CHILDREN'S PERCEPTIONS OF THEIR INTERNAL BODY PARTS AND FUNCTIONS

by

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A Thesis

Presented to
The University of Oregon School of Nursing
and the Graduate Council
of the University of Oregon Health Sciences Center
in partial fulfillment
of the requirements for the degree of
Master of Nursing

June 9, 1978

This study was supported by a traineeship

from the United States Public Health Service
Grant Number 5 All NUOO 250-02

ACKNOWLEDGEMENTS

I acknowledge with gratitude the guidance and editorial assistance given me by my advisor, Wilma Peterson, Ph.D., and also by my readers, Evelyn Schindler, M.A., and John Pearson, M.D. I am also grateful to Mrs. Betty Pollen from the Portland Public School System who granted me permission to conduct this study. Appreciation is also extended to those students who participated in the study.

I am especially thankful to my family and friends whose support and love throughout the year preserved my sanity.

p.a.g.

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CHAPTER I

Introduction

It is often assumed that the older a child becomes, the more he knows about his body. At the same time, it is logical to assume that a direct relationship exists between the age of the child and his level of knowledge about his body. This, however, is an assumption from an adult's point of view, and does not take into consideration the child's ideas and perceptions. Many of the child's ideas or perceptions of what is inside his body may seem nonsensical to adults since many adults may not realize the child's perception is not merely a simplified version of his own. As the child grows and develops, his understanding and knowledge undergoes qualitative as well as quantitative changes. He begins to see more of the whole rather than just individual pieces. He develops ideas of concepts and interrelationships (Piaget, 1969).

It is important to determine the child's perception of his internal body parts before any meaningful discussion with him can take place. Misconceptions may flourish if what an adult is trying to communicate does not coincide with what the child understands the adult to be saying.

Few studies have been done on this subject. Those that have been conducted deal primarily with hospitalized children (Gellert, 1962), mentally disturbed children (Bender

and Keeler, 1952), disfigured children (Abel, 1953), and Papago Indian children (Aamodt, 1971 and Kuka, 1972). It is evident that most of these groups have been captive audiences and more readily accessible to researchers. However, little research has been done with healthy, "normal" children in the community to provide data to serve as a baseline for comparison with these other groups. Porter (1974), utilizing a body outline drawing, tested 144 elementary school children in first, third, and fifth grades to determine their perceptions of internal body content. The purpose of her study was to ascertain how perceptions change with age, the organs drawn most frequently, the accuracy of children's drawings, differences in perceptions between the sexes, the body systems most familiar to children, and the parts rarely drawn and named. From the results of her study, Porter concluded: "Children knew considerably more about their internal body parts than previous studies had indicated, the parts most frequently named were the heart, brain, and bones, the three body systems most frequently represented were the cardiovascular, gastrointestinal, and musculoskeletal, and boys named more parts than girls."

The present study enlarges on Porter's (1974) study by securing: (1) more comprehensive review of the literature; (2) more representative sampling; (3) better control of test conditions; and (4) the addition of information on children's perceptions of organ function as well as organ name. The

purpose of the present study was to investigate the correlation of internal body-image with sex and socioeconomic level. This study was limited to fifth grade children. Internal body-image was defined by internal body parts drawn and labeled, and the knowledge of function of these body parts.

In the review of literature, the following concepts were examined: (1) the concept of body-image and its relationship to the self-image, (2) the development of body-image and its relationship to intellectual development, and (3) the relationship between children's drawings and their knowledge of body parts.

Review of the Literature

Body-Image

The concept of "body-image" has been developing over many years and has stimulated increasing interest. This interest has been reflected in studies which explore the body-image of many segments of the population. Porter (1974) studied healthy children, Pang (1975) adolescents, Bramberg (1974) Indians, and Anzieu (1974) psychiatric patients. The purpose of these and other studies has been to determine the relationship between body-image and personality traits (Tait and Ascher, 1955; Machover, 1949; Robach, 1974), developmental levels (Goodenough, 1926; Porter, 1974), and intellectual growth (Goodenough, 1926; Harris, 1963; and Sundberg, 1977). Observations of behavior, verbalizations, fantasies, dreams, drawings of the human figure, and other

projective techniques have been utilized to study body-image.

The image of the body as an influence on human behavior has been recognized by specialists in fields such as psychiatry, psychology, medicine, and cultural anthropology. It has been observed that beliefs about the functions of body parts affect the responses to illness and public health measures (Mead, 1955). It has also been shown that beliefs about the human body differ among cultures and subcultures. These differing beliefs affect attitudes toward certain medical procedures, contraception, early treatment of mental illness, and other preventative health practices (Gellert, 1962).

Other researchers, Schilder (1935), and Bender and Keeler (1952), have implied that an intact body-image is essential for normal development. They came to this conclusion after studying schizophrenic patients who had distorted body perceptions and were unable to distinguish body boundaries. Thus body-image has been correlated with personality factors, intellectual levels, and an image of intact and changing body was seen as evidence of normal development.

The Growth and Development of Body-Image

The question now arises as to when a child's body-image first begins to develop and what stimulates it to develop. Also, how are developmental level and body-image correlated and how are they reflected by each other? According to

Kubie (1951), the child's thought world probably begins with his body. His first concepts deal with its parts, products, needs, and feelings. All new knowledge must have points of reference to bodily things. The body is seen as the center point of his own little world and it is from there that he first begins to learn. Kubie (1951), substantiates this view by pointing to Pavlov's experiments which "proved" that no new reflex can be conditioned in a satiated animal and therefore all processes of learning dep nd upon the existence of a state of craving. She also stated that since in infancy and childhood cravings arise in body tensions, it is inevitable that the child's thought world should begin with his body. Observations have shown that the infant begins by communicating needs and wants through random motor activity, and ultimately learns to speak and think of the different parts of the body and of the desires and feelings associated with them. From these studies it can be inferred that an infant is first aware of himself and of his body, and through this perception he eventually distinguishes things outside his body. His body awareness and body-image are thus basic to his consciousness of others.

This body-image, according to Schilder (1935), is experienced by children at the unconsious level and can be projected onto human figure drawings just as it may be projected into fantasies and dreams. These drawings are a

reflection of the children's knowledge and sensory experience of the body-image. Several other studies (Goodenough, 1926; Tait and Ascher, 1955; Bender and Keeler, 1952; Abel, 1953; and Gellert, 1962) support the belief that children's drawings reflect their body-image. According to Lowenfeld (1947), body-image usually reflects the child's own desires, feelings, beliefs, and fancies rather than objective reality. It is usually not until adolescence that the child utilizes realistic representation. He draws the body as he sees or feels it rather than as it really is. Goodenough (1926), and Gellert (1962), have also pointed out the relationship between the child's growing concept of body parts and his depiction of these parts in drawings. The awareness of the various body parts and regions usually comes about in a characteristic order: first the head, followed by the legs, the arms, and finally the trunk. This sequence usually bears a direct relationship to the child's intellectual development. Goodenough (1926) refers to several studies (Perez 1888, Sully 1907, Barnes 1891, Baldwin 1894, Shinn 1897, Clark 1904, Herrick 1893, Lukens 1896, Maitland 1895, O'Shea 1897, and Gotze 1898) which appear to show that the nature and content of children's drawings are dependent primarily upon intellectual development. Goodenough (1926) elaborates on this point further by stating that drawings made by subnormal children resemble those of younger, normal

children because of their lack of detail and sense of proportion. Another fact pointed out by Goodenough (1926), is that the order of development in drawing is remarkably constant, even among children of different social antecedents. The reports of investigators throughout the world show close agreement, both in regard to the method of indicating the separate items in a drawing and the order in which these items tend to appear.

The child's acquisition of kn wledge about body parts shows a slow steady rise according to Gellert (1962), except for a sharp rise which occurs around the age of nine. The dramatic increase in information about the body found to occur around age nine might be expected based on current knowledge of children's interests during this period of their lives. It has been observed (Gesell and Ilg, 1946) that this is usually a time of considerable curiosity about nature studies, in general, and about the workings of the body in particular. Blos (1956) concurred with this finding and stated that it corresponded to the spurt in intellectual facility seen by teachers at this age.

