whether or not he attributes any change in his participation to the delabeling process. Seventy-seven and eight-tenths percent of the respondents

indicated that the student was average in classroom participation, whereas 22.2 percent felt he was above average in this respect; however, the latter group did not attribute this above-average participation to the delabeling process.

Questions 11 and 12 were concerned with any change in academic achievement following delabeling. Prior to delabeling, 77.8 percent were average, 11.1 percent below and 11.1 percent above average. Following delabeling the percents were 77.8 average and 22.2 percent above average, thus indicating an increase in academic performance of the below-average group.

Responses to questions 13 and 14, which were concerned with the student's social acceptance by his peer group before and after delabeling, are tabulated in Table IX.

TABLE IX. The Student's Social Acceptance Following Delabeling and the Percent in Each Category.

Acceptance	Percent
Highly Popular	22.2
Popular	22.2
Average	55.6
Below Average	0

It should be noted that prior to delabeling, 22.2 percent were below average in social acceptance whereas following delabeling none of the restricted group was below average in this category.

The respondents in question 14 indicated that 33.3 percent felt their social acceptance was not related to the results of the phonocardiogram screening, whereas 11.1 percent felt a relationship did exist. Chi² analysis verified that a relationship did exist between the responses prior to and following delabeling and that it was significant beyond the .01 level of confidence. It appears, therefore, that the social acceptance of the restricted student was improved following the delabeling process.

Question 15 pertained to whether or not the results of the phonocardiogram screening had been recorded on the student's school health record. It is significant to note that only 11.1 percent of the respondents of the restricted group indicated that the results of the screening program had been recorded. As shown in Table X, 55.6 percent of the restricted group indicated that their health records were not current prior to delabeling with respect to the condition of their hearts. Following delabeling it is significant to note that only 11.1 percent indicated that their health records were current. The majority of the parent-child respondents did not believe that the results of the screening program were recorded on their health record. A chi² analysis calculated to determine the significance of difference between the responses prior to and following delabeling, proved to be significant beyond the .001 level of confidence.

TABLE X. School Records Indicating Current Heart Conditions and the Percentage of Yes and No Responses for Group One; Sections One and Two.

Respondent	Yes	No
Section One-Group One	44.4	55.6
Section Two-Group One	11.1	88.9

Responses to question 16, regarding the removal of restrictions following screening, are presented in Table XI. It is noted that following screening 33.3 percent of the students who should be undergoing delabeling were still restricted. A χ^2 analysis between the 66.7 percent unrestricted and the 33.3 percent restricted following screening showed the difference between these two values to be significant beyond the .001 level of confidence, thus, greatly favoring the value of the screening program.

TABLE XI. Comparison of Sections One and Two for Restrictions of Physical Activity and the Percent of Yes and No Responses.

Respondent	Yes	No
Section One-Group One	88.9	11.1
Section Two-Group One	33.3	66.6

Of the 33.3 percent indicating a negative response for question 16, only 11.1 percent gave any indication of the type of restriction.

These were swimming, bicycle riding, hiking and running as recorded in response to question 17.

The high significance present in questions 15 and 16 provides a very positive support for the value of the phonocardiogram screening program in the school health services.

Section Three of The Questionnaire - General Delabeling Information

Question 1 asked whether or not the parent-child and teacher were informed of the results of the phonocardiogram screening program. Great concern was expressed by many of the respondents to the questionnaire. Some of them indicated that the receipt of the questionnaire was the first time that they had been informed of the results of the screening program. In the restricted group, 66.7 percent answered that they had not been informed. Respondents in groups two (delabeled-nonrestricted) and three (nondelabeled-nonrestricted), indicated that 62.8 percent and 75.0 percent, respectively, had not been informed of the results of the screening. Eight and three-tenths percent of group three (nondelabeled-nonrestricted) failed to answer question 1. The proportional distribution of the group responses is shown in Table XII.

TABLE XII. Responses by Groups Regarding Follow-Up Information and the Percent of Each Group by Yes-No Answers.

Sections	No		Yes	No
	Response			
Group One (Delabeled-Restricted)	0	33.3	66.7	
Group Two (Delabeled-Nonrestricted)	0	37.2	62.8	
Group Three (Nondelabeled-Nonrestricted)	8.3	16.7	75.0	

The extremely high percent of the negative responses in all three groups indicates the need for improving follow-up procedures in the school health service program. This supports other studies cited in the literature review.

Question 2, which pertained to who informed the student of the screening results, revealed that for group one (delabeled-restricted), the school administrator, the parent, the nurse, and the physician were equally mentioned. Each of these groups was credited with informing 11.1 percent of the students. Sixty-six and seven-tenths percent of the restricted group were not informed of the screening results.

The informants of students in group two (delabeled-nonrestricted) included the physician, the parent and the school administrator who informed 6.4 percent, 17.0 percent and 12.8 percent of the students, respectively. Forty-two and six-tenths percent of the respondents had not been informed and 19.1 percent failed to answer. Fifty-eight and three-tenths percent of the students in group three (non-delabeled-nonrestricted) were not informed of the screening results and 25.0 percent failed to respond to the question. Only 16.6 percent were informed; half of these by the school administrator and the other half by the Oregon Heart Association.

Informants of parents regarding the screening results, obtained by question 3, revealed that 55.6 percent of the parents of students

in group one (delabeled-restricted) had not been informed; 11.1 percent had been informed by the school nurse, 11.1 percent by the school administrator and 22.2 percent by "other".

Among the parents of students in group two (delabeled-non-restricted) 42.6 percent indicated they had not been informed; 6.4 percent had been informed by the physician, 2.1 percent by the parent, 21.3 percent by the school administrator, and 9.6 percent checked "other". Forty-two and six-tenths percent of the parents of students in this group had not been informed.

Sixty-six and seven-tenths percent of the parents of students in group three (nondelabeled-nonrestricted) indicated that they had not been informed of the results, 8.3 percent named the school administrator as the informant and 8.3 percent checked "other". Sixteen and seven-tenths percent failed to respond to the question.

