Play behaviors and peer interactions of preschoolers in classroom and playground settings

Sook-Young Shim
Iowa State University

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Play behaviors and peer interactions of preschoolers
in classroom and playground settings

by

Sook-Young Shim

A dissertation submitted to the graduate faculty
in partial fulfillment of the requirement for the degree of
DOCTOR OF PHILOSOPHY

Major: Human Development and Family Studies (Early Childhood Education)

Major Professor: Joan E. Herwig

Iowa State University
Ames, Iowa
1997

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Graduate College
Iowa State University

This is to certify that the doctoral dissertation of

Sook-Young Shim

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Major Professor

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GENERAL INTRODUCTION

The role of children's play in their development has been a topic of considerable interest (Bredekamp, 1987; Fromberg, 1992; Johnson, Christie & Yawkey, 1987; Rubin, Fein & Vandenberg, 1983; Varga, 1992). Play researchers have continued to generate knowledge concerning the definition of play and identification of play categories and age trends (Began, 1987; Buhler, 1937; Howes, 1980; Howes & Matheson, 1992; Johnson et al., 1987; Pack, 1995; Parten, 1932; Piaget, 1962; Rubin, Maioni, & Hornung, 1976; Rubin, Watson, & Jambor, 1978; Smilansky & Shefatya, 1990; Smith, 1978; Takhvar, & Smith, 1990).

Recent interest in children's play seeks ways to promote play in educational settings (Dempsey & Frost, 1993; Darvill, 1983; Lamb, Sternberg, Knuth, Hwang, & Berberg, 1994; Howe, Moller, & Chambers, 1994; Petrakos & Howe, 1996; Teets, 1985). Influences of environment on children's play behaviors and development are theoretically stated (Lewin, 1931; Darvill, 1982; Piaget, 1962; Vygotsky, 1967; Wachs, 1985) and empirically investigated (Green, 1933a, 1933b; Henniger, 1985, Pack, 1995; Sanders & Harper, 1976; Shin, 1994; Tizard, Philips, & Plewis, 1976a, 1976b; Wohlwill, 1983). Lewin (1931) proposed a rationale for an emphasis on the ecological features of the physical environment that affect children's play. He argues that although children move about the environment, the influence of any particular environment continues since the children's interactions have been affected by the environmental setting. Precisely, how the child interacts is greatly influenced by situational and environmental factors. Behavior is a function of the interaction between the person and each environment: \( B = f(PE) \) according to Lewin. Darvill (1982) modified Lewin's model by emphasizing play behavior (Bp) as a function of the playing child (Pc) and the play environment (Ep), or \( Bp = f(PcEp) \).

Wachs (1985) and Wohlwill (1983) propose that the physical environment of play can influence development only when it is mediated by social environmental parameters (i.e., peers). In other words, the parameters of the physical play environment may serve to structure the nature of social interactions among peers (Wachs, 1985). A number of studies have emphasized the effects of the physical environment play on children's peer interactions (Dempsey & Frost, 1993; Howe,
Moller, & Chambers, 1994; Howes & Rubenstein, 1981; Howes & Matheson, 1992; Johnson & Ershler, 1981; Parten, 1932; Piaget, 1962; Petrakos & Howe, 1996; Rubin & Krasnor, 1980; Rubin, Maioni, & Homung, 1976; Smith, 1978; Vygotsky, 1967; Wachs, 1985). Most of them have focused on peer interactions in preschool classroom settings, whereas few studies have examined the physical environment of play influencing children's peer interactions, especially outdoor playground activities (Fukuchi, 1995; Ladd, Price & Hart, 1988; Pellegrini, 1992; Pellegrini, Huberty, & Jones, 1995). More research is needed to examine how the outdoor playground setting influences children's social interactions with peers. Further, it is empirically necessary to investigate the nature and characteristics of peer interactions in the classroom and on the outdoor playgrounds. The present study provides needed research in this area by examining the relationship between preschooler's peer interactions and play behaviors in classroom and playground settings.