Goodenough (1926) elaborated on the concept of intellectual development and stated, "The marked mental growth that occurs during the middle childhood years is not simply a quantitative increase. It is not just that the person thinks better or more efficiently at twelve than he does at five. He thinks differently; there is a qualitative change." Piaget (Ginsberg, 1969)

believed that the four to seven-year-old children's thoughts and attentions were centered on their perceptions. They cannot quite take the perceptions apart, and consider the relations and facts about it separately. "As time passes, and through repeated experiences, thinking can then be done by means of concepts that maintain their identity no matter what the perceptual situation in which they are imbedded" (Ginsberg, 1969). Thus, not only does the child's ability to list body parts increase, his understanding of how they function and interact also increases.

While several studies (Goodenough, 1926; Gellert, 1962; and Tait and Ascher, 1955) had reasonably consistent findings about the level of body knowledge at various ages, Porter's (1974) study showed that children's level of knowledge of their internal body parts was greater than that of children studied previously in a similar way. It was suggested that this increase may have been the result of the greater emphasis on health teaching in the school systems, by society in general, the influence of television, advertising, and educational toys involving the body, or any combination of these factors.

A child's body-image begins with awareness of his body. This awareness develops gradually and appears to be directly related to the child's intellectual development. This concept of body-image can be visualized through the child's

human figure drawings. These human figure drawings can thus give us much information about the child's knowledge of body parts.

Human Figure Drawings

Primitive man used picture-writing as a means of expressing his thoughts. Modern children draw for much the same reason. According to Goodenough (1962), drawing is more similar to talking to himself than to talking to others for the young child. It is a way of dramatizing his ideas through making them visible. Drawing in this sense is a language. Children's drawings often do not coincide with objective reality; rather children draw what they know rather than what they see. According to Goodenough (1962), the little child does not care whether his pictures are beautiful, but he wants them to tell what he has in mind. Objective details do not trouble him; he goes straight for what is, to him, the main concern.

As children grow and develop, changes can be seen in their drawings. The changes in children's drawings that take place from age to age as well as many of the differences between the drawings of children of the same age have been shown to be far more closely related to general intelligence than to special artistic talent in children under the age of eleven. Goodenough (1926) based this belief on the results of a study of the biographical material found in Champlin's

Cyclopedia of Painters and Paintings compared with that in the Cyclopedia of Music and Musicians by the same editor. In few instances was it reported that the artists showed unusual ability in drawing before the age of 12 or 13, while a fair percentage of musicians had shown musical ability at that age. It thus appears that artistic ability may be relatively late in development and does not influence the results of studies using human figure drawings by young children.

Interpreting Human Figure Drawings Made by Children

According to Goodenough (1962), a number of studies (Portocarrero de Linares 1948, Hildreth 1941, Sorge 1940, and Homa 1937) emphasize that children tend to simplify what is too difficult or to give meaning to that which is meaningless. Thus, when asked to draw something that is too difficult, they often give a simplified version. Burton and Tueller (1941) verified this, but went on to say that when the drawing served to give concrete meaning to the relatively abstract symbol, the tendency was to amplify rather than simplify. Children's conceptions about body parts were seen to be influenced by the quality of thought processes. Gellert (1962) as a result of her study on perceptions of bodily parts and functions, developed the following two hypotheses: "(1) that body parts emanating little or no sensations are thought to be smaller than body parts which

can be felt frequently and/or intensely; and (2) that organs whose function is well understood are thought to be larger than are organs whose function is not known."

The conclusions drawn from the literature reviewed may be summarized as follows: (1) body-image is closely related to the self-concept; (2) the development of body-image closely parallels intellectual development; (3) children's drawings are a reflection of their body-image; (4) children's knowledge of body parts increases gradually over a period of time and in a fairly sequential pattern; and (5) human figure drawings reflect the close interaction of mind and body.

Purpose of the Study

Educators and professionals involved with the provision of health care and teaching to school age children need to know how the students perceive their body as a whole, its various parts, and its functions. They need to understand the growth and development of perceptions so they can plan their health teaching to foster and expand the children's normal increase of knowledge. Communication on the child's level of understanding is mandatory if effective health teaching is to be accomplished (Porter, 1974).

The general aim of this research was to explore children's understanding of their internal body parts and their functions. Since it has been shown that children's perceptions about their body change with increasing age, it is important to

determine what their perceptions are at various ages. For the purposes of this study, fifth grade children were chosen because of the level of their communication skills, the rapid body changes they were beginning to undergo, and the fact that more in depth health teaching is begun at this time.

In the present study, the following questions were considered: (1) which internal body parts do fifth grade children name most frequently? (2) what is the average number of body parts a fifth grade child can draw and name according to sex and socioeconomic level? (3) what body systems are fifth grade children knowledgeable about? (4) which functions of their internal organs and systems are fifth grade children able to identify?

CHAPTER II

METHODOLOGY

Subjects

The subjects participating in this study were 153 fifth grade students (73 girls and 80 boys) from the Portland Public School System. Only the children present in the classroom the day the test was administered were included in the study. All the children present participated.

Table 1

Distribution of Subjects Representing Six Schools From Three Socioeconomic Levels

	girls	boys	total
High income			
School 1	12	13	25
School 2	11	18	29
Middle income			
School 3	11	11	22
School 4	14	11	25
Low income			
School 5	10	16	26
School 6	15	11	26
Totals	73	80	153

One fifth grade class was selected at random from schools at six different locations. In order to choose two schools from each of a high, a middle, and a low socio-economic area, a map showing various socioeconomic areas of the city was utilized. These socioeconomic areas for the city of Portland were established by Dr. William Morton, Professor and Head of the Division of Environmental Medicine, University of Oregon Health Sciences Center. He used the following criteria in establishing these areas: (1) median family income, (2) percent families with income below poverty level, (3) percent high school graduates among persons aged 25 or older, (4) percent occupied housing units with 1.01 or more persons/room. (Appendix B) The percentage of minority students in the six schools ranged from 4% to 12%.

Portland Public Schools use the same health textbooks, and the children in the study had had the regular health education units from kindergarten through fourth grade. No attempt was made to identify those children who had transferred into this school system. None of the schools sampled had begun their fifth grade health education units at the time the tests were administered. However, two health related learning experiences had occurred. A science teacher in School 1 had talked to the fifth grade class about bones and muscles the week prior to testing, and the

school nurse in School 5 had talked with the fifth grade girls about menstruation and the changes that would be taking place in their bodies as they became women. These differences have been noted and are considered in the data analysis and discussion of findings.

Data-Gathering Instruments

The data for this study were obtained through the use of an outline drawing of the human body (Appendix C) and a two-page questionnaire on body functions (Appendix D).

The drawing of the human body was printed on an 8½x11 sheet of color-coded paper with the outline of the entire body of a nude child. Facial structures, hair, and umbilicus were shown inside the body borders. Sexual characteristics were not indicated.

Human figure drawings are a reflection of children's knowledge and sensory experience about their body-image and body parts. According to Schilder (1950), the body-image is experienced by children at the unconscious level and is then projected onto human figure drawings. Several other studies (Bender and Keeler, 1952; Abel, 1953; Tait and Ascher, 1955; and Gellert, 1962) support the thesis that children's drawings reflect body-image.

A weakness associated with projective tests, such as this human figure drawing, is the effect that artistic ability has on the results. Artistic ability may affect

the proportions, size of body parts, and accuracy of drawings to a certain extent, but Goodenough (1926) believes this effect is minimal and does not influence the results of the drawings.

The method in which the draw-a-person test was used in this study reduces many of the weaknesses inherent in projective tests. For instance, no inferences were made about intellectual level or psychological traits. It was basically a cognitive test of the children's knowledge about their internal body parts.

The questionnaire was designed by the researcher to attempt to determine knowledge about body functions. Two pilot studies were conducted to determine which of the two instruments was more effective for obtaining the information regarding function (Appendix E).

Design and Procedure

The aim of the present study was to obtain descriptive data by exploring fifth grade students' knowledge about their internal body parts and functions. To reduce variables, each group received identical instructions from the researcher.

An outline drawing of the human body was given to each child with the following instructions: "On the drawing I have given you, I want you to draw everything you know that is inside your body. I would then like you to name the parts you draw by putting labels outside the body and drawing a line

to the parts you have identified. This is not a test, and you will not be graded on your ability to complete this request, but it is important that you work by yourself and not talk to one another. You will have 15 minutes with which to work." After completing the draw-a-person test, the students were given the questionnaire on body functions. Each group of children was again told that this was not a test and they would not be graded on their ability to complete the request, but that they were to work by themselves and not to talk to one another. They were again reminded that they would have 15 minutes to complete the work.