While each teacher of the students in this study received a questionnaire, question 4 was included to determine if the parents were aware of the knowledge the teacher had concerning the condition of the student's heart and how the teacher obtained this information. In group one (delabeled-restricted), 55.6 percent of the parents indicated that the teacher was not informed of the screening results; in 22.2 percent of the cases the teacher had been informed by the parent; 11.1 percent checked the physician as the teacher informant, and 11.1 percent indicated "other". In group

two (delabeled-nonrestricted), 46.8 percent of the parents indicated that the teacher was not informed; 17.0 percent checked the school administrator as the informant; and the physician, the school nurse, the parent and "other" were equally mentioned as the informant of the teacher. Each of these informant groups was credited with informing 2.1 percent of the teachers. Twenty-seven and seven-tenths percent of the parents in this group failed to respond to the question. In group three (nondelabeled-nonrestricted), 25.0 percent of the parents thought the teacher had not been informed; 8.3 percent checked the school administrator and 8.3 percent indicated "other". Fifty-eight and three-tenths percent failed to respond to this question.

It is evident from the responses to the above questions relative to the follow-up aspect of the screening results that a serious lack of communication exists among the concerned and responsible persons regarding the heart condition of the students participating in this study.

An important aspect of the follow-up procedure is the conference between or among responsible persons for the purpose of reviewing the results, identifying problems which may exist and recommending procedures for rehabilitation where indicated. Questions 5 and 6 were included to determine if such a conference were held, and if so, who was present. In group one (delabeled-restricted), such a

conference was held for only 22.2 percent of the cases. An item analysis revealed that half of these restricted students were removed from their restrictions, whereas the remaining half were not. Both groups two and three indicated that no such conference had taken place. The proportional distribution of students involved in a conference is shown in Table XII.

TABLE XIII. Proportional Distribution of Students Involved in a Rehabilitation Conference.

Group	Yes	No
One (Delabeled-Restricted)	22.2	17.8
Two (Delabeled-Nonrestricted)	0	100.0
Three (Nondelabeled-Nonrestricted)	0	100.0

Of the 22.2 percent indicating that a conference had taken place, 11.1 percent of the respondents indicated that only the nurse was present and 11.1 percent marked only the school administrator.

The fact that restrictions were still manifest for 11.1 percent of the delabeled group indicates the need for further research to determine whether this results from failure to accept the screening results or is due to other factors.

While a diversity of personnel were involved in the follow-up procedures, a great need is apparent for an organized follow-up program. This need is substantiated by the fact that the majority of respondents were not informed, that in most schools a rehabilitation

conference was not held, and that the persons concerned or responsible for promoting the health of the child were not always involved.

Questions 7 and 8 were concerned with the desire of the student to increase his activity following delabeling and the encouragement he or she received from the parents to do so. The responses to these questions are presented in Table XIV.

TABLE XIV. Students Encouraged to Become More Active and Students Desiring to Become More Active.

Students	Yes	No	No Change
Encouraged	11.1	22.2	66.7
Desiring	11.1	22.2	66.7

An interesting observation occurred in the comparison of the students who had been removed from restriction. Group one (delabeled-restricted) indicated that 88.9 percent of the respondents had shown no change in their physical activity pattern following delabeling. This percent represents the sum of "no" and "no change" responses. Thus, it is evident that while 77.8 percent of the restricted children were free from any restriction, the majority failed to change their pattern of activity. Groups two (delabeled-nonrestricted) and three (nondelabeled-nonrestricted) all indicated "no change" as they had not been limited at any time following the diagnosis of their abnormal heart condition.

Question 9 asked the age at which the child was first diagnosed as having an abnormal heart condition. An age distribution and group comparison is shown in Table XV. While it is recognized that the majority of heart conditions are diagnosed shortly after birth, the information presented clearly demonstrated the long period of time that a restricted child may be handicapped in his developmental period prior to being delabeled.

TABLE XV. Age Distribution of the First Diagnosis of a Heart Condition and Group Comparison.

Age	Group One	Group Two	Group Three
Birth	66.7	51.1	33.3
1	00.0	6.4	00.0
2	11.1	4.3	00.0
3	00.0	6.4	00.0
4	11.1	2.1	16.7
5	00.0	8.5	33.3
6	00.0	2.1	8.3
7	00.0	4.3	8.3
8	11.1	4.3	00.0
9	00.0	10.6	00.0
10	00.0	00.0	00.0
	Range: 0-8	Range: 0-9	Range: 0-7
	Mean Age: 1.25	Mean Age: 1.12	Mean Age: 4.5

Question 10 was concerned with the last physical examination received prior to the screening program. Its purpose was to determine if the possibility existed for earlier delabeling and removal of restrictions. Respondents in group one (delabeled-restricted) indicated that 66.7 percent had been examined at age six, 11.1 percent of age two, 11.1 percent at age eight and 11.1 percent at age ten. It is of great

interest, however, that none of the examinations resulted in any delabeling. The tabulation of age of examination is shown in Table XVI.

TABLE XVI. The Age Distribution of Students Receiving Last Examination Prior to Phonocardioscan Screening.

Students	Age of examination and percent of distribution			
	2	6	9	10
Group One	11.1	66.7	11.1	11.1

Question 11, as referred to earlier in this study, was designed to determine if the student had been delabeled prior to the phonocardioscan screening program. As defined for purposes of this study, the delabeled student is one delabeled through this screening program and does not include students delabeled previously by a physician. Such a definition permits the three-group distribution used throughout this study. In answer to this question, 100 percent of the restricted group answered in the negative as did group two (delabeled-nonrestricted), while 100 percent of group three (nondelabeled-nonrestricted) answered in the affirmative. It was possible for only group three to complete questions 12 and 13 inasmuch as this group had been delabeled prior to the phonocardioscan screening. An age distribution of group three regarding the delabeling examination is shown in Table XVII.

