Sensorimotor versus Cognitive-Perceptual Training Effects on the Body Concept of Preschoolers

(Goodenough-Harris Drawing Test, body part identification, vestibular-kinesthetic input, tactual input, body scheme)

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The effects of two training programs on the body concept development of preschoolers as reflected in human figure drawings were investigated in this study. Twenty-four three-, four-, and five-year-old preschool children were divided into two experimental groups and one control group, matched closely by age and sex. All subjects were pre-tested with the Goodenough-Harris Drawing Test and post-tested with the same instrument after a one-month intervention training period. Group A received ten hours of sensorimotor training and Group B received ten hours of verbal body-part identification training. The mean gain scores of the two experimental groups were significantly different, with a greater mean gain by the sensorimotor group. Implications for occupational therapy are discussed.

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Gilfoyle and Grady define body scheme as a neurophysiological function resulting in a cognitive structure of various parts of the body and their relationship in space (1). Henderson distinguishes between body scheme, an unconscious mechanism underlying spatial motor coordination, and body concept, an abstract intellectual mechanism including perceptual, linguistic, and conceptual components (2). Both the unconscious and conscious components of the body experience reflect current sensory feedback as well as past perceptual experience. Because it is transactional in nature, the interpretation of sensory data may result in distortion of the body scheme and body concept (3). A clear understanding of how the body scheme and the conscious body concept interrelate and develop is essential in working with the patient experiencing distortion of either...
mechanism. In the course of treatment the occupational therapist challenges the client to draw on these two mechanisms and respond in an adaptive manner. In the following study, the term body concept is defined as the integration of the conscious and unconscious body experiences that allows the child to solve body awareness problems.

**Review of the Literature**

A method frequently used in both research and clinical practice to assess the child's body concept is a self-drawing. Research has indicated that when individuals comply with a directive to "draw a person," they tend to use their body as a reference (4, 5). Theoretically, drawing a person involves projection of the body concept of the person who drew the picture. Further, when a child expresses satisfaction with his or her drawing, it is felt this satisfaction reflects his or her current level of self-knowledge and integration of past sensorimotor experiences (6, 7).

Two different approaches—a cognitive-perceptual approach and a sensorimotor approach—are currently used to enhance body concept development in children. Focusing the child's attention on the body's parts is emphasized in the cognitive-perceptual approach. Medinrus, Bobitt, and Hullett predicted that the experience of assembling a jigsaw puzzle of a male figure would increase performance scores on the Goodenough Draw-A-Man test. The results of their study strongly supported the prediction (8). Musical games and various classroom activities based on the cognitive-perceptual approach have been recommended for inclusion in the curriculum for exceptional children (9, 10).

Providing the child with sensorimotor experiences is emphasized in the sensorimotor approach for enhancing body concept development. Painter investigated the effects of a sensorimotor activity program on kindergarten children's body concept. Her program resulted in significant gains on the Goodenough Draw-A-Man Test (11). Ball and Edgar tested the assumption that sensorimotor training would influence body concept development as measured by Head's Hand-Eye-Ear test, an imitation of posture test. The results of the study indicated that, when sensorimotor development was accelerated in normal kindergarten children, there was a concomitant gain in generalized body concept (12).

On the basis of the evidence presented above, it may be concluded that both cognitive-perceptual experiences and sensorimotor experiences will have an effect on body concept development. Yet little has been done to compare the effectiveness of these two approaches.

**Hypothesis**

This study tested the hypothesis that a program of sensorimotor activities will be more effective in promoting body concept development, reflected by larger score gains on the Goodenough-Harris Drawing Test, than will a body part identification program. In other words, vestibular-kinesthetic and tactile input are presumed to be more basic to body concept development in children than cognitive-perceptual input.

**Method**

**Subjects.** The sample consisted of 12 normal male and 12 normal female preschool children enrolled in two classes of a human development laboratory preschool program. The subjects were divided into three groups—two experimental groups and one control group. Group A, who received sensorimotor training, consisted of 4 males and 4 females with a mean age of 4.3 years; Group B, who received body-part identification training, consisted of 4 males and 4 females with a mean age of 4.3 years; and Group C, who were not involved in specific training, consisted of 4 males and 4 females with a mean age of 4.5 years.

**Procedure.** The Goodenough-Harris Drawing Test, a human figure drawing test, was used both as a pre-test and after an intervening period of one month as a post-test (5). To establish rapport with the subjects, the test administrator spent a half-hour with each child in the classroom before the administration of the pre-test. All subjects were individually tested in a quiet room by the same test administrator, who did not know the group designation of the children. The test consists of three separate pages on which the subject is asked to draw a picture of a "whole man," a "whole woman," and himself/herself, respectively. Each test session required approximately 20 minutes and included informal questions to clarify ambiguous aspects of the drawings, with the subjects responses recorded directly on the protocols. The same procedures were used for the post-test.