Analysis of Data

To examine the data regarding knowledge of body parts, each item drawn and named was recorded individually according to the school and sex of the child. The percentage of the total number of parts drawn and named by each child was calculated. The school and the child's sex were correlated with the number of organs drawn and labeled and with the number of systems represented. The data were also analyzed according to body systems. If any part of a system was identified, that system was considered to be represented and was counted in the total percentage calculation. A rank order of the mean number of parts listed for each system by boys versus girls was tabulated for each of the six schools. The rho test for level of significance was then done. A rank order and test for level of significance was also done for the

sex variable.

For each of the questions regarding function, the replies were tabulated according to content, and percentages were calculated for each content category. The mean number of functions listed for each question was determined for each of the six schools. A one-way analysis of variance was run between the three socioeconomic levels for each question with regard to number of functions listed. Individual comparisons were made using the Sc' iffe test.

CHAPTER III

RESULTS

Internal Body Parts Drawn and Named

The average number of systems identified by boys, by girls, and by both boys and girls from each of the six schools were tabulated and are compared in Table 2.

Table 2

Mean Number of Systems Identified by 153 Fifth Grade Girls and Boys from Three Socioeconomic Levels

	Girls	Boys	Total
High income			
School 1	5.25	5.62	5.44
School 2	5.54	5.83	5.72
Middle income			
School 3	5.36	4.90	5.14
School 4	6.57	6.09	6.36
Low income			
School 5	5.00	4.90	4.92
School 6	6.87	5.00	6.08

No significant differences were found between the mean number of systems represented in responses by boys and girls, or between the schools representing the three socioeconomic areas. Random differences between schools were noted.

In Table 3, the mean number of parts listed for each

Table 3

Mean Number of Body Parts for Nine Basic Systems Identified by 153 Fifth Grade Students from Three Socioeconomic Levels

	Cardiac	Gastro-intestinal	Respi-ratory	Renal	Musculo-skeletal	Repro-ductive	Sensory	Lymphatic	Neuro-logical
School 1									
girls	1.17	1.60	1.08	1.08	7.17	0.00	1.08	0.17	0.92
boys	1.15	2.92	0.92	0.38	7.70	0.15	1.08	0.08	1.15
total	1.16	2.28	1.00	0.72	7.44	0.08	1.08	0.12	1.04
School 2									
girls	1.45	2.36	0.91	0.73	2.18	0.18	0.54	0.00	1.18
boys	1.67	2.33	1.33	0.83	2.44	0.06	0.61	0.22	1.44
total	1.56	2.34	1.17	0.79	2.34	0.10	0.59	0.14	1.34
School 3									
girls	1.82	2.18	0.73	0.36	3.45	0.18	1.64	0.00	1.54
boys	1.36	1.73	0.82	0.27	2.00	0.18	0.54	0.00	1.54
total	1.56	1.95	0.77	0.32	2.73	0.18	1.14	0.00	1.54
School 4									
girls	1.57	3.57	1.79	0.93	2.71	0.14	0.71	0.43	1.50
boys	1.64	3.82	2.00	0.64	3.18	0.09	1.00	0.27	2.00
total	1.60	3.68	1.80	0.80	2.80	0.12	0.84	0.36	1.72
School 5									
girls	1.60	0.80	0.70	0.40	2.40	1.70	1.00	0.00	0.70
boys	1.50	1.37	0.75	0.19	2.75	0.19	0.25	0.19	0.75
total	1.54	1.15	0.73	0.27	2.60	0.77	0.54	0.11	0.73
School 6									
girls	1.47	1.73	1.27	1.07	3.47	0.40	1.27	0.47	1.73
boys	1.18	1.09	1.09	0.45	2.91	0.00	0.73	0.36	1.54
total	1.35	1.46	1.19	0.81	3.73	0.23	1.04	0.42	1.65

of the nine systems was tabulated for girls, for boys, and for all students in each of the six schools studied. With the exception of the two schools where the science teacher and the school nurse had each discussed health related material, no significant differences were found.

The test for level of significcance between the rank orders of boys and girls showed significant rhos for each of the six schools as follows, .829, .967, .913, .954, .748, and .946. The level of significance for the total number of girls and boys in the study gave a rho of .983.

A comparison was made between the results of Gellert's (1962) study, Porter's (1974) study, and the present study. These results are shown in Table 4. It should be noted that differences in methodology were utilized in each of the three studies.

Table 4

Mean Number of Internal Body Parts Drawn and Labeled in Two Preceding Studies and the Present Study

	Gellert's Study 9-11 yrs.	Porter's Study fifth graders	Present Study fifth graders
mean number of parts named	9.0	15.6	11.1

It was noted that detailed and intricate parts of the internal body such as cerebrum, eustachian tube, pancreas, optic nerve, ovary, and testicle were named by the subjects. Correct medical terms were applied in naming body parts with few exceptions in which lay terms were used. While children used terms such as arm bone or leg bone, other children used anatomic terms such as femur, tibia, and humerus.

Questionnaire on Body Function

In respect to the questionnaire on body functions, it was found that there was no significant difference in mean number of functions listed by boys and by girls. A one-way analysis of variance run between the three socioeconomic levels for each question with regard to number of functions listed revealed significant differences in the respiratory, gastrointestinal, and lymphatic systems. The F values for these systems were as follows, 4.02, 3.88, and 4.23. These F values were significant at 0.05. (Appendix F) Individual comparisons were made using the Schiffe test. For the respiratory system, significant differences were noted between the high and low socioeconomic levels with the high group naming more functions than the low group. For the gastrointestinal system, differences were noted between the three socioeconomic groups with the highest mean number of functions listed by the middle group. For the lymphatic system, differences were again noted between the three groups with the greatest

mean number of functions listed by the high and the fewest functions by the lowest socioeconomic group. No statistically significant differences were found between socioeconomic levels with the remaining systems. Random differences between the schools were noted. Mean number of functions listed for questions 1 through 11 may be found in Appendix G.

In reply to the question, "What does your brain do?" the functions listed primarily fit three content categories. Forty-two percent of the replies given stated that the brain "helps you think," 37% stated that the brain "helps control your body," and 12% stated that the brain "sends messages to tell the rest of your body what to do." It was found that the mean number of functions given for the brain was 1.39.

In response to the question, "What do your lungs do?" 81% of the replies stated that the lungs "help you breathe." The remaining 19% of the replies were divided between several responses.

When asked, "What are the parts of your digestive system and what do they do?" the mean number of functions listed was 0.83. A wide diversity of functions were listed and ranged from swallowing food, to grinding food, to transporting food. The most common function, 43% of the replies, was that of digesting food.

An analysis of the question, "What does your heart do?" revealed that the mean number of functions listed was 1.23.

Of the functions listed, 60% of the replies stated that the heart "pumps blood," 25% that the heart "keeps you alive," and 15% gave miscellaneous other responses.

In reply to the question, "What do your bones do?" the children listed a mean of 1.15 functions. The two major functions were locomotion, 47%, and strength, 43%.

In response to the question, "What do your glands do?" the mean number of functions listed was 0.2. Approximately one-third of the children listed something at as a function of the glands while the other two-thirds gave incorrect answers, 50% of which indicated the glands were "to help you swallow."

In reply to the question, "What do your eyes do?" most children gave the same reply. Ninety-six percent of the children answered this question and of those 96% who answered, 96% of the replies stated that the eyes "help you see." The remaining 4% of the replies stated that the eyes "send messages to the brain."

An analysis of the question, "What does your nose do?" revealed that the mean number of responses was 1.06. Of those who replied, 56% stated that your nose "smells," and 40% stated that your nose "helps you breathe."

In response to the question, "What do your ears do?" 99% of children answered this question. Of those who answered, 98% replied that ears "help you hear," while the remaining 2% replied that they "help you with your balance."

In reply to the question, "How does your body get rid

of its waste products?" the mean number of functions listed for all children was 0.58, which shows that many children did not list any functions for this system. Of the replies given, 69% stated that your body gets rid of its waste products by "going to the bathroom." Only 13% of the replies specified that your body gets rid of its waste products through urine and 9% specified that your body gets rid of its waste products through bowel movements.