TABLE XVII. Age Distribution of Delabeling Heart Examination for Group Three.

Age	Percent
Birth	33.3
1	8.3
2	8.3
3	00.0
4	00.0
5	33.3
6	8.3
7	8.3
8	00.0
Range: 0-7	
Mean Age: 3.5	

Students in group three (nondelabeled-nonrestricted) were diagnosed early in life and able to readily take part in the sequence of developmental activities suited to expose children to the rigorous play and healthful conditions necessary in child development. However, it is recognized that while students in group three (nondelabeled-nonrestricted) indicated that they were no longer restricted in any manner, 33.3 percent of the respondents indicated that their school records were not changed to correspond with their current health status. This further indicates the need for maintaining current school health records to eliminate needless restrictions.

Comparison of Parent-Child and Teacher Questionnaire

The number of returns of the parent-child and teacher questionnaires was not proportional for all three groups. Only questionnaires pertaining to group two (delabeled-nonrestrictive) were in sufficient number from both parent-child and teacher to justify a comparison.

Section One of The Questionnaire - Prior to Delabeling

In question 1 an item analysis indicated that of the parent-child respondents 90.6 percent stated that their child was not restricted whereas the teachers indicated that 81.3 percent of the students were not restricted. Twelve and five-tenths percent of the teachers failed to respond to the questions. The proportional distribution of parent-child and teacher responses is shown in Table XVIII.

TABLE XVIII. Percent of Parent-Child and Teacher Response to Child's Physical Restrictions..

Respondent	Total Response	Yes	No
Parent	100.	9.4	90.6
Teacher	87.5	6.3	81.3

Very little difference existed between the parent-child and the teacher responses with regard to the student's physical restrictions in question 3.

A rather large difference was found to exist between parent-child and teacher respondents regarding the student's restrictions in his school activities. The parent-child respondents indicated that 90.6 percent of the children were not restricted, whereas teacher respondents indicated that 75.0 percent of the students were not restricted. Eighteen and eight-tenths percent of the teachers failed to answer the question. From this information it is evident that the parents were more aware of their child's physical condition than were the teachers. The percent of distribution is shown in Table XIX.

TABLE XIX. Percent of Parent-Child and Teacher Responses to the Child's Restrictions in School Activities.

Response	Total Response	Yes	No
Parent	100	9.4	90.6
Teacher	81.3	6.3	75.0

Table XX presents a comparison of parent-child and teacher returns regarding the student's health record and their current condition. An item analysis determined that 75.0 percent of the parent-child respondents indicated that the health record of the student was not current. Eighteen and eight-tenths percent of the parents said yes and 6.3 percent failed to answer. The teacher respondents indicated that 68.8 percent answered negative, 6.3 percent positive

and 25.0 percent failed to answer. Chi² analysis determined the difference between these two groups of respondents to be significant beyond the .01 level of confidence. The high percent of negative responses both by the parent-child and teacher respondents clearly demonstrates the need for currency in maintaining school health records.

TABLE XX. Parent-Child and Teacher Responses Regarding the Current Condition of the Student's Health Record.

Response	No Response	Yes	No
Parent	6.3	18.8	75.0
Teacher	25.0	6.3	68.8

While question 16 was concerned with the physical activities outside of school, it is interesting to note that the negative responses by parent-child and teacher were identical. Both groups of respondents indicated that in 81.3 percent of the cases the student was not restricted in his or her physical activity.

Section Three of the Questionnaire-General Delabeling Information

This section was concerned with the follow up of the screening program and is applicable only to parent-child and teacher responses regarding students in group two (delabeled-nonrestricted). Both groups of respondents indicated that follow up had been seriously lacking. The parent-child respondents indicated that 59.4 percent

had not been informed while 40.6 answered yes. The teacher respondents indicated that 56.3 percent had not been informed and 31.3 percent failed to answer the question, again pointing up the need for more emphasis on follow-up procedures. A distribution of responses for question 1 is provided in Table XXI.

TABLE XXI. Distribution of Responses Regarding Follow Up.

Respondent	No Response	Yes	No
Parent	00.0	40.6	59.4
Teacher	31.3	12.5	56.3

In question 4 it is interesting to note that 40.6 percent of the parent-child respondents indicated that no one had informed the teacher of the results of the screening; however, 50.0 percent of the teacher respondents stated that they had not been informed.

Question 5 was concerned with the rehabilitation conference. The parent-child respondents indicated that in 93.8 percent of the cases no conference occurred, 62.5 percent answered in the negative, and 34.4 percent failed to answer the question. It is evident from these data that the follow-up aspect of the screening program is greatly lacking in the school health services. The proportional distribution of parent-child and teacher responses is shown in Table XXII.

TABLE XXII. Parent-Child and Teacher Responses Regarding the Occurrence of a Rehabilitation Conference.

Respondent	No Response	Yes	No
Parent	00.	6.3	93.8
Teacher	34.4	3.1	62.5

Question 11 was concerned with whether or not the student had been delabeled prior to the screening program. It was thought that this question should be known by the teacher as well as the parent. Of the parent-child responses, 96.9 percent indicated that the student had not been delabeled prior to screening, as contrasted to 37.5 percent negative responses from the teachers. Sixty-two and five-tenths percent of the teachers failed to answer the question. Responses to question 11 are given in Table XXIII.

TABLE XXIII. Parent-Child and Teacher Responses Regarding the Student Being Delabeled Prior to Screening.

Respondent	No Response	Yes	No
Parent	00.	3.1	96.9
Teacher	62.5	00.	37.5

It is apparent from this study that the phonocardiogram screening program is a practical and efficient method for mass heart screening in schools; that a need exists for more efficient maintenance and utilization of school health records; and that additional analysis must be placed upon the planning of the follow-up procedures prior to program implementation.

