

EFFECTS OF SPATIAL DENSITY ON PRESCHOOL  
CHILDREN'S CONTACT BEHAVIORS WITH  
PEERS AND TEACHERS

By

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## CHAPTER I

### THE RESEARCH PROBLEM

#### Introduction

Hereditary and environmental factors have both been considered in many studies of child development. This paper is concerned with an environmental factor, and how it affects preschool children's developing communication behaviors. To be more specific, the environmental factor in question is the spatial density within a preschool block center, and the communication processes are the touching behaviors of the three-, four-, and five-year-old children playing in the block center. The aim of this study is to determine effects that increased spatial density have on the physical contacts between preschool peers and between preschool children and their teachers.

Bartholomew (1973) stressed the point that the:

. . . large number of child care facilities that are either existing or planned make the need for research on the effects of the physical environment on children's behavior especially pressing (p. 2).

Numerous studies have researched how specific physical characteristics of the environment affect preschool children's behaviors. Wall color, room temperature, texture, noise level, room shape, and furniture arrangement have all been considered. Shape is another factor which has been considered.



The primary ingredient for a quality learning environment is space. Space with appropriate dimensions, not the brick and mortar, is the heart of a good living-learning environment (Gardner, 1968, p. 5).

Being a teacher for three years has brought forth a question in this researcher's mind. Why do some teachers seem to be so unsatisfied with their present ratio of number of children to available classroom space? Are their desires for more space per child a selfish demand, or do these teachers see undesirable or otherwise deviant behaviors occurring due to the lack of space? Research on this topic has brought about contradictory results.

Loo (1976) found that space did have significant effects on five-year-olds' behavior. Where space was limited, the children interacted less positively, used various means of avoidance, became vigilant on-lookers, and were unstable in their toy play activities. There also appeared to be a significant sex difference in response to crowding. More aggression was exhibited by both males and females in the higher density condition, with the boys displaying the greatest amount of increased aggression. Echols (1976) and Roberts (1976) found that amount of space available was inversely related to the number of physical contacts that were made in the natural preschool setting. Aggressive contacts occurred slightly more in the more crowded setting. On the other hand, assistance wanted by the students from their teachers seemed to be less in the higher density situation. Echols' (1976) explanation was:

Because aggressive contact does occur more frequently indoors and because space is at a premium, it seems possible that the child rejects assistance because of a need to be more protective of personal territory in the more crowded setting (p. 20).

Echols (1976) and Roberts (1976) were actually directing their studies to the physical contacts that occurred between preschool peers and between preschool children and adults. They were studying these contact behaviors, based on the importance of physical contact to the communication processes of preschool age children. Anderson (1973) noted that during the preschool stage of development, young children often supplemented their growing ability at verbal communication with nonverbal, tactile communication. Hallahan, Kaufman, and Mueller (1975) reported that young children's frequency of verbalization was significantly correlated with their frequency of physical contacts with peers.

Research has indicated that physical contacts seemed to be one of the behaviors affected by spatial density. Little research has dealt with the effects that spatial density has on physical contact behaviors of preschool children and their teachers in a natural setting.

#### Statement of the Problem

This study evolved around the idea that the environment does affect a child's development, either positively or negatively. Today in the United States, many children from the ages of three to five years are being placed in the preschool environment. Children are experiencing varying environments in these different types of preschool settings. One variable within these environments is the amount of space per child, the spatial density. From Loo's (1976) study and others reviewed, it appears that spatial density does affect preschool children and their interactions with peers and teachers. Interactions between preschool children and their peers and teachers can cover a very broad area.

Since one of a child's earliest communication processes consists of touching (Wood, 1976; Eckerman, Whatley, and Kutz, 1975) and is a form of communication used throughout life, this aspect of how the preschool child interacts with those around him has been chosen for this study.

This researcher designed an observational experiment within a preschool block center in which the spatial density was manipulated for the purpose of recording the frequency of physical contact behaviors between preschool children and their teachers. The objective of this design was to determine how the amount of space per child affected one of the child's developmental communication processes--touching. The researcher looked for results that would be helpful in determining standards for spatial density of a child's preschool environment.

#### Purpose and Objectives

The purpose of this study was to examine the effects of spatial density on the physical contact behaviors between preschool children and their teachers and between preschool aged peers. The following objectives guided the study:

1. To investigate physical contact behaviors that occur in a block center with an established spatial density, between (a) preschool children and teachers, and (b) preschool aged peers.
2. To investigate physical contact behaviors that occur in the same block center of increased spatial density, between (a) preschool children and teachers, and (b) preschool aged peers.

3. To compare and analyze the frequency of physical contact behaviors which occur in the established block center to those contacts which occur in the same block center after increasing the spatial density.
4. To compare and analyze the frequency of physical contacts which occur in the block center having the increased spatial density to the contacts which occur in the same block center when restored to its original density.

#### Hypotheses

According to the results of recent studies, spatial density may affect the type and frequency of physical contacts that occur between preschool peers and their teachers. Yet, conflicting results do exist. Therefore, the following hypotheses have been developed for this study:

H1.1: Increased spatial density (less space per child in the block center) will have no significant effect on the frequency of "affectionate" contacts between preschool children and (1) peers and (2) teachers.

✓ H2.1: The frequency of "aggressive" contacts that occur between preschool peers will not significantly increase or decrease when the spatial density of the block center is increased.

✓ H2.2: Increased spatial density in the block center will have no significant effect on the frequency of "aggressive" contacts between preschool children and their teachers.

- H3.1: Increased spatial density in the block center will have no significant effect on the frequency of "assistance" contacts between preschool children.
- H3.2: The frequency of "assistance" contacts that occur between preschool children and their teachers will not significantly increase or decrease when the spatial density of the block center is increased.
- H4.1: The frequency of "accidental" touchings that occur between preschool children and peers will not significantly increase or decrease when the spatial density of the block center is increased.
- H4.2: The frequency of "accidental" touchings that occur between preschool children and their teachers will not significantly increase or decrease when the spatial density of the block center is increased.

#### Assumptions and Limitations

During this study, it was assumed that:

1. Individual children and teachers maintain a constant level of mental and physical health.
2. The teachers cooperate fully and their teaching philosophies and methods are consistent.
3. Spatial density for the preschool will remain the same, with exception of the block center.

Several limitations existed for the conclusions of this study.