In response to the statement, "If you drew anything else on your picture that I have not asked you about, tell me what it is and what it does," many children did not list anything. Of those who did list parts, a few listed parts of the reproductive system and a few simply restated parts and functions they had named in response to previous questions.

Source of Knowledge about Internal Body Parts and Functions

An analysis of the question, "Where did you get your information about what is inside your body?" revealed no significant differences between the replies of boys and girls or between children of various socioeconomic areas. Of the 153 fifth graders who participated in this study, 84% answered this question. Of those who did answer, 59% replied that they had obtained most of their information from school, 21% replied that they had learned most of their information from their parents, 11% had gotten most of their information from other sources (primarily books),

7% had gotten most of their information from television, and 2% had received most of their information from friends.

CHAPTER III

DISCUSSION

Internal Body Parts Drawn and Named

The investigator found that the answers given by the students were generally correct and fairly uniform. Schilder and Wechsler (1935) reported that most children gave "correct" answers at a mental age of eleven. By correct answers, they refer to probable adult norms, rather than to a comprehensive scientific understanding of human anatomy or physiology. While there were differences in answers, these fit into several distinct content categories. Gellert (1962) made the following observations about a similar finding:

> It is tempting to speculate about the etiology of the remarkable homogeneity of the children's explanations. A number of factors may account for it. It is possible that the subjects lacked the lively imagination required for arriving at original conclusions. Another potential explanation is that the subject may have had recourse to similar sources of information. A third hypothesis that may be advanced is that the same reasoning process may have been used by most children in interpreting observations and direct information about the body, thus leading them to similar explanations. Perhaps all these factors played a part. Any attempt to reconstruct how the youngsters had arrived at their ideas about the body must be tentative and incomplete.

It was noted in the present study that there was no significant difference between the mean number of systems represented between the various socioeconomic levels. This was in contrast to Goodenough (1962) who showed that children

from low socioeconomic backgrounds knew less about their bodies than children from high socioeconomic backgrounds. This investigator found only random differences in body knowledge between the various schools. These differences may have resulted from exposure to visual aids and educational materials and the individual teacher's openness to discussing the body. Evaluation of methods of teaching and teacher attitudes was not a purpose of this study.

As shown in Table 2 there wer no significant differences between the number of systems represented by boys and by girls. This finding conflicted with the studies by Goodenough (1962) and Porter (1974) which showed that boys knew more than girls. Goodenough (1962) suggested that the sex differences which she found could be present because:

> (1) perhaps boys have more curiosity than girls; (2) perhaps boys are allowed to run about more freely than girls are permitted to do; (3) perhaps parents without being clearly aware of their attitudes nevertheless feel that boys should be taught facts because some day they will grow into men whose success or failure in life will be affected by the amount of knowledge he acquires, but that a knowledge of facts will be of little service to girls in their future job of catching a husband; (4) or possibly due to heredity where sex-linked genes may predispose one sex more than the other to go in search of knowledge.

In the 16 years since Goodenough's study, sex-role stereotyping has become less pronounced. This may have contributed to the finding of similar levels of knowledge in boys and girls.

In examining the mean number of parts listed for each

of the nine systems identified, no significant differences were found between boys and girls. However, the students from School 1 listed significantly more parts of the musculo-skeletal system than students from other schools. The class members also used the highest proportion of scientific terminology, such as, femur, tibia, humerus, and phalanges. In order to explain this phenomenon, a return visit to the school was made by the investigator. This visit disclosed that the science teacher had discussed muscles and bones approximately one week prior to testing. This indicates that these students were receptive to increased teaching at this time and that they were able to retain and utilize the scientific terminology in labeling the parts.

A comparison was made between mean number of internal body parts named in Gellert's (1962) study, Porter's (1974) study, and the present study (Table 4). Children in the present study were able to name more parts than were children in Gellert's study, and fewer parts than those in Porter's study. It should be noted that Gellert interviewed each child individually, then supplemented the verbal replies by asking each child to sketch various organs on an outline drawing. Though Porter and the present investigator used the same outline drawing, she did not differentiate socioeconomic levels, had a smaller sample, and did her study in a different geographic region. Whether these differences in mean number of parts drawn and labeled were due to changes in knowledge

level or to differences in research design were not determined in the present study.

Another significant finding was noted in that the girls from School 5 listed a larger number of parts of the reproductive system. It was discovered that the school nurse had discussed menstruation and development approximately one week prior to testing. This further indicates the apparent readiness of this age group for learning the scientific vocabulary and suggests that a single talk or dis ıssion is beneficial in communicating health information.

The low number of reproductive parts identified was in keeping with the results of Tait and Ascher's (1955) study in which no reproductive parts were listed and Porter's (1974) study in which only three children named structures related to reproduction. Whether this finding represents reticence or reflects ignorance about reproductive parts has not been determined.

The low number of responses regarding the lymphatic system found in this study documents the results of Tait and Ascher (1955) and Porter (1974). Gellert (1962) did not discuss this system in her study. This finding may reflect the relative lack of knowledge about this system in the adult population.

Gellert (1962), Tait and Ascher (1955), Schilder and Wechsler (1935), and Porter (1974), all showed that children frequently mentioned the heart, brain, and bones, but no percentages were reported. The present study concurred with

this finding and it was further found that the children knew more about the musculoskeletal, cardiovascular, and gastrointestinal systems, in descending rank order.

Questionnaire on Body Function

It was difficult to compare the results of this investigation with other studies because of the differing research designs. Porter (1974) and Tait and Ascher (1955) studied healthy children, while Goodenough (1962) surveyed ill children. None of the studies included knowledge about function. Gellert (1962) included function, but her population consisted of chronically ill children aged 4 to 16. She employed guided interview technique while this investigator utilized non-directive group testing. For the above reasons, the investigator was able to make limited comparisons with other studies.

In this study it was found that the children appeared to know most about those systems on which our culture focuses most attention. These systems included the neurological, respiratory, cardiovascular, muscular, skeletal, and special senses.

Significant differences were found in the mean number of functions listed by children from the three socioeconomic groups for the questions involving the respiratory, gastrointestinal, and lymphatic systems. For the respiratory system, significant differences were noted between the high and low

socioeconomic levels with the high group naming more functions than the low group. For the gastrointestinal system, differences were noted between the three socioeconomic groups with the highest mean number of functions listed by the middle group. For the lymphatic system, differences were again noted between the three groups with the greatest mean number of functions listed by the high and the fewest functions by the lowest socioeconomic group. No significant differences were found between socioeconomic levels with the remaining questions. Review of the literature revealed no other study regarding knowledge of body parts and functions in which the investigator had used socioeconomic status as a variable. Therefore, no reported findings were available with which to compare the findings of the present study. For those systems where students demonstrated the greatest amount of knowledge, no significant differences between socioeconomic levels were noted. However, in the respiratory, gastrointestinal, and lymphatic systems where significant differences were noted, there were inconsistencies between socioeconomic levels. In this study, no attempt was made to interpret this finding.

In response to the question, "What does your brain do?" 42% of the replies indicated that "the brain helps you to think." Thinking and brain become associated at an early age. It was also noted that by this age, many children were viewing the brain as a control center which directs the activity of other parts of the body. This concept represents a more

advanced knowledge of the human body, one that incorporates an idea of the interrelationships of the various systems.

By the age of ten, many children have observed the relationship between exercise and the respiratory rate. They know that when they engage in strenuous exercise, they breathe faster. It is possibly for this reason that 81% of the replies stated that the lungs help us to breathe. Several of the students also mentioned the interrelationship between the heart and the lungs and the importance of the lungs in "cleaning the blood." Eight students were even more explicit and explained that inhaled oxygen enters the blood in the lungs and carbon dioxide is removed from the blood and exhaled.

When asked what the parts of the digestive system were and what they did, the children listed a mean of 0.83 functions. While 43% of the replies specifically stated that the digestive system digests food, most of the remaining replies were functions related to the various aspects of digestions such as grinding, softening, transporting, and absorbing food. While Gellert's (1962) study showed that 100% of her 9 to 11-year-old children could relate food and eating to the stomach when questioned directly, this study indicates broader understanding of the digestive system.