CHAPTER IV

GENERAL SUMMARY AND CONCLUSIONS

The need for students to be in good health in order to gain the full benefits of education has long been recognized as an important concept. One of the basic conditions which assures good physical health and, in turn, facilitates significant mental and intellectual development is the condition of the heart.

Medical studies indicate that 40 to 50 percent of normal children may have a heart murmur at one time or another. In most cases, such murmurs are innocent or insignificant and no longer exist. It is imperative that these falsely-labeled children be identified, delabeled and restored to a normal regimen of physical and social activity.

The professional responsibility for the detection, diagnosis and treatment of abnormal heart conditions is the responsibility of the physician. However, with the patient-physician ratio increasing, it would be impractical and costly for physicians to appraise the heart condition of thousands of school children. In addition, the problem of auscultatory fatigue is a limiting factor for the examining physician. This, then, emphasizes the need for a mass heart-screening device which would indicate those children who need medical evaluation and follow up to determine the presence of

absence of heart disease. One such device in use today is the phonocardiogram screening instrument. Some of the practical aspects of this device are the preservation of physician time since it can be operated by a trained technician; the machine is not subject to auscultatory fatigue; and the device can screen a large group of students in a relatively short period of time.

Although the phonocardiogram detects the presence of abnormal heart conditions, it is of even greater value from a practical point of view in detecting students whose heart is normal yet who are being deprived of a full regimen of activity because of the false assumption of an abnormal heart condition. The effect of the delabeling process on these students was the primary focus of this study. The specific purpose of this research was threefold:

1. To determine how the false assumption of a heart condition affected the lives of the false positive students.
2. To determine the effects of phonocardiogram screening and cardiologist follow-up procedures on delabeled cardiac patients among school age children.
3. To determine the effectiveness of follow-up procedures used in delabeling the false-positive students and the relative effectiveness of these various methods.

The survey method was selected as the procedure of investigation for this study. The data for analysis were obtained by use of a three-part questionnaire (Appendix D) a copy of which was completed by the child and parent and another by the student's classroom teacher.

A mail questionnaire was submitted to 137 students and parents who participated in the heart-screening program conducted in the greater Portland area during the school year 1969-70. Sixty-nine teachers who had been in charge of the students while the screening program was taking place also received a questionnaire. The mailing procedure included a stamped, self-addressed envelope. The cover letter explained the questionnaire, assured anonymity and carried the sanction of the Oregon Heart Association.

The questionnaire replies were analyzed by tabulating responses to determine a parameter analysis of common properties descriptive of the population under study. Chi^2 analyses were calculated where possible in order to determine levels of significance in conditions of change or alteration. Item analyses comparing teachers and parent-child responses were also made within comparable areas.

Major Findings

The findings of this study are summerized below:

1. The questionnaire was returned by 102, or 74.5 percent, of the potential parent-child respondents and fifty-four,

- or 80.9 percent, of the potential teacher respondents.
2. Of the total parent-child respondents, 9.18 percent were restricted in their activities. Sixty-five, or 66.32 percent, were not restricted, but had been delabeled as a result of the screening program. Twenty-four, or 24.5 percent, had been delabeled prior to the screening program and had not been restricted in their activities. Therefore, for purposes of analysis, the students participating in the screening program were divided into the following groups: group one (delabeled-restricted), group two (delabeled-nonrestricted) and group three (nondelabeled-nonrestricted). While less than 10 percent of the students were restricted, 9.18 percent is still a considerable number of students being restricted from developmental benefits of physical activity. Although 11.1 percent of the restricted students were classified as limited, they still were allowed to participate in vigorous activities.
 3. One hundred percent of group one were cautioned against physical activities, but neither group two nor group three were so cautioned.
 4. None of the respondents felt his grades were below average as a result of his heart condition. However,

22.2 percent indicated that they were below average on a popularity scale and 11.1 percent did attribute this to the heart condition.

4. The majority of respondents indicated that the student's health record did not indicate the current heart condition. This high percentage indicates the lack of proper record keeping which is one of the critical factors of school health services.
6. The respondents in group one indicated that 88.9 percent were restricted in general physical activity. No restrictions were found in groups two or three.
7. Following delabeling, 77.8 percent of the restricted group were removed from the restricted category. The high percent of delabeled students indicates the tremendous benefit to be derived from the screening program.
8. While 100 percent of the restricted students were restricted before delabeling, only 55.6 percent were encouraged to become physically active following delabeling. This may indicate failure of the child and/or parent to accept the fact that the health condition exists, failure to be notified of the screening results, or inability of the parent and/or child to

overcome an established practice.

9. Among the below average achievers in the restricted group, 22.2 percent indicated improvement in their academic achievement following delabeling.
10. Prior to delabeling 22.2 percent of group one were below average in social acceptance, whereas following the delabeling process, all were average or above in this category. Chi^2 analysis verified that a relationship did exist between the negative responses prior to and following screening and that it was significant beyond the .01 level of confidence.
11. Eighty-eight and nine-tenths percent of the delabeled students, compared to 55.6 percent of nondelabeled respondents, indicated that their health record had not been changed following delabeling. Chi^2 analysis indicated the comparison to be significant beyond the .001 level of confidence indicating a pressing need for maintaining accurate, current health records.
12. Among the respondents in group one, 88.9 percent were restricted prior to delabeling, whereas only 33.3 percent were restricted following delabeling. Chi^2 analysis determined the difference to be significant beyond the .001 level of significance. This high

significance of confidence interval provides positive support for phonocardioscan screening in the school health program.

13. A large majority of the respondents had not been informed regarding the results of the school screening program. The negative responses were distributed among the various groups as follows: 66.7 percent in group one (restricted); 62.8 percent in group two (delabeled-nonrestricted); and 75.0 percent in group three (nondelabeled-nonrestricted). The extremely high percent of negative responses indicates the need for improving follow-up procedures in the school health service program. This supports other studies cited in the literature review.
14. A great diversity of personnel were involved in the follow-up procedure, but the fact that over 50 percent of the participating students and their parents were not informed of the screening results indicates the need for systematic, organized follow-up programs.
15. Among group one, 77.8 percent had not been involved in any type of rehabilitation conference. An item analysis revealed that 11.1 percent of those attending such a conference were still restricted.