This study investigates the play behaviors and peer interactions of preschoolers as a function of their age (2-and 3-year-olds vs. 4-and 5-year-olds), setting (indoors vs. outdoors) and child care center. The specific objectives of the study are:

1. To examine the differences in preschooler's play behaviors between the indoor classroom and outdoor playground setting.
2. To examine the differences in children's play behaviors between older and younger preschoolers in their classroom and on the outdoor playground.
3. To examine the differences in preschooler's peer interaction between the indoor classroom and outdoor playground setting.
4. To examine the differences in children's peer interaction between older and younger preschoolers in their classroom and on the outdoor playground.
5. To determine the differences in children's play behaviors and peer interactions among three child care centers.
Dissertation Organization

This dissertation follows a dissertation format arranged by dividing the work into two sections. The first section (Chapter 1) is a review of literature concerning children’s play behaviors and peer interactions in the play environment. The latter section contains a manuscript (Chapter 2) which is prepared for publication. It includes the methodology, statistical analyses, findings, discussion of the results, and implications for future research.

Appendices are attached at the end of the dissertation. These include the supplementary tables (Appendix A), examples of the correspondence (Appendix B), the instruments for the quality of child care program and playground, play behavior, and peer interaction (Appendix C), and the coding manual for the outdoor playground, play behaviors, and peer interactions (Appendix D).

This study was revised and approved by the University Human Subjects Review Committee.

Literature Cited


CHAPTER 1: CHILDREN'S PEER INTERACTIONS AND PLAY BEHAVIORS IN PLAY ENVIRONMENT:
A LITERATURE REVIEW

A paper to be submitted to the Early Childhood Research Quarterly

Sook-Young Shim

Abstract

Although influences of the play environment on children's play behaviors and development have been theoretically stated and empirically investigated, relatively little is known about the relationships between the play settings on children's play behaviors and social interactions with peers. The literature review presents theories and research concerning the role of play in children's development. Then, research is presented concerning the influences of the physical environment on children's play behaviors, and the influences of the play settings on children's peer interactions. Summary and implications for future research are presented.

Introduction

In recent years, a growing body of research and position papers has emerged affirming that self-initiated, explorative, and autonomous play influences young children's development and learning (Bredekamp, 1987; Fromberg, 1992; Johnson, Christie & Yawkey, 1987; Rubin, Fein & Vandenberg, 1983; Varga, 1992). The essential feature of appropriate early childhood experiences is play, according to the position statement of the National Association for the Education of Young Children (NAEYC, 1987). Varga (1992) argues that play is the activity through which all areas of children express their development, and through play children's development progresses.

Play, for example, has a key role in social development by providing a context in which children can acquire many important social skills, such as turn-taking, sharing, and cooperation, as well as the ability to understand other people's thoughts, perceptions, and emotions (Black, 1989;
Doyle, Doethring, Tessier, & de Lorimier, 1992; Howe, Moller, & Chambers, 1994; Howes & Farver, 1987; Hughes, 1991; Johnson et al., 1987; Rubin & Hayven, 1981; Saracho, 1986). When children play and interact with their peers, children detect that their peers' points of view sometimes contradict their own. These situations require children either to understand their peers' points of view and transform those perspectives to correspond with their own, or to accommodate the contradictory perspectives by recognizing a variety of points of view and accepting individual differences in the social atmosphere (Rubin & Hayven, 1981). Through play, young children begin to realize that they need to become sympathetic to their peers' feelings, to be patient, to wait for their turn, to be cooperative, to share materials and experiences, and to obtain immediate satisfaction when others they value like them (Saracho, 1986).