Most children are familiar with the heart and its functions. By this age, children are aware that when they play hard, their hearts beat faster. Possibly for this reason, 60% of

the functions listed stated that the heart pumps blood. There is much publicity in all the media forms about the heart, the effects of diet on the heart, and cardiopulmonary resuscitation. Also many of the children have heard their parents and friends talk about people who have had heart attacks. Twenty-five percent of the replies stated that the heart keeps you alive. According to Piaget (Ginsberg, 1969) this is an example of moral causality which is a modality of immature thought that appears frequently in the statements of younger children. This process involves reasoning by moral necessity and is illustrated by statements such as "boats have to float, otherwise they would be of no use." Statements such as "we need it to live," as an explanation of what a particular organ does represents this type of thinking. Piaget (Ginsberg, 1969) stated that the functions of body parts were often explained in this fashion by children below age eight.

The data showed that the skeletal system was a familiar system to children. Bones are tangible to children, they can be felt. The function of this system is within their range of common experience. Sixty-one percent of the functions listed for the skeletal system were those of giving structure to the body. One student described bone function as "Bones help us to stand up. Without bones, we'd be like a pile of jelly."

The muscular system can be observed and felt. Cartoon

characters talk about eating spinach to build up muscles. American culture places much emphasis on the body and the maintenance of physical fitness. Thus locomotion and strength were seen by children as the two most common functions of the muscular system.

In response to the question, "What do your glands do?" 33% of the children gave a correct response and these replies related to the function of the sweat glands. The high percentage of incorrect replies, 67%, may have been caused by the fact that the glandular system is less well known. Of the 67% who gave incorrect replies, 30% of the children stated that glands "help us to swallow." To clarify this finding, several children were asked how their glands helped them swallow. They explained that when their throat was sore and they had trouble swallowing, they heard adults say they had swollen glands. From this experience, they may connect difficult swallowing with swollen glands, and thus associate glands with deglutition.

When asked about the function of their eyes, nose, and ears, the majority of students gave a correct response. Ninety-six percent of the students connected eyes with vision and nose with smell or breathing, and 98% associated ears with hearing. These associations of sense organs and functions are usually taught to children by significant adults at an early age. A number of children listed more intricate functions of the special senses. Seven children stated that the eye

sends images to the brain which in turn are interpreted by the brain. Seven children mentioned that in addition to helping us breathe and smell, the nose warms, moistens, and filters the air we inspire. The sense of balance was listed by four children as one of the functions of the ear.

Relative to the question, "How does your body get rid of its waste products?" the mean number of functions listed was 0.58. This means that almost half of the children gave no reply. Of the functions listed 69% stated that the body gets rid of waste products by going to the bathroom, 13% that wastes are excreted in urine, and 9% that wastes are eliminated in bowel movements. To what extent this finding represents lack of knowledge about the excretory system or indicates reticence and social taboos was not explored in this study.

This investigator found that many of the fifth grade students were beginning to conceptualize the interrelationships between various systems. Gellert (1962) also commented on this fact. Some examples of interrelationships noted by this investigator include: that the heart pumped blood to the lungs where it was cleaned, that bones provide support and make blood, and that muscles "helped push blood back up to their hearts." From these examples it can be seen that children not only have increased knowledge of body functions, but are beginning to appreciate interrelationships of systems.

Source of Knowledge about Internal Body Parts and Functions

From the replies given to the question, "Where did you get your information about what is inside your body?" it was found that of the 84% of children who replied, 59% received most of their knowlege from the school and 21% received most of their information from their parents. This supports the important role of the school in health teaching. The fact that only 21% of the children who replied stated that they had received most of the r instruction from their parents leads to speculation. Perhaps children did not recognize that they received health teaching at home. It could also be that children are not as receptive to teaching from parents as from an outside authority. On the other hand, parents may lack knowledge, may place little emphasis on health, or may be uncomfortable in discussing body functions.

Limitations

Within the school system it was assumed that the students were homogeneous within each individual school. This assumption may have been incorrect in that busing did occur and that some schools may have served students from divergent socioeconomic groups. In the present study the correlations are in the ecological level, hence the results cannot be translated into individual socioeconomic levels without further study.

Although grade schools within three different socioeconomic

levels were utilized, they were within the same city, which limits generalizations. The majority of students in the study were Caucasians which might also limit the generalizability of the findings.

All classrooms in the Portland Public School System use the same health textbooks; however, the actual course content may vary. Thus students may not have received identical health instruction.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Few studies have been made to determine children's level of knowledge about their internal body parts and functions. These studies have for the most part utilized chronically ill, handicapped, or mentally disturbed children. It was the purpose of this descriptive study to explore children's perceptions of their internal body parts and functions in normal, healthy fifth grade children. In addition, this investigator was concerned with exploring the effect, if any, of sex differences and socioeconomic level on the children's level of knowledge about their internal body parts and functions.

The subjects were 153 fifth grade students from the Portland School System, approximately one-third of which came from each of a high, a middle, and a low socioeconomic area. The children were given a draw-a-person test to assess knowledge of internal body parts and a questionnaire to explore knowledge of body function.

The data obtained were tabulated by recording each item drawn and named according to the child's sex and school. The percentage of the total number of parts named was calculated for each child. The sex of the child and the child's school were correlated with the number of organs drawn and

labeled, with the number of systems represented, and with the number of functions listed.

The data obtained indicated that children in the current study achieved significantly higher scores than those participating in Gellert's (1962) study utilizing chronically ill children, but less than those participating in Porter's (1974) study. The children were able to use scientific terminology correctly in labeling the parts they had drawn. They also demonstrated a beginning awareness of the interrelationships between various systems. Statistically significiant differences were found in the mean number of functions listed by children from the high, middle, and low socioeconomic levels with respect to the respiratory, gastrointestinal, and lymphatic systems. No significant differences were found between socioeconomic levels for the remaining systems or for the mean number of parts listed for any system.

Recent literature shows that health education is starting too late and recommends that more advanced and intense health teaching be offered in the primary grades. While many educators are trying to implement this concept, little attention has been given to determining children's perceptions of their internal body parts and functions. In the present study, it was demonstrated that at the fifth grade level children are able to assimilate and use scientific terminology as a result of one exposure to this content. The current emphasis on individual health maintenance can effectively be introduced at the fifth grade level.

Recommendations for Future Research

Mead (1955) observed that people's beliefs about the workings of their bodies may affect the response made to illness and to public health measures such as contraception and mental illness. Ineffective responses occur when the recommendations for the treatment of illness or public health measures conflict with the individual's ideas about his own body. Such conflicts occur many times daily throughout the world and are often respon ible for the common complaint of lack of compliance with medical directives. Accordingly, the investigation of ethnic, cultural, and religious differences with respect to ideas about the body should be of interest not only to the theoretician, but to those workers in many applied professions as well.

It would be useful to design a study utilizing the knowledge of normal, healthy adults with which to compare the children's responses. In determining the children's level of maturity and knowledge, it is necessary to compare them with the "normal" adult responses. Tait and Ascher (1955) compared knowledge of internal body parts involving both children and adults, but many of these adult subjects were mentally ill and the sample of children was small. The effect of lifestyle, parental knowledge, and attitude on children's perceptions of their internal body parts and functions should be determined to facilitate better communication of health information.

The findings of statistically significant differences in knowledge of body function between the three socio-economic groups for three systems indicates the need for further investigation of the effects of socioeconomic levels. Findings from this type of research on the influence of socioeconomic group membership on knowledge of health and health maintenance behavior has wide implications for education, social planning, and the development of health care resources.

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APPENDICES

APPENDIX A

Release from Consent Form

September 7, 1977

Dr. Mae Rawlinson
Department of Nursing
University of Oregon
Health Science Center
3181 S. W. Sam Jackson Road
Portland, Oregon 97201

Dear Dr. Rawlinson:

This afternoon I spoke with Dr. Victor Doherty, Assistant Superintendent and director of the Evaluation Department for our school district regarding Pat Grillot's proposed health study. Dr. Doherty and I agree that the results of Pat's study would be more valuable to us if parent consent letters are not required. Essentially we might consider her project a pre-test for our regular health classes to be administered to all children present on a given day.

At any rate, we want you to know that she has our permission to omit the parent consent letters.