16. While 77.8 percent of the restricted students had been delabeled, 88.9 percent had not been encouraged to become more physically active nor did they desire such rehabilitation. This shows a definite need for improvement of health counseling and follow up.
17. Group three was diagnosed at a mean age of 3.5 years as having no abnormal heart condition. However, at the time of the study, 33.3 percent indicated that their health records still indicated an abnormal heart condition. This further indicates the need for current school health records to eliminate needless restrictions.
18. A large difference existed between teacher and parent regarding student restrictions. Parent respondents indicated that 90.6 percent were not restricted whereas teachers indicated only 75.0 percent. Fifteen and six-tenths percent of the teachers failed to answer the question regarding restrictions. It appeared that the parents were more aware of their child's physical condition than were the teachers.
19. Seventy-five percent of the parents, compared with 68.8 percent of the teachers, indicated that the students health records were not current. Chi² analysis determined the difference to be significant

beyond the .01 level of confidence.

20. Fifty-nine and four-tenths percent of the parents and 56.3 percent of the teachers indicated they had not been informed of the screening results, again pointing up the need for more emphasis on follow-up procedures.
21. It is interesting to note that 40.6 percent of the parents indicated that apparently the teacher had not been informed regarding the screening results. In fact, over 50 percent of the teachers indicated they had not been informed.

Conclusions and Recommendations

The following conclusions and recommendations are based on the results of this study:

1. The phonocardioscan is of obvious value as a screening device, supported by the fact that a high percent of the students participating were delabeled through this mass heart-screening program. Therefore, it is recommended that this type of screening program be introduced as a routine screening procedure at designated grade levels as a part of the total school health service program.
2. A need is apparent for more emphasis upon planning the follow-up aspects of the program prior to program

implementation. All persons concerned with the program, including the follow-up phase, should be involved from the beginning stages of program planning. As a prerequisite for demonstration programs of this type, school administrators should agree to assume responsibility for well-planned, follow-up procedures.

3. Considerably more attention should be given classroom education regarding cardio-vascular health prior to, during and following the screening program. All school health screening programs should serve educational purposes for the participating students.
4. It is recommended that schools examine their policies and procedures for health record keeping, including maintenance and use by nurses, teachers and other school personnel.
5. The results of this study point to the need for more health education of parents in the promotion of cardio-vascular health. The results would also be useful in the classroom education of prospective and inservice teachers.
6. The results of this study should prove helpful to the Joint Committee of the Oregon State Board of Education and the Oregon State Board of Health in its revision of

the handbook, "Health Services for the School Age Child of Oregon", which recommends policies and procedures for local school health service programs.

7. Schools should give greater education to appropriate channels of communication among the parent, school personnel, physicians and other professional groups to assume more effective utilization of school health appraisal findings.
8. The results of this study should be useful to the school health committees of the American Heart Association and its subsidiary state associations in establishing guidelines in planning and carrying out phonocardiogram screening programs in the schools throughout the nation. The use of such guidelines would be of value in the joint preplanning of the follow-up procedures by the schools, parents, medical association and agencies involved to help increase the effectiveness of the delabeling process.

Recommendations for Further Research

It is recommended that further research be conducted into some of the specific factors or problems revealed through this study:

1. Future studies are indicated to determine why students failed to fully accept the delabeling information and the reasons why they were not totally removed from a restricted category.
2. Inasmuch as the majority of the delabeled students neither increased their physical activities nor desired to do so, further study should be carried out to determine the reasons for this failure to act upon the delabeling information.
3. Further studies are indicated to determine the effectiveness of various procedures involved in the maintenance and use of school health records.
4. Various follow-up programs and procedures with parents and students should be studied to determine the relative effectiveness of each. This is an aspect of the school health services program which has been largely neglected.
5. Inasmuch as this study was restricted to a selected group of Portland, Oregon, schools and was confined to fourth-grade students, it is recommended that similar studies be conducted in other geographic areas

utilizing different age groups to determine if these results are consistent with findings in other geographic areas and with different age groups. In less urban areas where health personnel and facilities for follow-up are more limited, a less effective program might be found.

6. Studies should be conducted to determine the relative value of the various health services traditionally included in the school health program as a basis for assigning priorities. Some of the time-honored school health services may have outlived their usefulness and should yield to new programs and procedures.

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APPENDICES

APPENDIX A

To: Teachers and parents of students in phonocardioscan project

From: Carl Anderson, D.P.H., Chairman
School Health Committee

This is to introduce Mr. Richard L. Maughan, a student at Oregon State University who is a candidate for a doctorate degree.

Mr. Maughan is analyzing the results of the Oregon Heart Association's Phonocardioscan Project, in which Oregon school children (fourth grade students and certain other special groups) were examined over the past three years for abnormal heart sounds. The objective was to find those children who might have previously unknown heart disease.

An unexpected result of the screening, however, was the finding that a substantial number of the children in school who were thought to have heart disease in reality did not have it. These children were labeled on the school health record (goldenrod form) as having heart disease, because of an early indication or misinterpretation of information. These are the children who were "delabeled" after both the phonocardioscan and the physician who saw the children at the clinic session ruled out any abnormality of the heart.

Mr. Maughan's doctorate pertains to their experiences before and after delabeling. He will endeavor to find out the attitudes and behavior patterns of parents, school personnel and the students. He will attempt to compile information on how these affected the student, and to determine the extent of change following the delabeling process.

We will appreciate all the cooperation you can give Mr. Maughan in completing this valuable assignment.