The conclusions were limited to children who are: three to five years of age; attend early childhood education programs staffed by

professionally trained teachers; are from middle socioeconomic backgrounds; and possess normal mental and physical characteristics.

### Definitions

The following terms were used in this study. Their definitions are:

Block center: "An area indoors that contains blocks of different sizes and shapes for the children to use for construction and dramatic play" (Read, 1976, p. 85). "There should be adequate space in the block area for expanding buildings . . . Block play does require observation and supervision by an adult" (Seefeldt, 1974, p. 81).

Indoor self-selected time: The children are free to move throughout the school to select from a variety of materials and activities that are presented in an interest center arrangement. This period usually lasts for about an hour.

Interactions: "The initial contact-making acts, the responses, and the initiated acts" (Schroeer and Flapan, 1971, pp. 195-196).

Physical contact:

Any different or indirect touching of body parts. Indirect contact includes touching that takes place when an extension of one person touches another, for example, when a hat, board, tinkertoý, etc., held by one person touches another person (Roberts, 1972, p. 5).

Preschool children: ". . . the 3-5 year olds" (Bielawski, 1973, p. 3).

Spatial density: "Amount of space per person" (Baron, 1975, p. 319).

University child development laboratory:

Primarily intended to train teachers and used as a facility for research. Commonly located on a school campus. Student teachers from sponsoring institution of higher learning work under supervision of teachers from school faculty (Hess and Croft, 1972, p. 11).

## CHAPTER II

### REVIEW OF THE LITERATURE

The following literature review begins with the broad topic of children's communications and focuses on the exact problem at hand-- how spatial density affects the physical contacts among preschool children and their teachers. The review is concerned first with the child's communication processes of which physical contact is one of these processes. Then the different classifications of physical contact behaviors observed among preschool children and their teachers are discussed in more detail. This leads into studies that tend to indicate how the environment, especially amount of space per child, effects the frequency of physical contacts between preschool peers and between preschool children and their teachers.

#### Children's Communications

When we speak of the communication process, we are speaking of man's ability to transmit and receive information, signals or messages by means of either gestures, movements or facial expressions, or by talk or writing. We often distinguish between these nonverbal and verbal forms of communication, and most of us use both kinds every day of our life (Jones, 1972, p. 20).

Verbal and nonverbal communication is an essential part of a young child's life. It is through these types of communication that he experiences the world and people around him, and learns about himself (Wood, 1976). "Verbal channels include sounds, words, and sentence



patterns; nonverbal channels include body motion, the voice, and touch (space)" (Wood, 1976, p. 14).

Touching or physical contact plays an important part in early human development (Schaffer and Emerson, 1964). Yarrow, Goodwin, Manheimer, and Milowe (1971) indicated contact with the maternal caretaker included warm, frequent physical contacts, which constituted a favorable effect on later emotional and intellectual development of the child. Anderson (1973) reported from personal teaching experience in nursery school and kindergarten that many children at this age level communicate through gestures, facial expressions, different body positions, and physical contacts. In a study done by Hallahan, Kaufman, and Mueller (1975) physical contact behaviors between young children and their peers seemed to be significantly correlated with their frequency of verbalization. Gottfried's (1974) investigation of the influences of age and sex on the developmental course of social behavior, involving body contact, pointed to some sex differentiation. He found that:

Little change is observed for girls between the ages of three and five; however the frequency of body contact increases for boys during this period. The levels for the two sexes intersect at about age four, following which there is a substantial increase in the magnitude of the sex difference (pp. 67-68).

These studies suggested that physical contact is a part of the preschool child's way of communicating with peers and adults around him. The results also indicated the developmental importance of a child's physical contact with his surrounding world.

#### Physical Contacts Between Children and Peers

Research findings have revealed that children's physical contact

behaviors in different settings can be identified and recorded by categories such as: accidental contacts, cooperative contacts, aggressive contacts, and affectionate contacts. Anderson's (1973) study of three-, four-, and five-year-olds indicated that accidental contact was the most prevalent physical contact occurring between the children. Childress, Fessler and Greenblatt (1972) found the same evidence. Over one-half of the peer contacts that Brandt (1972) observed in the British Infant Schools were recorded as cooperative in nature.

Whitings and Edwards (1973) found indications in a variety of cultures that aggressive contact was more characteristic of male children. This tends to correlate with McIntyre's (1975) results that boys engaged in predominantly physical aggression while the aggression of girls was mainly verbal. Echols (1976) studied two- to five-year-old children and found that males did exhibit more aggressive contact while females exhibited significantly more affectionate contact. Her research indicated that males interacted most often with other males in the categories of aggression, affection, assistance, and other non-physical contacts. Anderson (1973) also reported that the children chose to interact with members of their own sex much more frequently than with members of the opposite sex.

#### Physical Contacts Between Children and Adults

When Brandt (1972) observed in the British Infant Schools, he reported that children were found to be in contact with adults 29.3 percent of the time, with peers 20.4 percent of the time, and the remainder of the time was spent alone. Roberts (1976) observed physical contacts

which occurred between preschool children and their teachers and visiting parents in a university child development laboratory. Her data does suggest some significant differences in several of the contacts between children and adults. Observations revealed that more assistance occurred between female children and adults as compared to male children and adults. Also, girls were recorded as initiating affectionate contact with adults more often than boys. Yet, no significant differences were found in the frequency with which aggressive contact behavior with adults was initiated by boys or girls.

Roberts (1976) not only found differences in the categories of physical contact behaviors, but also found that the frequency with which physical contact occurred between the preschoolers and adults depended on the preschool setting. Influences of the environmental setting will be discussed further.

#### Environmental Influences Within the Classroom

Allen (1972) investigated parameters of the physical environment and parameters of the social environment to determine their interactive effects on several types of social behavior in groups of three children of the same sex. Results disclosed that groups which had interacted in the low density conditions played longer and exhibited more positive social behavior during the task than groups in the high density conditions. However, high density conditions during free play was associated with more positive social behavior, even though males showed less tolerance for high density conditions.

Spatial density and social density were two main concerns of McGrew (1970). Four experimental density conditions were achieved in

the same nursery school with enrollments of children between the ages of three and five years. The following describes the environmental situations:

The two spatial conditions were 100% space, where children had access to the entire playroom, and 80% space, where 0 rendered approximately 1/5 of the playroom's space inaccessible. The two social conditions were 100% group size, varying from 16-20 Ss according to natural attendance fluctuations, and 50% group size, varying from 8-10 Ss (McGrew, 1970, p. 199).