Sincerely,

(Mrs.) Betty R. Polen
Specialist
Health Education

BRP:dea

APPENDIX B

Map and Score Code Showing Socioeconomic Areas for Multnomah County

Socioeconomic Score Code for Counties, SMSA Census Tracts, or County Census Divisions

Median Family Income

Code xx for unknown

01 for 34,000 or more	19 for 16,000-16,999
02 for 33,000-33,999	20 for 15,000-15,999
03 for 32,000-32,999	21 for 14,000-14,999
04 for 31,000-31,999	22 for 13,000-13,999
05 for 30,000-30,999	23 for 12,000-12,999
06 for 29,000-29,999	24 for 11,000-11,999
07 for 28,000-28,999	25 for 10,000-10,999
08 for 27,000-27,999	26 for 9,000- 9,999
09 for 26,000-26,999	27 for 8,000- 8,999
10 for 25,000-25,999	28 for 7,000- 7,999
11 for 24,000-24,999	29 for 6,000- 6,999
12 for 23,000-23,999	30 for 5,000- 5,999
13 for 22,000-22,999	31 for 4,000- 4,999
14 for 21,000-21,999	32 for 3,000- 3,999
15 for 20,000-20,999	33 for 2,000- 2,999
16 for 19,000-19,999	34 for 1,000- 1,999
17 for 18,000-18,999	35 for 0- 999
18 for 17,000-17,999	

Percent of Families with 1969 Income Below Poverty Level

Code xx for unknown

01 for 0.0- 0.9	13 for 12.0-12.9	25 for 24.0-24.9
02 for 1.0- 1.9	14 for 13.0-13.9	26 for 25.0-25.9
03 for 2.0- 2.9	15 for 14.0-14.9	27 for 26.0-26.9
04 for 3.0- 3.9	16 for 15.0-15.9	28 for 27.0-27.9
05 for 4.0- 4.9	17 for 16.0-16.9	29 for 28.0-28.9
06 for 5.0- 5.9	18 for 17.0-17.9	30 for 29.0-29.9
07 for 6.0- 6.9	19 for 18.0-18.9	31 for 30.0-30.9
08 for 7.0- 7.9	20 for 19.0-19.9	32 for 31.0-31.9
09 for 8.0- 8.9	21 for 20.0-20.9	33 for 32.0-32.9
10 for 9.0- 9.9	22 for 21.0-21.9	34 for 33.0-33.9
11 for 10.0-10.9	23 for 22.0-22.9	35 for 34.0-34.9
12 for 11.0-11.9	24 for 23.0-23.9	36 for 35.0-35.9

Socioeconomic Score Code for Counties SMSA Census Tracts
or County Census Divisions
page 2

Percent of High School Graduates among Persons 25 years or Older

Code xx for unknown

01 for 98.0-99.9	15 for 70.0-71.9	29 for 42.0-43.9
02 for 96.0-97.7	16 for 68.0-69.9	30 for 40.0-41.9
03 for 94.0-95.9	17 for 66.0-67.9	31 for 48.0-39.9
04 for 92.0-93.9	18 for 64.0-65.9	32 for 36.0-37.9
05 for 90.0-91.9	19 for 62.0-63.9	33 for 34.0-35.9
06 for 88.0-89.9	20 for 60.0-61.9	34 for 32.0-33.9
07 for 86.0-87.9	21 for 58.0-59.9	35 for 30.0-31.9
08 for 84.0-85.9	22 for 5[illegible].0-57.9	36 for 28.0-29.9
09 for 82.0-83.9	23 for 54.0-55.9	37 for 26.0-27.9
10 for 80.0-81.9	24 for 52.0-53.9	38 for 24.0-25.9
11 for 78.0-79.9	25 for 50.0-51.9	39 for 22.0-23.9
12 for 76.0-77.9	26 for 48.0-49.9	40 for 20.0-21.9
13 for 74.0-75.9	27 for 46.0-47.9	41 for 18.0-19.9
14 for 72.0-73.9	28 for 44.0-45.9	42 for 16.0-17.9

Percent of Occupied Housing Units with 1.01 or more Persons per Room

Code xx for unknown

01 for 0.0- 0.9	13 for 12.0-12.9	25 for 24.0-24.9
02 for 1.0- 1.9	14 for 13.0-13.9	26 for 25.0-25.9
03 for 2.0- 2.9	15 for 14.0-14.9	27 for 26.0-26.9
04 for 3.0- 3.9	16 for 15.0-15.9	28 for 27.0-27.9
05 for 4.0- 4.9	17 for 16.0-16.9	29 for 28.0-28.9
06 for 5.0- 5.9	18 for 17.0-17.9	30 for 29.0-29.9
07 for 6.0- 6.9	19 for 18.0-18.9	31 for 30.0-30.9
08 for 7.0- 7.9	20 for 19.0-19.9	32 for 31.0-31.9
09 for 8.0- 8.9	21 for 20.0-20.9	33 for 32.0-32.9
10 for 9.0- 9.9	22 for 21.0-21.9	34 for 33.0-33.9
11 for 10.0-10.9	23 for 22.0-22.9	35 for 34.0-34.9
12 for 11.0-11.9	24 for 23.0-23.9	36 for 35.0-35.0

Sum of Scores

Code xxx for all or part unknown
Otherwise, code directly: ---, 009,010,011, ---

Socioeconomic Score Code for Counties SMSA Census Tracts
or County Census Divisions
page 3

Summary Score Categories

Code x for unknown or not applicable.
0 for score of 20-29
1 for score of 30-39
2 for score of 40-49
3 for score of 50-59
4 for score of 60-69
5 for score of 70-79
6 for score of 80-89
7 for score of 90-109
8 for score of 110-129
9 for score of 130 and over

Ethnic Socioeconomic Distribution in Multnomah County, Oregon

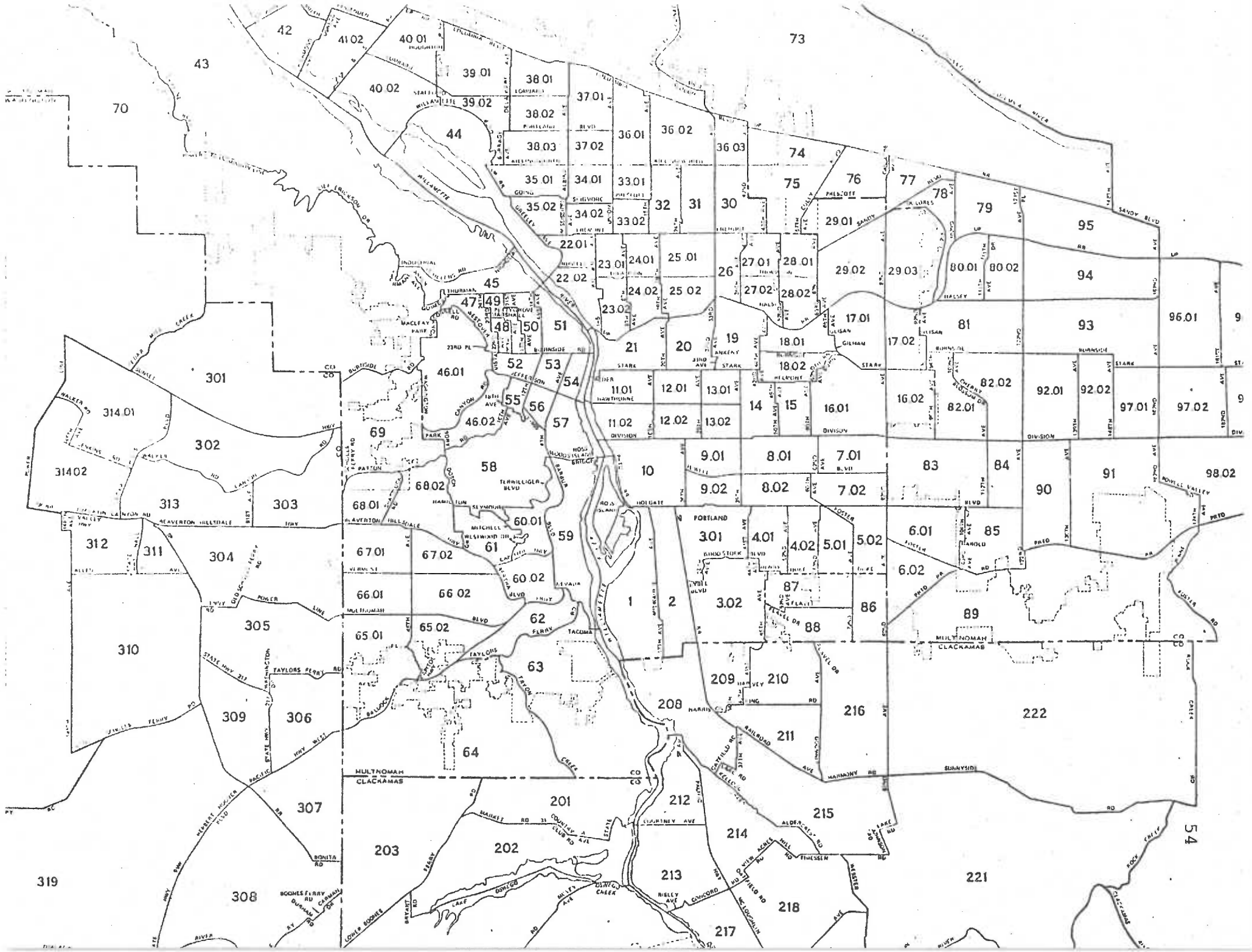
Socioeconomic Score *	1970 Population	Blacks #	Blacks %	Spanish Language #	Spanish Language %
High 20 - 20	9,092	14	0.2	114	1.3
30 - 39	30,073	163	0.5	312	1.0
40 - 49	97,805	425	0.4	1,113	1.1
50 - 59	171,572	2,668	1.6	2,477	1.4
60 - 69	143,106	4,587	3.2	2,106	1.5
70 - 79	72,076	2,919	4.0	1,634	2.3
80 - 89	22,190	4,816	21.7	280	1.3
90 - 109	9,297	5,935	63.8	196	2.1
Low 110 - 129	1,234	612	49.6	100	8.1
Intermediate	222	16	7.2	24	10.8
Total	556,667	22,155	8.0	8,356	1.5