APPENDIX B

Dear Parent, Child and Teacher:

This letter is in reference to the questionnaire which was sent to you March 8, 1972, regarding the Phonocardioscan Heart Screening. As of yet I have not received sufficient responses to fulfill the needs of my study. Perhaps this questionnaire has been misplaced during your busy schedule. I would appreciate it very much if you would please check your files and if the questionnaire is still in your possession, would you complete it as soon as possible and return it to me. Your cooperation in this survey will be greatly appreciated.

If you have completed your questionnaire, kindly disregard this letter.

Once again thank you for your assistance.

Sincerely,

Richard L. Maughan
Department of Health
Oregon State University
Corvallis, Oregon

APPENDIX C

The following questions are multiple choice, with the exception of Question 17 in Section #1 and Section #2, and Questions 9 and 10 in Section #3. These four questions will require you to fill in the blank. For the multiple choice questions, please check the most appropriate answer by placing an x in the blank provided in front of the various choices. If some questions do not apply to you as a parent, teacher or nurse please write in "Don't Know".

If the multiple choice answers provided do not describe your responses, place an x in the blank in front of other and write your responses in the blanks provided.

The following chart is for your assistance if you have questions regarding the kinds of activities considered vigorous, moderate and mild referred to in Questions 2 and 4 of Section #1 and 2 and 4 of Section #2.

Vigorous	Moderate	Mild
Competitive sports	Sports	Sports
basketball	bowling	archery
volleyball	golf	shuffleboard
football	aerial darts	aerial darts
touch football	practice of skills	horseshoes
speedball	lead-up games	quirts
soccer		ring toss
table tennis		golf (stroke practice only)
swimming		
badminton		
tennis		
hockey		
track		
wrestling		
Dance	Modified dance	Modified posture training & exercise
square dance		
contemporary		
Gymnastics	Posture training & exercides	Modified condition- ing exercises
(competitive)		
Conditioning exercise	Modified gymnastics	

Sometimes the physician may merely indicate no exertion or restricted activity. If this is the case, please check the appropriate choice.

The name of the student appears at the top of the questionnaires. This is merely to determine which students and family has received and returned a questionnaire. In the actual writing of the dissertation or study No names of child, parent, teacher or nurse will be used. You will remain totally anonymous.

Please complete and return the questionnaire by March 13.

Nurses and Teachers (Please note) you have received a questionnaire for each student under your charge that was involved in the study.

Thank you for your cooperation.

Sincerely,

APPENDIX D

QUESTIONNAIRE

PLEASE NOTE: The questions in Section #1 are in reference to information desired PRIOR to the phonocardiogram screening and cardiologist follow-up.

SECTION #1

1. Was the child ever restricted or limited in any of his or her recess or general play activities?

Yes
 No

2. If the child was restricted or limited. Please indicate the degree of exertion to which he or she was limited?

No exertion
 Mild exertion
 Moderate exertion
 Vigorous exertion
 Unspecified restrictions

3. Was the child ever restricted or limited in any of his or her physical education activities?

Yes
 No

4. If the child was restricted or limited please indicate the degree of exertion to which he or she was limited:

No exertion
 Mild exertion
 Moderate exertion
 Vigorous exertion
 Unspecified restrictions

5. Was the child ever restricted or limited in any of his or her school activities?

Yes
 No

6. If the child was restricted or limited please check any of the following activities from which he or she was restricted?

Climbing stairs
 School plays
 Dancing
 Band
 Class reports
 Shop
 Field hikes
 Other Activities
 not included above

7. Was the student cautioned against such a school activity as physical education and general play?
- Yes
 No
8. Who cautioned the student against such school activities as physical education and general play?
- | | |
|---|---|
| <input type="checkbox"/> Physician | <input type="checkbox"/> Teacher |
| <input type="checkbox"/> Parent or guardian | <input type="checkbox"/> School administrator |
| <input type="checkbox"/> School nurse | <input type="checkbox"/> Physical therapist |
9. How was the student's general classroom participation?
- Average
 Below average
 Above average
10. If the student's classroom participation was below average, do you feel that it was related to his supposed heart condition?
- Yes
 No
11. How was the student's academic achievement?
- Average
 Below average
 Above average
12. If the student's academic achievement was below average, do you feel that it was related to his supposed heart condition?
- Yes
 No
13. How was the student's social acceptance by his peer group (friends and classmates)?
- Highly popular
 Popular
 Average
 Below average
14. If the student's social acceptance by his peer group was below average, do you feel that it was related to his supposed heart condition?
- Yes
 No

15. Did the student's school health record indicate the current heart condition and the type of restriction imposed upon the child?

Yes
 No

PLEASE NOTE: The following questions deal with physical activity. This is not to be confused with a regimented program of physical exercise. Physical activity can be a broad spectrum of outside play, bike riding, tree climbing, fishing, boating, walking to the store and other activities of this nature.

16. Was the student restricted in any of his physical activity?

Yes
 No

17. If the above answer is yes, indicate what the student was allowed to do and also what he or she was restricted from doing?

Allowed to do

Restricted from doing

PLEASE NOTE: If the child was not restricted or limited in any manner by his heart condition, omit section 2 and go on to section 3. If the child was restricted or limited by his heart condition please complete section 2 before going to section 3. The questions in section 2 are in reference to information desired FOLLOWING the phonocardiogram screening and cardiologist follow-up.

SECTION #2

1. Were the restrictions or limitations placed on the child's recess or general play activities removed?

Yes
 No

2. If the child's restrictions or limitations were removed, please indicate the degree of exertion in which he or she was able to participate?

<input type="checkbox"/> No exertion	<input type="checkbox"/> Vigorous exertion
<input type="checkbox"/> Mild exertion	<input type="checkbox"/> Unspecified restrictions
<input type="checkbox"/> Moderate exertion	

3. Were the restrictions or limitations placed on the child's physical education activities removed?

Yes
 No

4. If the child's restrictions or limitations were removed, please indicate the degree of exertion in which he or she was able to participate?