During each observation, physical contacts between two or more individuals were recorded. The results showed that there were no significant differences between peer contact in any of the experimental densities. Surprisingly the highest frequency of physical contacts occurred in a lower density condition. As for the physical contacts between children and adults, the frequencies were extremely low which reflected the adults' policy of non-interference.

Observations were made of four-year-old children in three schools in the Netherlands, which provided  $1.16\text{m}^2$  per child, and two preschools in the United States, one having  $2.33\text{m}^2$  per child and the other having  $10.46\text{m}^2$  per child (Fagot, 1977). Fagot (1977) found that the classroom densities had no significant effects on the children's physical and verbal, task and nontask interactions.

Shapiro (1975) found that space did have an effect on preschool children's behaviors. Children were observed in classrooms of three different densities: more than 50 square feet per child, 30-50 square feet per child, and less than 30 square feet per child. Classrooms with less than 30 square feet per child seemed to have the greatest amount of disruptive and onlooking behaviors displayed. The classrooms with more than 50 square feet per child had the most random behaviors,

whereas the largest number of positive behaviors were seen in the classrooms with 30-50 square feet available per child.

Bates (1970) compared two- and three-year-old children's behaviors in free-play settings of three different densities: 83 square feet per child, 51 square feet per child, and 40 square feet per child. The results revealed a number of changes in behavior as a function of social density. With increasing density the girls spent more time alone, tended to play in smaller groups, played significantly more often with members of their own sex, spent more time in the least-used area of the room, and tended to increase the percentage of their interactions which were of a conflict nature. The boys responded somewhat differently to the changes in social density. When the density was increased the boys reduced their amount of locomotion around the room, played in larger groups, and increased their percentage of conflict interactions. They spent a significantly greater percentage of time in the least-used part of the room in the medium density setting (51 square feet per child) than in the low density setting (83 square feet per child); but they played more on the favored periphery of the room in the high social density setting (40 square feet per child).

Johnson (1974) did a study on the effects of varied class sizes where five, ten, fifteen, and twenty children per teacher were observed. Interactions were observed in both a free play and structured activity setting for a 16-day period. Results indicated that when the children were in the larger numbered groups, they increased their appropriate peer interaction and decreased their requests for attention from the teacher. The teacher provided more management in the larger groups and reported greater fatigue and less satisfaction under these

conditions. O'Connor (1975) looked at a similar situation in a different way. Her study concerned the child-teacher ratio. School differences in dependency suggested that children in high-adult available situations may make a greater proportion of adult-directed bids (O'Connor, 1975). She also found that the younger the child the higher the adult-directed dependency.

In summary, there were inconsistent findings concerning the effects of spatial density on interactions between preschool peers and adults. Several studies (Bates, 1970; Echols, 1976; Loo, 1976; and Shapiro, 1975) indicated that less positive social interactions between preschool peers were the result of increased density. Contradictory data were recorded by Allen (1972) and Fagot (1977). Their results seemed to show that high density conditions created just as favorable behaviors between preschool children as lower density conditions. Specific social interactions, such as physical contacts, also came under scrutiny. McGrew (1970) found that the highest frequency of physical contacts occurred in lower density conditions. Just the opposite findings were revealed in studies done by Echols (1976) and Roberts (1976). Studies concerned with interactions between adults and preschool children were few and had little data to support any possible conclusions. There seems to be a definite need for further study of children's interaction with peers and adults within more natural preschool settings.

## CHAPTER III

### RESEARCH DESIGN

This chapter presents the methodology used in analyzing hypotheses stated for this study. The chapter is divided into the following sections: research design and reason for selection, the population and sample, the instrument and procedures of implementation, and statistical analysis.

#### Type of Research

"The purpose of controlled experimental research is to test hypotheses about the effects of certain treatments on specific characteristics of individuals of objects" (Compton and Hall, 1972, p. 72). The purpose of this study was concerned with the effects of spatial density on the interactions of the preschool children and the teachers in the school. To test the hypotheses, a quasi-experimental design was used.

There are many natural social settings in which the research person can introduce something like experimental design into his scheduling of data collection procedures (e.g., the when and to whom of measurement), even though he lacks the full control over the scheduling of experimental stimuli (the when and to whom of exposure and the ability to randomize exposures) which makes a true experiment possible. Collectively, such situations can be regarded as quasi-experimental designs (Gage, 1963, p. 204).

The type of quasi-experimental design used was the time-series experiment. This design provides periodic measurement of some groups and

the introduction of an experimental change into this series of measurements, and is diagrammed as shown:  $O_1 O_2 O_3 X O_4 O_5 O_6 O_7$  (Campbell and Stanley, 1963, p. 37).

#### Selection of Research Subjects

Compton and Hall (1972) explained purposive sampling as handpicking the subjects according to one's need. This study used the technique of purposive sampling in order to obtain a sample of students who would be highly motivated to play in the block center throughout the period of this study. This eliminated arbitrary assignment of subjects to the experimental site and ensured a more natural setting and more natural behaviors. Twice a week for three weeks, for approximately eight hours, the researcher observed both morning and afternoon preschool groups during the indoor self-selected time. The total amount of time each child spent in the block center was recorded. At the end of the observation period, those children who had spent the greatest amount of total time in the block center were chosen as subjects for the study. The subjects were six white males, three- to four-years-old. Three of the subjects were enrolled in the morning group and three were in the afternoon group in the same university child development laboratory setting. According to the occupational status of the subjects' parents, which ranged from a university professor to an executive director of the United States Wrestling Federation, the children were judged to be from middle class backgrounds.

Teachers involved in the study were: three lead teachers, two graduate assistants, and a number of student teachers. The lead teachers held master's degrees in early childhood education, while the



graduate assistants and student teachers were in the process of gaining their early childhood or related degrees. Although the ratio of children to teachers ranged from three to six children per teacher--the block center was normally supervised by only one or two teachers.

### The Instrument

The instrument employed in this study was first developed by Childress et al. (1972), revised by Anderson (1973), and further modified by Echols (1976) and Roberts (1976). Roberts (1976) used the instrument to observe and record physical contacts between preschool children and adults. Echols (1976) used the same instrument to record physical contacts between preschool peers. Their main concerns were the occurring physical contacts during indoor self-selected, outdoor self-selected and group times within the preschool sessions.