* Sum of scores for census tract characteristics:

a. median family income
b. % families with income below poverty level
c. % high school graduates among persons aged 25 or older
d. % occupied housing units with 1.01 or more persons/room

Socioeconomic strata contain these census tracts:

20 - 29: 46.01, 46.02, 61, 69
30 - 39: 3.02, 58, 60.01, 60.02, 63, 68.01, 68.02, 95
40 - 49: 3.01, 16.01, 19, 25.01, 25.02, 26, 27.01, 27.02, 28.01, 28.02, 29.03, 55, 62, 64, 65.01, 65.02, 66.01, 66.02, 67.01, 67.02, 70, 78, 80.01, 82.01, 94, 98.02
50 - 59: 2, 4.01, 8.01, 9.01, 9.02, 12.02, 14, 15, 17.02, 18.01, 18.02, 24.01, 24.02, 29.01, 29.02, 30, 31, 36.03, 39.02, 40.02, 47, 52, 54, 57, 79, 80.02, 81, 82.02, 91, 92.01, 92.02, 93, 96.01, 96.02, 97.01, 97.02, 100, 101, 102, 104.01, 105
60 - 69: 4.02, 5.01, 5.02, 6.01, 8.02, 12.01, 13.02, 16.02, 17.01, 20, 32, 35.02, 36.02, 37.01, 37.02, 38.02, 38.03, 39.01, 41.02, 44, 45, 53, 56, 59, 71, 72, 73, 74, 75, 76, 77, 83, 84, 89, 98.01, 99, 103, 104.02
70 - 79: 1, 6.02, 10, 11.02, 13.01, 23.02, 35.01, 36.01, 38.01, 41.01, 42, 43, 48, 49, 50, 85, 86, 87, 88, 90
80 - 89: 7.01, 11.01, 21, 22.02, 33.01, 34.01, 40.01
90 - 109: 23.01, 33.02, 34.02, 51
110+ : 22.1
Indeterminate: 40.99, 41.99, 44.99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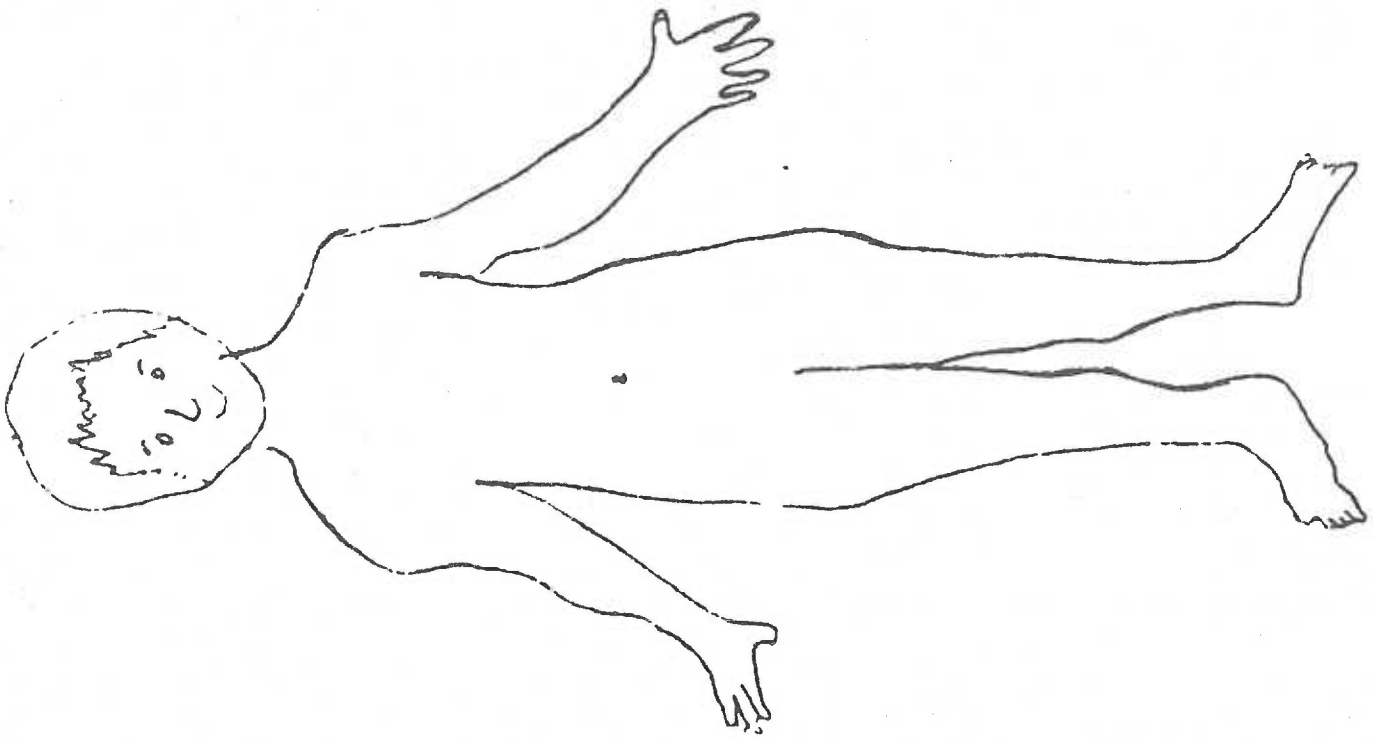
313
303
68.01
60.01
59
6.01
85
312
311
304
67.01
67.02
61
3.01
4.01
4.02
5.01
5.02
60.02
87
6.02
66.01
66.02
3.02
86
89
305
65.01
65.02
62
1
2
88
310
63
209
210
208
216
222
309
306
64
211
MULTNOMAH
CLACKAMAS
201
212
215
307
214
203
202
213
221
319
308
218
217
54

APPENDIX C

Outline Drawing of Human Body



APPENDIX D

Questionnaire on Body Function

. What does your brain do?

. What do your lungs do?

. What are the parts of your digestive system, and what do they do?

. What does your heart do?

. What do your bones do?

. What do your muscles do?

. What do your glands do?

9. What does your nose do?

0. What do your ears do?

1. How does your body get rid of its waste products?

2. If you drew anything else on your picture that I have not asked you about, tell me what it is and what it does.

Where did you get your information about what is inside your body?"

ircle the one letter that best answers the question.