No exertion
 Mild exertion
 Moderate exertion
 Vigorous exertion
 Unspecified restrictions

5. Was the child's restrictions or limitations in his or her school activities removed?

Yes
 No

6. If the child's restrictions or limitations in his or her school activities were not removed, please check any of the following activities from which he or she was restricted?

Climbing stairs
 School plays
 Dancing
 Band
 Class reports
 Shop
 Field hikes
 Other

7. Was the student encouraged to engage in physical education, general play and school activities?

Yes
 No

8. Who provided the encouragement for the student to engage in physical education, general play and school activities?

Physician
 Parent
 School nurse
 Teacher
 School administrator
 Physical therapist
 Other

9. How was the student's general classroom participation?

Average
 Below average
 Above average

10. If the student's classroom participation is average or above, do you feel it is related to the phonocardiogram and cardiologist findings?

Yes
 No

11. How was the student's academic achievement?

Average
 Below average
 Above average

12. If the student's academic achievement is average or above, do you feel it is related to the phonocardiogram and cardiologist findings?

Yes
 No

13. How was the student's social acceptance by his peer group?

Highly popular
 Popular
 Average
 Below average

14. If the student's social acceptance by his peer group is average or above, do you feel it is related to the phonocardiogram and cardiologist findings?

Yes
 No

15. Has the student's school health record been changed to correspond with the results of the phonocardiogram screening and follow-up?

Yes
 No

PLEASE NOTE: The following questions deal with physical activity. This is not to be confused with a regimented program of physical exercise. Physical activity can be in a broad spectrum of outside play, bike riding, tree climbing, fishing, boating, walking to the store and other activities of this nature.

16. Was the student restricted in any of his physical activity?

Yes
 No

17. If the above answer is yes, indicate what the student was allowed to do and also what he or she was restricted from doing?

Allowed to do

Restricted from doing

PLEASE NOTE: The questions in Section #3 are in reference to information desired concerning some general aspects of the phonocardiogram screening and follow-up.

SECTION #3.

1. Were the parent, child and teacher informed as to the results of the screening and cardiologist follow-up?

Yes

No

2. Who informed the student as to the results of the screening and cardiologist follow-up?

<input type="checkbox"/> Physician	<input type="checkbox"/> School administrator
<input type="checkbox"/> Nurse	<input type="checkbox"/> No one
<input type="checkbox"/> Parent	<input type="checkbox"/> Other

3. Who informed the parent as to the results of the screening and cardiologist follow-up?

<input type="checkbox"/> Physician	<input type="checkbox"/> School administrator
<input type="checkbox"/> Nurse	<input type="checkbox"/> No one
<input type="checkbox"/> Teacher	<input type="checkbox"/> Other

4. Who informed the student's teacher of the results of the screening cardiologist follow-up?

<input type="checkbox"/> Physician	<input type="checkbox"/> School administrator
<input type="checkbox"/> Nurse	<input type="checkbox"/> No one
<input type="checkbox"/> Parent	<input type="checkbox"/> Other

5. Was a conference held to educate those involved as to the proper rehabilitation of the student?
- Yes
 No
6. If the above answer is yes, indicate those present?
- | | |
|------------------------------------|---|
| <input type="checkbox"/> Child | <input type="checkbox"/> Nurse |
| <input type="checkbox"/> Parent | <input type="checkbox"/> School administrator |
| <input type="checkbox"/> Teacher | <input type="checkbox"/> Other |
| <input type="checkbox"/> Physician | _____ |
| | _____ |
| | _____ |
7. Following the phonocardiogram and cardiologist follow-up did the parent encourage the child to become more physically active.
- Yes
 No
 No change
8. Following the phonocardiogram and cardiologist follow-up did the child desire to become more physically active?
- Yes
 No
 No change
9. At what age was the child first diagnosed as having a heart condition _____?
10. At what age did the child receive his or her last physical examination before the phonocardiogram screening was performed at school? _____
11. Was the child ever examined before the phonocardiogram screening and found to have no abnormal heart condition?
- Yes
 No
12. If #11 is yes, at what age did this examination take place?

13. If #11 is yes, was the student's school health record changed to agree with the examination results?
- Yes
 No

APPENDIX E

OREGON HEART ASSOCIATION

HEART SOUNDS SCREENING DEMONSTRATION PROJECT

Introduction

The analysis of heart sounds, particularly in children, is most significant as a means of reflecting both congenital and acquired heart disease. Of the 50 million school children in the United States, recent studies have suggested that there may be two to five children per 1000 who have previously undetected heart disease. The heavily burdened schedules of presently available medical personnel and the costs involved for trained physicians to examine this large population precludes detection by auscultation of large populations.

The phonocardioscan (PCS) heart sound screening aid was developed as a means of rapidly examining large populations, to detect those individuals with suspicious heart sounds in order that they may be referred for final diagnosis, evaluation and treatment. Since a large majority of the population will be eliminated by the PCS as being within normal limits, only a small percent need be examined by the physician.

The School Health Committee of the Oregon Heart Association plans to introduce the PCS mass screening technique into schools throughout the state in a three year program. It is the intent of the Committee

to initiate a demonstration project in selected school districts during the first year designed to determine the feasibility and practicability of school districts or public health departments incorporating this technique into on-going school health services programs. The second year would be devoted to introducing the project on a limited scope on wider basis with joint cooperation among schools, medical professions, health departments and Heart Association. The third year, it is hoped that the Oregon Heart Association would be able to remove itself from direct operation and financing of the project and that appropriate agencies will accept the technique and incorporate it into their health screening programs.

The Oregon Heart Association submits for approval the following proposal in terms of the first or demonstration year of the project.

THE HEART SOUNDS SCREENING DEMONSTRATION PROJECT

Purpose

The purpose for the demonstration project is:

1. The reduction of morbidity and mortality from heart disease in children by early detection techniques and the application of appropriate medical or surgical therapy.