Examination of the data from Echols' (1976) and Roberts (1976) studies revealed that only one fear motivated contact was recorded for the interactions of peers, and none were recorded between children and adults. Also, the number of contacts recorded in the categories of fear, attention getting, extension of verbal, required, and other physical contacts did not account for one percent of the total occurrences in peer interactions and were not separately reported in the study between children and adults. It was suggested by Echols that simplifying the instrument would be necessary for further research. Therefore, the above categories were deleted for this study.

The categories judged to be most applicable for the purpose of this study were:

1. Aggressive contact: Any contact which appears to be motivated by negative feelings or appears to be a deliberate hostile act. Examples: hitting, kicking, biting, and pinching.
2. Control by contact: Any contact which attempts to restrain another person, or to keep him from an action, or physically to move or guide another person. Examples: an adult moving a child from a stressful situation, a subject grabbing an aggressor's hand, or a child moving or pushing someone out of line of vision.
3. Accidental contact: Contact that appears to be unintentional. Examples: bumping into another person, rubbing against another person when in close contact, and similar actions.
4. Exploratory tactile contact: Any contact involving learning or exploration by the sense of touch. Examples: hair stroking, sensory experimentation with clothing, lifting another child to determine weight, comparing hand size, etc.
5. Affectionate contact: Any contact which demonstrates positive feeling toward another person or occurs while expressing pleasurable feelings. Examples: sitting close to someone while reading a story, two children holding hands as they watch a race, etc.
6. Assistance: Any contact which occurs while persons are giving or receiving aid. Examples: a teacher handing a block to a child, a child helping another child get up, etc.
7. Other non-physical: The behaviors included in this category are all those behaviors which occur in response to or which provoke physical contact, but which do not themselves involve physical contact. Examples: withdrawing from an initiated contact, verbal attempts to initiate or respond to physical contact, gesturing in response to physical contact, etc. (Echols, 1976, pp. 11-12).

A copy of the instrument is found in Appendix A.

## Methods and Procedures

### Establishment of Inter-Observer

#### Reliability

Using the observational category system, the researcher and one other early childhood trained observer spent several weeks becoming familiar with the instrument, the behavioral category definitions, and the data recording procedures. Tape recorded observations were then taken. When the observers felt they were sufficiently familiar with the procedures, they independently observed the same ten children in the block center for three minutes per child, recording a total of three minutes per child, recording a total of 30 minutes. From this data, an inter-observer reliability of 89 percent was established. Therefore, all observations and recordings were done by the researcher.

#### The Experimental Conditions

There were three experimental conditions in the study:

1. Original Block Center. In the original condition (Figure 1), there was an average spatial density of 93.5 square feet per child. This figure was established by dividing the total available square feet in the block center by the average number of children usually observed in the center during a period of three weeks ( $561 \div 6 = 93.5$  square feet per child). This condition was considered by the teachers to be optimal dimensions for the block center.
2. Crowded Block Center. In the crowded condition (Figure 2), there was an average spatial density of 30 square feet per child ( $180 \div 6 = 30$  square feet per child).

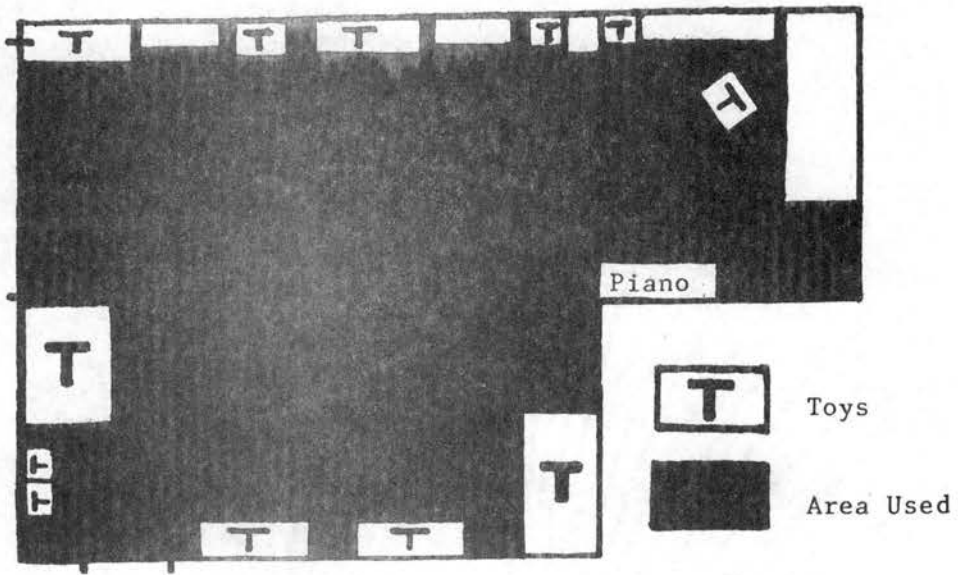


Figure 1. Original and Restored Block Center

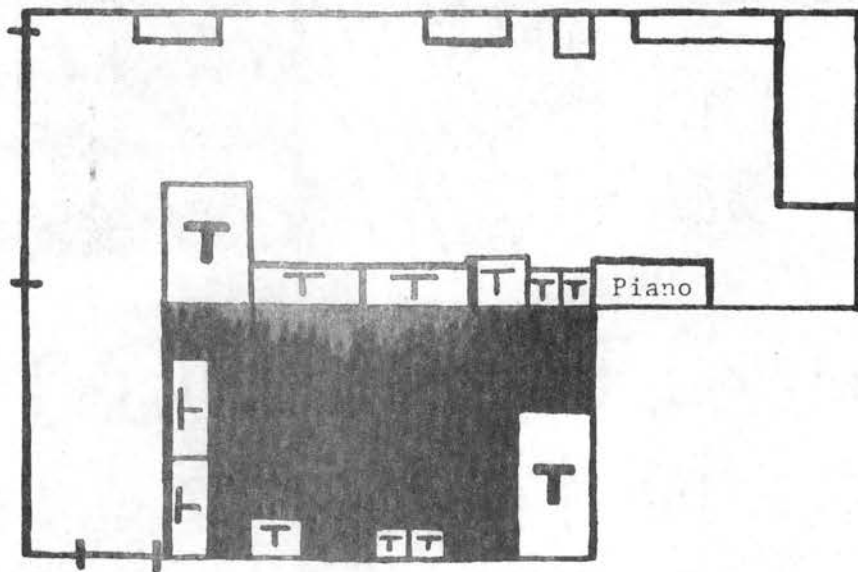


Figure 2. Crowded Block Center

3. Restored Block Center. After observations were made in the crowded condition, the block center was restored to its original dimensions (Figure 1).