. parents

. school

. friends

. TV

. other, please list

APPENDIX E

Pilot Study Questionnaires

Part 2

1. What happens inside your head?

2. What happens inside your body when you breathe?

3. What happens to the food you eat?

4. What does your heart do?

5. What do your bones do?

6. What do your muscles do?

7. What do your glands do?

8. What do your eyes do?

9. What does your nose do?

10. What do your ears do?

11. How does your body get rid of its waste products?

12. If you drew anything else on your picture that I have not asked you about, tell me what it is and what it does.

Circle the letter that best answers the question.

"Where did you get your information about what is inside your body?"

a. parents
b. school
c. friends
d. TV
e. other, please list

Part 2

1. What does your brain do?

2. What do your lungs do?

3. What do the parts of your digestive system do?

4. What does your heart do?

5. What do your bones do?

6. What do your muscles do?

7. What do your glands do?

8. What do your eyes do?

9. What does your nose do?

10. What do your ears do?

11. What do your kidneys do?

12. What do your bowels?

13. If you drew anything else on your picture that I have not asked you about, tell me what it is and what it does.

"Where did you get your information about what is inside your body?"

Circle the one letter that best answers the question.

a. parents
b. school
c. friends
d. TV
e. other, please list

Summary Table for One Way Analysis of Variance Between Three Socioeconomic Levels with Regard to Mean Number of Functions Listed for the Respiratory System

	Sums of Squares	Degrees of Freedom	Mean Square	F
Total	75.84	151		
Groups	3.86	2	1.93	4.02**
Error	71.98	149	0.48	

if computed value > 3.00 then significant ($P \leq .05$)*
if computed value > 4.61 then significant ($P \leq .01$)**

Summary Table For One Way Analysis of Variance Between Three Socioeconomic Levels with Regard to Mean Number of Functions Listed for the Gastrointestinal System

	Sums of Squares	Degrees of Freedom	Mean Square	F
Total	146.2	151		
Groups	7.22	2	3.61	3.88*
Error	138.98	149	0.93	

if computed value > 3.00, then significant ($P \leq .05$)*
if computed value > 4.61, then significant ($P \leq .01$)**

Summary Table for One Way Analysis of Variance Between Three Socioeconomic Levels with Regard to Mean Number of Functions Listed for the Lymphatic System

	Sums of Squares	Degrees of Freedom	Mean Square	F
Total	21.84	151		
Groups	1.11	2	0.55	4.23*
Error	20.73	149	0.13	

if computed value > 3.00, then significant ($P \leq .05$)*
if computed value > 4.60, then significant ($P \leq .01$)**

APPENDIX G

Mean Number of Functions Listed for Questions 1 through 11 According to Sex and Socioeconomic Levels

Mean Number of Functions Listed for Questions 1 through 11 According to Sex and Socioeconomic Level

Question 1: What does your brain do?

	girls	boys	total
high income			
School 1	1.75	1.30	1.52
School 2	1.36	1.10	1.21
middle income			
School 3	1.27	1.27	1.27
School 4	1.28	1.18	1.24
low income			
School 5	1.40	1.19	1.27
School 6	1.93	1.75	1.85

Question 2: What do your lungs do?

	girls	boys	total
high income			
School 1	0.92	1.31	1.12
School 2	1.00	1.22	1.14
middle income			
School 3	1.27	1.04	1.09
School 4	1.50	1.00	1.28
low income			
School 5	0.80	1.00	0.96
School 6	0.80	0.91	0.85

Question 3: What are the parts of your digestive system, and what do they do?

	girls	boys	total
high income			
School 1	1.17	1.00	1.08
School 2	0.91	1.00	0.96
middle income			
School 3	1.36	1.14	1.18
School 4	0.64	0.64	0.64
low income			
School 5	0.60	0.56	0.58
School 6	0.67	0.36	0.54

Mean Number of Functions Listed for Questions 1 through 11 According to Sex and Socioeconomic Level

Question 4: What does your heart do?

	girls	boys	total
high income			
School 1	1.08	1.15	1.12
School 2	1.45	1.28	1.34
middle income			
School 3	1.18	1.00	1.09
School 4	1.29	1.00	1.16
low income			
School 5	1.50	1.06	1.23
School 6	1.67	1.18	1.46

Question 5: What do your bones do?

	girls	boys	total
high income			
School 1	1.08	1.38	1.24
School 2	1.18	1.11	1.14
middle income			
School 3	1.09	1.09	1.09
School 4	0.93	1.09	1.00
low income			
School 5	0.90	0.94	0.92
School 6	1.00	0.27	0.69

Question 6: What do your muscles do?

	girls	boys	total
high income			
School 1	1.17	1.46	1.32
School 2	1.17	1.50	1.36
middle income			
School 3	1.36	1.00	1.18
School 4	1.07	1.09	1.08
low income			
School 5	0.70	1.06	0.92
School 6	1.13	0.91	1.04

Mean Number of Functions Listed for Questions 1 through 11 According to Sex and Socioeconomic Level

Question 7: What do your glands do?

	girls	boys	total
high income			
School 1	0.42	0.42	0.42
School 2	0.00	0.28	0.17
middle income			
School 3	0.18	0.27	0.23
School 4	0.14	0.18	0.16
low income			
School 5	0.00	0.19	0.11
School 6	0.13	0.09	0.11

Question 8: What do your eyes do?

	girls	boys	total
high income			
School 1	0.92	1.00	0.96
School 2	1.00	1.00	1.00
middle income			
School 3	1.00	1.00	1.00
School 4	1.14	1.00	1.08
low income			
School 5	0.90	0.69	0.77
School 6	0.93	0.91	0.92

Question 9: What does your nose do?

	girls	boys	total
high income			
School 1	1.00	1.08	1.04
School 2	1.00	1.17	1.10
middle income			
School 3	0.90	0.82	0.86
School 4	1.14	1.00	1.08
low income			
School 5	1.30	1.00	1.11
School 6	1.27	1.09	1.19

Mean Number of Functions Listed for Questions 1 through 11
According to Sex and Socioeconomic Level

Question 10: What do your ears do?

	girls	boys	total
high income			
School 1	0.92	1.08	1.00
School 2	0.91	0.83	0.86
middle income			
School 3	1.00	0.82	0.91
School 4	1.00	0.91	0.96
low income			
School 5	0.90	0.94	0.92
School 6	1.00	0.91	0.96

Question 11: How does your body get rid of its waste products?

	girls	boys	total
high income			
School 1	0.67	0.75	0.71
School 2	0.45	0.77	0.65
middle income			
School 3	0.54	0.45	0.50
School 4	0.50	0.73	0.60
low income			
School 5	0.70	0.44	0.54
School 6	0.53	0.36	0.46

AN ABSTRACT OF THE THESIS OF

PATRICIA GRILLOT

For the MASTER OF NURSING

Date receiving this degree: June 9, 1978

Title: CHILDREN'S PERCEPTIONS OF THEIR INTERNAL BODY PARTS AND FUNCTIONS

Approved: Wilma Peterson
Wilma Peterson, Ph.D. Thesis Advisor

The purpose of this descriptive study was to explore children's perceptions of their internal body parts and functions. The subjects were 153 fifth grade students in the Portland Public School System. Of these students, approximately one-third came from each of a high, a middle, and a low socioeconomic area. The children were given a draw-a-person test to assess knowledge of internal body parts and a questionnaire to assess knowledge of body function.

The data obtained were tabulated by recording each item drawn and named according to the child's sex and school. The percentage of the total number of parts named was calculated for each child. The sex of the child and the child's school were correlated with the number of organs drawn and labeled, with the number of systems represented, and with the number of functions listed.

The data obtained indicated that children in the current

study achieved significantly higher scores than those participating in Gellert's (1962) study utilizing chronically ill children, but less than those participating in Porter's (1974) study. The children were able to use scientific terminology correctly in labeling the parts they had drawn. They also demonstrated a beginning awareness of the interrelationships between various systems. Statistically significant differences were found in the mean number of functions listed by children from the high, middle and low socioeconomic levels with respect to the respiratory, gastrointestinal, and lymphatic systems. No significant differences were found between socioeconomic levels for the remaining systems or for the mean number of parts listed for any system. No significant differences were noted between the number of body parts and functions listed by boys and girls.