2. Utilization of a primary screening device to indicate those children who need medical evaluation and follow-up to determine the presence or absence of heart disease.

Objectives

1. To demonstrate that mass public health screening of heart sounds is a practical possibility in any community without burdening cardiologists with thousands of routine examinations.
2. To demonstrate the feasibility of a school district or public health department incorporating this technique into its ongoing school health services program by determining the most productive use of machines and personnel in terms of time, logistics, costs/benefits, school curriculum schedules and facilities.
3. To develop procedures which will insure effective and follow-up for diagnosis, treatment and possible rehabilitation of children suspected of having heart disease.
4. To develop possible avenues of research beyond the demonstration project.
5. To develop administrative procedures making the widest possible use of volunteer personnel and at the same time coordinating closely with the school health services administrative procedures.

6. Given the hoped-for results, to develop an educational program designed to motivate communities, families and individuals to accept this method of mass screening of children for early detection of heart disease.

Scope and Depth of Project

For the purposes of the demonstration project, during the first or fall period of screening covering eight (8) weeks of the 1968-69 school year, 1600 fourth graders in selected school districts in the tri-county (Multnomah, Clackamas and Washington) area will be screened. The spring screening of the same school year will cover the same number of fourth graders. There will be no demographic variables intentionally introduced into the project. There will be no structuring of the sample of fourth graders. This is in line with the stated purpose and objectives of the project.

Screening Procedures

All children will have had parental permission for the examination. Technicians operating the machines (PCS) will place the children in the supine position and screen them in four (4) designated precordial areas:

- . Apex or point of maximal impulse, or if not visible or palpable, the 5th left intercostal space in line with the left nipple.
- . 4th left intercostal space .
- . 3rd left intercostal space.

- . 2nd left intercostal space.

For the purposes of the demonstration project, all children are tested twice by two different technicians using two (2) phonocardioscan machines. This greatly reduces error. Upon completion of the screening, the following screening categories indicate further definitive diagnosis:

- a. Positive results on two (2) PCS screening examinations.
- b. Technically unsatisfactory results on two (2) screening exams.
- c. Positive on initial and absent for rescreening.
- d. Technically unsatisfactory result and a positive result.

Experience from other PCS programs have indicated approximately 6% of the children screened will be among the four categories listed after the 2nd screening. These children will be given secondary examinations, at no cost to the children, at a later date in a clinic setting either at the place of screening or some central location(s) by a team of physicians (internists-cardiologists) for the purpose of establishing a definitive diagnosis. The results of the screening and diagnosis will then be referred to the private physician or whatever agency is appropriate in the particular case for further work-up and management. The public health nurse will be responsible for the follow-up. The schools will notify the parents of the results of the screenings and the physician examination of the positives. Follow-up

will continue until a sufficient time has elapsed for the case to be given treatment or rehabilitation. Procedures will be set up to receive feedback after referral to private physician or clinics.

Professional Education

The physicians practicing in the tri-county area will be oriented to the various aspects of the program.

Public Education

There will be an intensive public educational program designed to prepare the communities for the approval and acceptance of the project. This includes securing parental permission for children to participate in the project.

Evaluation

Evaluation will be in terms of the objectives of the project. After the first half of the screening is completed, evaluation will be made toward possible revision of procedures for the second half or spring screening.

OREGON HEART ASSOCIATION

HEART SOUNDS SCREENING DEMONSTRATION PROJECT

APPENDIX A

These guidelines will be followed in the operation of the PCS heart sounds screening project, which the Oregon Heart Association will conduct in certain selected schools in Multnomah County.

I. Administrative Responsibility

The Oregon Heart Association's School Health Committee will have the responsibility of overall direction of the heart sounds screening project. However, it will work, consult and coordinate closely with the local medical society, public health department, selected school districts, and PTA councils.

A. Oregon Heart Association will be responsible for:

1. Selecting and contacting school districts for their approval of the project operation in these school districts.
2. Explaining the project in meetings with building principals, classroom teachers, public health nurses, physicians and local building PTA leaders.
3. Providing any additionally needed equipment in the screening areas for efficient operation of the project.

4. Providing all the necessary educational materials and forms for distribution to parents to secure parental permission for children to participate in the project.
5. Providing all necessary records and forms for the screening project.
6. Securing and working with volunteer clerical aides who will,
 - a. Maintain all of the screening records
 - b. Explain to the students the procedures to be followed during the screening process.
7. Prepare and provide copies of a final report for all appropriate agencies.

B. Multnomah County Division of Public Health will be responsible for:

1. Maintaining any records they wish to keep from the results of the screening program.
2. Setting up a system of feedback from private physicians after referral has been made by the cardiologist at the conclusion of the secondary examinations.
3. Informing project director of results of feedback for project records.

C. School Districts will be responsible for:

1. Providing the rooms and basic equipment necessary for the screening examinations.
2. Instructing teachers to conduct brief classroom orientations about the project to the 4th grade students from an outline explanation provided by the Oregon Heart Association.
3. Recording information from results of the screening project to school health records.
4. Coordination, when necessary, among PTA's, public health nurses and project.

II. Medical Responsibility

A. The Oregon Heart Association will be responsible for:

1. Providing the screening services, using its own machines and trained technicians.
2. Providing review clinic services for suspect children. Dr. John Bussman (Pediatric-Cardiologist) will be responsible for this clinic service. Clinics will be open on Friday mornings at specified dates after the screening project gets underway and at locations as centralized as possible within each school district.

3. Referring results of clinical examinations and medical evaluations to child's private physician, or responsible public agencies in appropriate cases when necessary, with letters to parents informing them of the same results with advice as to further action. At this time the parents of all children screened will be informed as to the results of the screening examination. The public health departments will also receive this information.

B. The Public Health Department will be responsible for:

1. Follow-up services for all children referred to either private physician or appropriate public agencies.
2. Continuation of follow-up services until sufficient time has elapsed for case to be given treatment or rehabilitation.