### Observational Procedures

The names of the three subjects selected from the morning group and the three subjects from the afternoon group were placed on separate slips of paper and then randomly drawn and recorded on a master list to establish an order for observation. Observations began with the subject whose name appeared at the top of the list. That child was observed for 60 seconds, for no more than three consecutive minutes. The same procedure was followed for the second, then the third child. If a child was not in the block center when his name was next on the list, that child's name was skipped and the next subject was observed. Since the indoor self-selected time lasts from 45 minutes to one hour, the researcher was able to record three to nine minutes per child per day. These observations continued until 30 minutes were recorded for each of the six subjects in each of the experimental conditions.

For all three experimental conditions, observations were made during indoor self-selected time in the block center of the same university child development laboratory where Echols (1976) and Roberts (1976) observed for their studies. Because of the complexity of the instrument the decision was made to use a tape recorder. During the observations, the researcher described the observed physical contacts into a portable tape recorder. Each contact observed was verbally described and identified as a behavior responded to or initiated by the subject and whether the other person, who initiated or responded to the contact,

was a teacher or a child who had chosen to play in the block center at that time. If the subject had contact with another person for longer than 60 seconds, the sustained contact was given one count for each minute it was observed. Later the tape was analyzed and the data transferred to the instrument (Appendix A).

The first set of observations were made in the original block center (Figure 1), two days a week during a period of five weeks in the fall of 1978. During the children's absence the space in the block center was reduced from 561 square feet to 180 square feet. Even though the square footage was decreased by two-thirds, the basic arrangement of the equipment and accessories (except the piano) was the same (Figure 2). In this condition, the second set of observations were made using the procedures described above. Because the researcher was able to observe four days a week, rather than two days a week, the data collection took only three weeks. The equipment was then put back in the original position--restoring the space in the block center to 561 square feet. The third set of observations were then recorded for each of the six subjects in the restored block center for a period of three week.

These three sets of observations extended over approximately four months, during which 540 minutes of data were collected. A total of 118 child/teacher and 969 child/child physical contacts were recorded.

#### Analysis of the Data

In data analysis, each physical contact a subject initiated with another person or responded to another person's initial contact, was counted. These data were separated into: (1) contacts involving the

subject and another child and (2) contacts involving the subject and a teacher. This was done in order to determine the effects of spatial density on the nature of child/child versus child/teacher physical contacts. Chi square analysis was used to test the major hypotheses of the study. According to Compton and Hall (1972):

The chi square ( $x^2$ ) statistical technique is used for summarizing differences in distribution found between two or more sample groups in a counting experiment. This approach deals with frequencies rather than mean scores. It can thus be determined whether there is a difference in the number or frequency of people responding in certain ways . . . With the chi square technique, one can determine the probability that the frequencies observed in his study differ from an expected theoretical frequency . . . The chi square can also be used to test the departure of two observed distributions from one another (p. 353).

Analysis of variance was used to test the significance level of differences between the frequency of occurrences within the seven categories of child/child physical contacts. Duncan's Multiple Range was then used to determine which of these categories of physical contacts were significantly different from each other at the .05 level.

## CHAPTER IV

### RESULTS AND DISCUSSION

#### Examination of Hypotheses

H1.1: Increased spatial density (less space per child in the block center) will have no significant effect on the frequency of "affectionate" contacts between preschool children and (1) peers and (2) teachers.

Analysis of the data allows for tentative rejection of this hypothesis for children's interactions with (1) peers, but not for (2) teachers. Chi square analysis indicates that there were significantly more affectionate contacts ( $\chi^2 = 10.4$ , 1df,  $p < .01$ ) between the children in the original block center than in the crowded block center. However, there was no significant difference between the frequencies of affectionate contacts ( $\chi^2 = .01$ , 1df,  $p > .90$ ) between preschool peers in the crowded block center versus the restored block center. Consequently, there were significantly more affectionate contacts ( $\chi^2 = 11.3$ , 1df,  $p < .001$ ) expressed in the original block center than in the restored block center. This creates the question, "Why did the children touch each other affectionately more times at the beginning of the experiment, than at the close of the experiment, when the spatial densities were identical?"

One possible answer could be that the crowded environment caused



the children to become more protective of their personal space. This inhibition of expression of affectionate behaviors may have prevailed, even when the block center was restored to its original spatial density. In summary, for this group of subjects, increased spatial density resulted in significantly fewer affectionate contacts between children and peers which seemed to have a "carry over" effect in their relationship in a subsequent environment where they had more space.

Chi square analysis indicated that the frequency of affectionate contacts between the children and teachers was not significantly different among the three conditions of the block center ( $\chi^2 = .51, 2df, p > .75$ ). This may have been due to the teaching methods employed by the teachers, who used supportive techniques rather than control by physical intervention. This is evidenced by a total of only five, nine, and four affectionate child/teacher contacts recorded in the original, crowded, and restored conditions, respectively.

H2.1: The frequency of "aggressive" contacts that occur between preschool peers will not significantly increase or decrease when the spatial density of the block center is increased.

H2.2: Increased spatial density in the block center will have no significant effect on the frequency of "aggressive" contacts between preschool children and their teachers.

Very few aggressive contacts were observed during this study. Among the children, aggressive contacts occurred slightly more in the crowded block center, a total of 14 contacts, than in the original block center, in which there were a total of 5 contacts and in the restored block center in which there were 7. However, these differences were not statistically significant ( $\chi^2 = 3.6, 2df, p > .10$ ).

Since the researcher adhered closely to the definition of aggression as an act motivated by negative feelings, there appeared to be no aggressive contacts between the children and teachers. During observations of behavior in the block center, the children never tried to hit or otherwise use physical contact to show negative feelings toward a teacher. Neither did the teachers act in this manner toward the children. Whenever a child started to hit or hurt another child, the teachers would control the situation by removing or guiding a child away from the situation. This action was observed only once, and was recorded in the "control" category.