Many researchers have pursued investigations about the nature of children's play by examining the developmental patterns of play (Bergen, 1987; Johnson et al., 1987; Pack, 1995; Smilansky & Shefatya, 1990). Through a variety of observational methods and analytical models, researchers and theorists have demonstrated that play is a developmental phenomenon and provided taxonomies (Buhler, 1937; Johnson & Ershler, 1981; Howes, 1980; Howes & Matheson, 1992; Parten, 1932; Piaget, 1962; Rubin et al., 1983; Rubin, Maioni & Hornung, 1976; Rubin, Watson, & Jambor, 1978; Smilansky, 1968; Smith, 1978; Takhvar & Smith, 1990). For example, Parten (1932) suggested a taxonomy of social play levels based on her examination of social development in preschool children in a nursery-school setting. The categories include six sequential social participations of unoccupied behavior, solitary play, onlooker behavior, parallel play, associative play, and cooperative play. She described onlooker behavior as a child observing the other children playing, unoccupied behavior as a child watching anything of momentary interest or playing with her own body, solitary play as a child playing alone, parallel play as a child playing independently but beside other children, associative play as a child playing with other children but each child acting her own wishes, and cooperative play as a child playing with other children with mutual regards or acting in complementary roles.
Developmental changes in play are evident with this scale; however, the interpretation of the play categories is less clear. Hartup (1983) disagreed with Parten’s classification of play as a hierarchical pattern, noting that solitary play is actually quite common throughout the preschool period and need not be considered immature. Other researchers have reported nonsignificant age effects for parallel play as an intermediate play stage as Parten suggested (Harper & Huie, 1985; Johnson & Ershler, 1981; Smith, 1978). For example, Smith (1978) found that 2- and 3-year-olds went directly from solitary play to group play without showing a tendency for parallel play.

Rubin and his colleagues combined Parten’s social participation scale and Smilansky’s cognitive play categories into a single instrument, allowing both dimensions of play development to be assessed and to demonstrate a broader theoretical understanding of play (Rubin et al., 1976). They nested four types of social participation (i.e., solitary play, parallel play, associative play, cooperative play) with four types of cognitive play (i.e., functional play, constructive play, dramatic play, games with rules) to create 16 social-cognitive components of play (e.g., solitary-functional play, parallel constructive play). Onlooker and unoccupied behaviors are classified as nonplay categories.

A number of studies, however, have demonstrated that Parten’s and Parten-Smilansky’s play sequences do not form a developmental sequence (Fein, Moorin, & Enslein, 1982; Howes & Matheson, 1992; Rubin et al., 1976; Rubin, 1982; Takhvar & Smith, 1990). For example, constructive play is not a more immature form of behavior than dramatic play (Rubin, 1982). Instead, constructive play and dramatic play are alternative modes of activity characteristic of two-to six-year-old children (Takhvar & Smith, 1990). With this notion, Howes (1980) developed a developmental sequencing of young children’s play that examines children’s social play behavior during free play, in greater detail than the Parten-Smilansky matrix. This scale, the Peer Play Scale, focuses on two dimensions of peer play, such as the complexity of social interaction among children and the degree to which their activities are organized and integrated. The Peer Play Scale consists of 5 levels identified as: (a) simple parallel play, children engaging in similar activities but no social contact, (b) parallel play with mutual regard, children engaging in the same or similar activity and
having social contact, (c) simple social play, children directing social behavior to one another, (d) complementary play with mutual awareness, children engaging in complementary action and mutual gaze or awareness of the other, and (e) complementary social play, children engaging in complementary actions and reciprocal social roles.

Later, Howes and Matheson (1992) proposed a new developmental sequencing of young children's peer play based on the cognitive complexity of children's social activities. Two more categories, cooperative social pretend play and complex social pretend play, were added to the original Peer Play Scale. Cooperative social pretend play is defined as children playing complementary, nonliteral, or pretend roles (e.g., mother and baby) but without any planning or communicating about the meaning of the roles or the form that the play will take, and complex social pretend play is determined when children actively plan their pretend play (e.g., naming, explicitly assigning roles, prompting the other child).