**Training Procedure.** The experimental groups were involved in 13 training sessions over a 1-month period. The initial session lasted 60 minutes and the subsequent sessions 45 minutes each. Each experimental group worked with the same training leader and followed a specific sequence of activities for each session. Group A participated in the following set of activities, with the total amount of time spent in each activity recorded: yoga, 130
Figure 1: Representative pre- and post-test "self" drawings for Group A, Group B, and Group C.

**GROUP A**
Subject G (sensorimotor training)

**GROUP B**
Subject L (body-part identification)

**GROUP C**
Subject S (no training)

The data analyzed consisted of pretest and post-test difference scores of the 24 preschool children on the Goodenough-Harris Drawing Test. The post-test scores were obtained 1 month following the pre-test scores. Each drawing included for analysis was individually scored by a rater who did not know the group designation of the children. The difference scores were calculated by subtracting a pre-test composite score, obtained by averaging the scores of the three pre-test drawings, from the post-test composite score, obtained by averaging the scores of the three post-test drawings.

To determine the reliability of the first rater, a second rater independently scored a randomly selected sample (N = 12) of the entire sample of tests. Overall inter-rater reliability was calculated to be $r = .95$.

Pre-test scores indicated no significant differences between the three groups, $F(2, 21) = .745, p > .01$. Significant differences were not found between males and females in the pre-test and the post-test score comparisons, $F(1, 22) = .278, p > .01$, or in relationship to classroom attended, $F(1, 22) = .304, p > .01$.

The mean differences between pre-test and post-test scores were calculated for each group, with Group A gaining an average of 9.55 minutes; tumbling on mats, 135 minutes; balance beam, 90 minutes; motor exercises (e.g., "Animal Walks"), 180 minutes; and relaxation/breathing exercises, 65 minutes. For each session, the following sequence was used: 10 minutes of yoga; 30 minutes of planned activities (tumbling on mats, balance beam, or motor activities); and 5 minutes of relaxation/breathing exercises.

Group B participated in the following set of activities, with the total amount of time spent in each activity recorded: body-part identification songs and finger plays, 280 minutes; flannelboard fantasy man, 135 minutes; identifying body parts in a mirror, 55 minutes; reading *Bodies* (13), 65 minutes; and "Where's Mr. Thumbkin?", 65 minutes. The sessions were structured to follow this sequence: 10 minutes of songs; 30 minutes of planned activities (additional songs, fantasy man, mirror activity, or *Bodies*); and 5 minutes of "Where's Mr. Thumbkin?"

Group C was not involved in specific training activities during the intervention period.
points, Group B gaining an average of 4.2 points, and Group C gaining an average of 0.55 points. Figure 1 shows selected pre-test and post-test "self" drawings for each group. Differences in the pre-test and post-test scores were due mainly to the addition of body parts. All drawings were in frontal perspective. No differences were attributed to changes in the amount of clothing drawn or body/leg proportion.

Examination of the data for individual subjects in all three groups regarding mean score gains yielded the following information: In the control group, only one score increase of more than 5 points was found, whereas in Group B, 6 score increases of more than 5 points were found. One increase of more than 12 points in Group B and 4 increases of more than 12 points in Group A were also seen.

There was a significant difference between the difference scores of the three groups, F(2, 21) = 6.28, p < .01. And, as predicted, the difference scores of the two experimental groups differed significantly, with a greater mean gain in scores by the sensorimotor group, t(14) = 3.58, p < .01.

Discussion

It appears that body concept, as measured by human figure drawings, was altered by intervention for the experimental subjects in the present study. Although it remains to be demonstrated that long-term effects may result from the kind of experiences introduced, the fact that sessions totalling only 10 hours influenced the child's Goodenough-Harris Drawing Test performance to a significant degree suggests that repeated and continued training of this nature might produce even greater and more marked results for this age child. The results indicate that a sensorimotor program offering subcognitive sensory body experiences yielded higher mean gains in scores than a cognitive-perceptual program. This would suggest that, for the preschool child, sensorimotor learning is more effective than verbal learning in promoting body concept, reflected in the ability to draw human figures.

Awareness of various parts of the body and their relationship to each other is essential for a variety of activities, such as dressing, and must therefore be considered by the occupational therapist (14). Ayres, in discussing body scheme, suggested that, in addition to promoting praxis, the body scheme acts as the basis for development of spatial concepts (15). In working with neurologically handicapped or developmentally delayed individuals, body concept and treatment modalities designed to enhance it are important. In the literature, activities for remediation of a poor body concept include suggestions for games and movement experiences, as well as practice in pointing to and naming body parts (16). The task for the occupational therapist is to select the approach that will offer the most effective experiences to the client. The success of intervention will be reflected in the client's ability to apply his or her body concept to problem solving and skill development. It appears that, for the preschool child and possibly for a client functioning at the same developmental level, activities that provide vestibular-kinesthetic and tactile experiences may be the most effective for the occupational therapist to use to enhance body concept development.

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