In summary, hypothesis 2.2 could not be tested because the aggressive contacts between children and teachers occurred too infrequently for analysis. Hypothesis 2.1 is accepted because there was no significant difference in the frequency of occurrence of aggressive contacts between any of the conditions of spatial density in the block center. The extremely low amount of aggressive behaviors in this group of subjects may be explained by a number of factors: length of school day, positive guidance methods employed, and alternate activity choices of the subjects. The length of school day is three hours. This short school day may place less stress on the children's social and interpersonal interactions than would be true in a longer school day. Also, the positive guidance methods used by the teachers tended to reduce negative reactions and aggression. Another important factor was that there was no control of the spatial density of other areas of the school. The children were free to come and go from the controlled situation. In the crowded block center, the researcher found it more difficult to observe each subject for a consecutive block of three one

minute segments. It seemed that the subjects tended to remain in the crowded block center for shorter periods of time. Although the subjects were "committed block players," they may have responded to the stress of a crowded condition by choosing to play in other areas.

H3.1: Increased spatial density in the block center will have no significant effect on the frequency of "assistance" contacts between preschool children.

H3.2: The frequency of "assistance" contacts that occur between preschool children and their teachers will not significantly increase or decrease when the spatial density of the block center is increased.

Chi square analysis for all three conditions indicated no significant difference for assistance contacts between child/child ( $\chi^2 = 5.2$ , 2df,  $p > .05$ ) and between child/teacher ( $\chi^2 = 3.3$ , 2df,  $p > .10$ ). Therefore, both hypothesis 3.1 and 3.2 are accepted.

Robert's (1976) study revealed that adults gave more assistance to the female children than to male children. Since the present study involved only males, expectations based on Robert's (1976) findings, would be that few assistance contacts would occur between the teachers and the subjects. This was found to be true.

H4.1: The frequency of "accidental" touchings that occur between preschool children and peers will not significantly increase or decrease when the spatial density of the block center is increased.

Data allows for rejection of this hypothesis. Four separate chi square analyses were performed to test this hypothesis. First, there

was a significant difference between the frequencies of accidental touchings ( $\chi^2 = 16.4$ , 2df,  $p < .001$ ) among the original, crowded, and restored conditions. Secondly, the accidental touchings between the children were found to be significantly more numerous ( $\chi^2 = 11.9$ , 1df,  $p < .001$ ) in the crowded block center than in the original block center. Yet, there was no significant difference between the frequencies of accidental touchings ( $\chi^2 = .2$ , 2df,  $p > .50$ ) in the crowded versus the restored block center. Consequently, there was a significant difference between the frequency of accidental contacts ( $\chi^2 = 15.1$ , 1df,  $p < .001$ ) in the original density versus the restored density.

The increased accidental touchings in the crowded block center, tends to agree with Echol's (1976) idea that the amount of space available is inversely related to the number of contacts. Therefore, less space equals more accidental contacts and increased potential for responses to these contacts in either a positive or negative way. Although this was indicated for the condition of less space, the change from less to more space did not alter the contacts significantly. This raises a question just the reverse of the question formulated for the affectionate contacts. Why did the children accidentally touch each other more at the close of the experiment than at the beginning of the experiment when the spatial densities were identical? One possible answer is that the children had accommodated their behaviors to the more crowded conditions and this behavior extended into the restored block center with the original amount of space. The children may have become accustomed to the higher density situation to the point that even when more space was available, they still played within closer proximity of each other, resulting in more accidental contacts.

In conclusion, several questions remain to be answered. Is there a "carry-over" effect on children's behaviors with one another in conditions of varying spatial density? If such an effect exists, what is the duration? Is it a temporary or permanent effect?

H4.2: The frequency of "accidental" touchings that occur between preschool children and their teachers will not significantly increase or decrease when the spatial density of the block center is increased.

This hypothesis is accepted, based on the findings that there is no significant difference among the frequency of accidental contacts ( $\chi^2 = 1.6, 2df, p > .25$ ) that occurred in the original, crowded, and restored block center. This supports the finding of McGrew (1970), who found no significant difference in the child/adult contacts within four different density conditions. Also, the teachers in this study seemed to be keenly aware of the more crowded conditions. When the block center was reduced in size, the teachers would stand outside the boundaries of the block center and look over the shelves to watch the children or they would stand near the edges or in the corners of the room, giving the children as much space as possible thereby creating less chances for accidental contacts with the teachers.

#### Further Analysis

To gain a more comprehensive perspective of children's physical contact behaviors in a block center, several additional analyses were conducted. Analysis of variance was used to test for the level of significance of differences between the frequencies of occurrence of the seven categories of physical contact. Duncan's Multiple Range

was then used to clarify the relationship among the frequencies of the physical contacts.

Since the number of contacts between child/teacher were inadequate for the analysis of variance test, the results discussed below are concerned with the total number of child/child contacts recorded for the duration of the study. Frequencies are indicated in Table I.

TABLE I  
TOTAL CHILD/CHILD PHYSICAL CONTACTS

Categories of Physical Contact	Frequencies of Contact for Each Subject						Total
	1	2	3	4	5	6	
Aggression	1	7	1	0	0	16	25
Control	3	16	4	12	9	9	53
Exploratory Tactile	3	0	3	0	2	0	8
Affectionate	46	23	39	35	25	55	223
Assistance	4	16	1	8	4	1	34
Accidental	21	54	33	40	44	76	268
Other Non-Physical	61	71	68	59	51	42	352

Analysis of variance indicated that there was a significant difference between the frequency of contacts that occurred among the respective categories ( $F_{6, 30} = 31.4, p < .001$ ).

Duncan's Multiple Range was then used to determine which categories

of physical contacts were significantly different from each other at the .05 level. Results are indicated in Table II.

TABLE II  
AVERAGE NUMBER OF PHYSICAL CONTACTS, PER  
CHILD, FOR EACH OF THE PHYSICAL  
CONTACT CATEGORIES

ET.	AGG.	ASSIS.	CON.	AFF.	ACC.	ON.
1.33 <sup>a*</sup>	4.16 <sup>a</sup>	5.66 <sup>a</sup>	8.83 <sup>a</sup>	37.16 <sup>b</sup>	44.66 <sup>b</sup>	58.66 <sup>c</sup>

\*Those means followed by the same letter are not significantly different at the .05 level.