In summary, the Parten-Smilansky Play Scale has been used extensively to examine age trends in young children's play behavior as well as to assess correlations between different forms of play and measures of social and cognitive development in the classroom (Christie & Johnson, 1987). Howes' Peer Play Scale has been used to investigate developmental patterns in young children's peer interaction in the classroom (Farver, Kim, & Lee, 1995; Howes, 1980, 1987, 1988; Howes & Matheson, 1992). Although the scales have been used in a number of research studies, they only appear to explore children's play and peer interaction, in the indoor classroom setting. Research is needed to validate the social-cognitive categories of children's play and peer categories of children's interaction and assess whether they will tap those play and peer categories in different settings (i.e., the classroom and outdoor playground), and to investigate young children's play behaviors and interactions in the same two settings.

Physical environment has been traditionally defined as the stage or setting upon which the interplay of social and physical environments take place, while social environment involves interpersonal transactions between children and other persons in their social context (Wachs & Gruen, 1982). In other words, physical and social environments can be differentiated by the animate
versus inanimate features of the environment (Wohlwill, 1983). The physical environment is postulated by inanimate objects, encompassing physical or sensory attributes whereas the social environment is represented by people, encompassing interactional and emotional stimuli.

Lewin (1931) proposed a rationale for the emphasis on ecological features of the physical environment and social environment that affect play. Although children move in and out of certain environment, the influence of an environment remains since the interactions of children have been affected by the environment. How the child interacts is greatly affected by situational and environmental factors. Behavior is a function of the interaction between the person and the environment: \( B = f(PE) \) claims Lewin. Darvill (1982) modified Lewin’s model to a specific model of play behavior by transforming \( B \) to \( B_p \) (play behavior), \( P \) to \( P_c \) (the playing child), and \( E \) to \( E_p \) (play environment). This new model considers a child’s play behavior as a function of the relation between the playing child and the play environment or \( B_p = f(P_cE_p) \). In this regard, the framework of Lewin’s and Darvill’s model appears to evaluate the quality of children’s play by simultaneously recognizing the important role of other influential factors in children’s play environments.

It appears that peer interactions in play settings afford a particularly rich environment (Berk & Winter, 1995) for Vygotsky (1967) theory that argues for a zone of proximal development, which is the "distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (p. 86). For example, a preschool age child typically has representational thinking, even if she has had limited experiences with peer interactions. Such a child would be expected to engage in pretend play with a peer as soon as she has acquired sufficient social interaction skills to cooperate in play with peers. In this play setting, the child must coordinate newly acquired and mature symbolic abilities with social interactive skills in order to engage in pretend play with a peer.

There are a number of studies investigating the physical environment of play that influences children’s peer interactions as both discriminative stimuli and reinforcers. Most of them have focused on peer interactions in a preschool classroom setting (Dreyer & Rigler, 1969; Howe et al.,
1994; Howes & Rubenstein, 1981; Lamb, Stemberg, Knuth, Hwang, & Broberg, 1994; Petrakos & Howe, 1996; Rubin, 1977; Teets, 1985). For example, Petrakos and Howe (1996) investigated classroom learning centers designed to facilitate either solitary or group play behaviors and the influence of type of theme (e.g., extended house, train station) on preschooler's social and cognitive play. They found that the solitary-designed centers facilitated more solitary play interactions and group-designed centers facilitated more group play interactions. Specially, group-designed centers facilitated children social interactions where children were able to focus on each other (e.g., double seating in the train) and to engage in complementary role play (e.g., ticket seller and buyer). In contrast, solitary-designed centers facilitated individual use of materials (e.g., single seating in the train) and limited social exchanges and role play behavior (e.g., tearing off ticket from ticket machine).

In contrast, few studies have examined the physical environment of play influencing children's peer interactions, especially outdoor playground activities (Fukuchi, 1995; Ladd, Price & Hart, 1988; Pellegrini, 1992; Pellegrini, Huberty, & Jones, 1995). Several studies have examined children's outdoor play behaviors and peer interactions concerning stability of play behaviors and achievement over time (Ladd et al., 1988; Pellegrini, 1992). Other research has investigated the interaction between children and teacher on the playground (Fukuchi, 1995). In this regard, more research is needed to examine the effects of the outdoor setting on children's interactions with peers.