The fewest amount of contacts that occurred between the subjects and their peers were those contacts recorded in the exploratory tactile (ET.), aggression (AGG.), assistance (ASSIS.), and control (CON.) categories. These contacts were exhibited less than contacts recorded in the affectionate (AFF.), accidental (ACC.), and other non-physical (ON.) categories. Almost as many affectionate contacts were recorded as accidental contacts. The largest number of contacts were recorded in the "other non-physical" category. This represents the instances when the subjects would respond verbally, or would ignore, or walk away from the person who had come into physical contact with him.

These results correlate with the findings in Echols' (1976) study. She found that accidental and affectionate contacts were exhibited more frequently than aggressive contacts. She also found preschool children most frequently respond to physical contact in non-physical ways.

### Summary of Findings

In conclusion, the findings of this study indicated that children do exhibit different types of physical contact behaviors. These types of contact behaviors were observed to occur within three significantly different groups. Starting with the contact behaviors which had the largest frequency count, these groups are: (1) non-physical responses to physical contacts; (2) accidental and affectionate contacts; and (3) control, assistance, aggression and exploratory tactile contacts.

There were significant differences in the occurrences of some of these behaviors when the spatial density within the block center was increased. Affectionate contacts decreased between child/child. Accidental contacts increased between child/child. The frequencies of occurrence of accidental and affectionate contacts were sustained even when the block center was restored to its original spatial density. There were more aggressive acts between child/child in the crowded block center, but the frequencies of occurrence were not significantly different.

Spatial density change seemed to have no effect on child/teacher physical contacts. Contacts between the children and their teachers were few in all conditions of spatial density. This may have been due to the verbally supportive nature of the methods utilized by the child development laboratory staff.

Spatial density is only one factor among many factors which contribute to children's behaviors in school. Data of this study indicate that spatial density did affect some of the physical contact behaviors between six preschool males and their peers, while playing in



the block center. This adaptive behavior seemed to "carry-over" from the crowded condition of 30 square feet per child to the restored condition of 93.5 square feet per child. This experiment was conducted in a model setting which had a student/teacher ratio of three-six students per teacher, a short school day, and many on-going activities available in optimal space. The experimental treatment, the change from optimal to a more crowded spatial density, may not have had as significant an impact on the subjects' behaviors as might have been exhibited in a less ideal environment. Further study would be necessary to confirm this hypothesis. Nevertheless, data of this study indicates that children may be able to adapt their physical contact behaviors according to spatial density. If this is true, we need further research in order to understand the specific behaviors so affected. Planners of early childhood learning environments need to be aware of the possible effects of crowding, i.e., less affectionate behavior, more accidental physical contacts, on children's behaviors in school.

## CHAPTER V

### SUMMARY

#### Purpose of the Study

The major purpose of this study was to examine the effects of spatial density on the physical contact behaviors between preschool children and their teachers and between preschool aged peers. Specific objectives of this study were:

1. To investigate physical contact behaviors that occur in a block center with an established spatial density, between (a) preschool children and teachers, and (b) preschool aged peers.
2. To investigate physical contact behaviors that occur in the same block center of increased spatial density, between (a) preschool children and teachers, and (b) preschool aged peers.
3. To compare and analyze the frequency of physical contact behaviors which occur in the established block center to those contacts which occur in the same block center after increasing the spatial density.

4. To compare and analyze the frequency of physical contacts which occur in the block center having the increased spatial density to the contacts which occur in the same block center when restored to its original density.

The hypotheses examined were to compare and analyze the frequency of physical contacts between child/teacher and child/child in a block center of two spatial density conditions. Categories of physical contacts observed and recorded were: aggression, control, accidental, exploratory tactile, affectionate, assistance, and other non-physical.

### Subjects

"Committed block players" were needed to achieve the purposes of this study. They were selected according to the total time they were observed to play in a block center during indoor self-selected time, for an observation period of three weeks. Six white, three- and four-year-old males, were chosen. Three of these were selected from the morning group, and three from the afternoon group of children attending the same university child development laboratory. The teachers involved in the study were three lead teachers, two graduate assistants, and a number of student teachers.

### Methods of the Study

The researcher used an observational method to gather data for testing the hypotheses. After observer reliability was established, this study was conducted in three phases:

1. Five weeks of observations were made of the physical contacts that were either initiated or responded to by the six

subjects in a block center of optimal spatial density--93.5 square feet per child.

2. Three weeks of observations were made of the physical contacts that were either initiated or responded to by the six subjects in the same block center with increased spatial density--30 square feet per child.
3. Three weeks of observations were made of the physical contacts that were either initiated or responded to by the six subjects in the same block center restored to its original spatial density--93.5 square feet per child.

Each phase was completed after each of the six subjects had been observed for a total of 30 minutes. The length of observation time during each phase varied, according to the availability of the researcher. There were a total of 540 minutes of behavior observation and 1,087 total physical contacts observed.

The instrument used was an adaptation of an observational category system originated by Childress et al. (1972), modified by Anderson (1973), revised by Roberts (1976) and Echols (1976), and further adjusted to fit this study.

### Results

Chi square analysis was used to test the major hypotheses. The major results were:

1. Increased spatial density did affect the frequency of "affectionate" contacts between preschool peers ( $p < .01$ ).

2. Increased spatial density did not affect the frequency of "affectionate" contacts between preschool children and their teachers.
3. Increased spatial density in the block center had no significant effect on the frequency of "aggressive" contacts between preschool children and their (1) peers and (2) teachers.
4. Increased spatial density in the block center did not have a significant effect on the frequency of "assistance" contacts between preschool (1) peers and (2) teachers.
5. The frequency of "accidental" touchings did increase between preschool children and their peers when the spatial density of the block center was increased ( $p < .001$ ).
6. The frequency of "accidental" touchings did not increase significantly between preschool children and their teachers when the spatial density of the block center was increased.

There was a significant difference between the frequencies of child/child affectionate contacts ( $p < .001$ ) and accidental contacts ( $p < .001$ ) for the original spatial density, 93.5 square feet per child, versus the restored spatial density, 93.5 square feet per child. A possible interpretation of this data is that the behavior "adapted" in the crowded condition may have "carried over" to the optimal spatial condition.

The total number of child/child contacts were then analyzed. Analysis of variance indicated that there was a significant difference ( $F_{6,30}=31.4$ ,  $p < .05$ ) between the frequency of contacts that occurred among the respective categories. Duncan's Multiple Range indicated that there were three groups of physical contact behaviors between the preschool subjects and their peers. These three groups were:

1. The largest number of contacts were non-physical responses to physical contacts. This behavior was significantly different from the other two groups.
2. Accidental and affectionate contacts constituted the next largest number of contacts between the subjects and other children. These behaviors were not significantly different from each other, but were significantly different from the other two groups.
3. The fewest contacts were recorded in the categories of control, assistance, aggression, and exploratory tactile. These behaviors were not significantly different from each other, but were different from the other two groups.

#### Limitations of the Research

The following aspects of the study limited the generalization of the results to similar populations:

1. the size and nature of the sample;
2. the observation time available;
3. the model environment in which the study was conducted; and

4. the many choices available to the children other than playing in the block center.

#### Recommendations for Further Research

This study revealed that spatial density may have an effect on one of a preschool child's developing communication behaviors--touching. The findings and limitations of this study indicated that further research was needed. The researcher makes the following recommendations:

1. Include a larger sample size, consisting of both males and females, of varied ethnic and social groups.
2. Conduct a similar study over a longer observation period.

The "carry-over" effects from crowded to restored block center raised questions that might be answered if more time were given for the students to get accustomed to the different densities and to adapt their behaviors accordingly.

3. Observe children in "less-than-ideal" environments.

Three factors to be considered are: spatial density, student/teacher ratio, and length of school day.

Children that begin in a preschool that has high spatial density conditions may react much differently than the subjects in this study who had been accustomed to "optimal" space, and were then placed in an environment of less space. Also, all day preschool programs which have a larger ratio of students per teacher might reveal more realistic results to fit a wider range of population groups.

4. Record the length of time subjects spend in the same block center under conditions of varying spatial densities. The observer had the impression that the subjects remained in the crowded block center for shorter periods of time and, in some instances, they even verbalized to the teachers and parents that they did not like the crowded block center as much as the original. Teachers who believe that young children need opportunities to lengthen their attention span and engage in concentrated dramatic play would find it helpful to know which spatial densities tend to discourage and which spatial densities tend to encourage longer periods of involved play.
5. Calculate the number of children who play in the same block center under conditions of varying spatial densities. During this study, it was observed that the number of children who played in the block center, in all conditions of spatial density, fluctuated from one to nine or more children in the center at the same time. This had a definite bearing on the physical contacts that occurred. Recording how the children positioned themselves during their play could also provide information to help substantiate or disprove the idea that once the children began to play closer together in the crowded block center, this same behavior "carried over" in their play in the restored block center.



Findings of this study tended to show that spatial density may be an important factor affecting children's physical contact behaviors. Awareness of which types of contact behaviors and other possible non-physical behaviors that spatial density may affect is needed for the planners of early childhood environments. Teachers of preschool aged children also need to be aware of the dimensions of their facilities and how they may be affecting the children. If the teachers, planners, and other people involved with preschool children have more solid results, they may then make their own judgments as to the environments that their children will experience.

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## APPENDIXES

APPENDIX A

THE OBSERVATIONAL INSTRUMENT

Subject \_\_\_\_\_  
 Date \_\_\_\_\_

1-Subject      I-Initiator      C-Child  
 2-Interactor    R-Responder      T-Teacher  
 Q-Continuous

	THIRD MINUTE	SECOND MINUTE	FIRST MINUTE
Aggression			
Ag			
Control			
Con			
Exploratory			
ET			
Affectionate			
Aff			
Assistance			
As			
Accidental			
Acc			
Other			
Nonphysical			
ON			

	THIRD MINUTE	SECOND MINUTE	FIRST MINUTE
Ag			
Con			
ET			
Aff			
As			
Acc			
ON			

	THIRD MINUTE	SECOND MINUTE	FIRST MINUTE
Ag			
Con			
ET			
Aff			
As			
Acc			
ON			

APPENDIX B

LETTER TO PARENTS





# Oklahoma State University

DEPARTMENT OF FAMILY RELATIONS  
AND CHILD DEVELOPMENT

STILLWATER, OKLAHOMA 74074  
241 HOME ECONOMICS WEST  
(405) 624-5057

December 5, 1978

Dear Parents,

This letter is to let you know that observations for a research project are currently being conducted in our morning and afternoon programs.

After Christmas break, you will notice that the block area has been reduced by almost 1/2 the original floor space. This new arrangement is necessary to achieve the major purpose of the project, to observe how decreased physical space affects children's physical contact behaviors. After the observation period of several weeks is completed, the block area will be returned to the original floor plan. Results of this study can help establish space requirements for schools for young children.

If you have questions concerning the study, please feel free to contact us or Miss Leone List, Director, Child Development Laboratories.

Sincerely,

*Donna Garrett*

Donna Garrett, Graduate Assistant  
Home Economics East, Lab III

*Judy Powell*

Judy Powell, Assistant Professor

DG:JP:m

VITA<sup>2</sup>

Donna Lea Garrett

Candidate for the Degree of

Master of Science

**Thesis:** EFFECTS OF SPATIAL DENSITY ON PRESCHOOL CHILDREN'S CONTACT BEHAVIORS WITH PEERS AND TEACHERS

**Major Field:** Family Relations and Child Development

**Biographical:**

**Personal Data:** Born in El Reno, Oklahoma, August 5, 1953, the daughter of Mr. and Mrs. Don L. Garrett.

**Education:** Attended Banner School, 1st-8th grade; graduated from Yukon High School, Yukon, Oklahoma, in May, 1971; received an Associates of Arts degree from El Reno Junior College, El Reno, Oklahoma, in May, 1973; graduated with a Bachelor of Science in Education degree from Southwestern Oklahoma State University, Weatherford, Oklahoma, in May, 1975; completed requirements for the Master of Science degree in Family Relations and Child Development at Oklahoma State University in May, 1979.

**Professional Experience:** First grade teacher at Myers Elementary School, Yukon, Oklahoma, 1975-1978; Graduate assistant, Child Development Laboratory, Stillwater, Oklahoma, 1978-1979.