There has been limited research reporting investigations concerning differences in peer interactions in the classroom and the outdoor playground settings (Green, 1933a, 1933b; Henniger, 1977, 1985; Pack, 1995; Tizard, Philps, & Plewis, 1976a, 1976b). Most of them have primarily focused on children's interactions with peers in different physical setting by using observation (Green, 1933a, 1933b; Henniger, 1977, 1985; Tizard, Philps, & Plewis, 1976a, 1976b) and observation plus interview (Pack, 1995). Green (1933a, 1933b) assessed children's peer interaction in indoor and outdoor environments. Observations were made outdoors during warmer weather and indoors when the weather was cold so the distinctions of the data are not known. Pack (1995) examined the differences between the indoor and outdoor play behavior of children when two
different methods (i.e., observation and interview) were used. The results, however, were confounded by including interview method with observation because the proportion of the variance in children's peer interaction is not clear either due to differences of the settings or differences in the methods. Henniger (1977, 1985) investigated the relationships between preschooler's indoor and outdoor play in nursery school, using the Parten (1932) social categories and the Smilansky (1968) adaptation of Piaget's cognitive categories. He found that the indoor environment had a strong effect on constructive play whereas the outdoor environment stimulated nearly all the functional play. Cooperative play was observed in nearly equal frequencies in both environments.

Taken together, these studies present several methodological limitations before conclusions can be drawn. The children's interactions with peer could be involved interactions with children as well as teachers rather than only children during observation period. More precise and comprehensive assessment of young children's peer interaction needs to be forthcoming to determine the effect of the physical environment of play (i.e., classroom, outdoor playground). Rather than relying on a single assessment approach, many researchers have recommended using multimethod, multisource, and multisetting information to obtain a comprehensive assessment of young children's peer interactions (e.g., Achenbach, McConaughy, & Howell, 1987; Brown, Odom, & Holcombe, 1996). For example, detailed examination of peer interactions has allowed investigators to better understand the variables that explain any obtained similarities and differences in children's social responding (e.g., behavioral differences exhibited in various settings or with different people) (Brown et al., 1996). In this regard, research needs to examine the effects of different settings (i.e., classroom, outdoor playground) on children's interactions with peers, using multiple methods and more precise and comprehensive assessments.

In summary, peer interaction has been based on the assumption that the physical environment can influence development only when it is mediated by social environmental parameters (i.e., peer, adult). In other words, the parameters of the physical environment may serve to structure the nature of social interactions among peers (Wachs, 1985). For example, group-designed centers in the classroom facilitated children social interactions by allowing children to focus
on each other (e.g., double seating in the train) and to engage in complementary role play (e.g.,
ticket seller and buyer) (Petrakos & Howe, 1996). On the outdoor playground, slides, sandboxes and
large toys (e.g., rocking boats, swings, climber) designed for several children to be together
facilitated children's peer interaction by allowing children to talk and physically contact each other
(Wortham & Wortham, 1989). Despite these differences of peer interactions in different physical
setting, many researchers have been interested in the effect of the indoor classroom environment on
children's peer interactions whereas few studies have investigated the physical environment of play
influencing children's peer interactions, especially outdoor playground activities. In this regard, more
research is needed to investigate children's peer interactions and play behaviors in the different
physical environments and its effects on children's peer interactions. The present study attempts to
add needed research in this area by making an in-depth comparison of preschooler's peer
interactions and play behaviors in indoor and outdoor environments.

Literature Review

The background literature falls into three categories: (a) the role of play in children's
development that is definition of play and play developmental pattern; (b) physical environment of
play that is indoor play and outdoor play; and (c) peer interaction that is influences on peer
interactions within the classroom, within the playground and indoor and outdoor settings.

The Role of Play in Children's Development

Definition of play  Play, as a vehicle for enhancing young children's development, has been
studied across the decades. According to Bailey and Wolery (1989), play can take on many forms;
thus, it is not form specific. Play occurs in almost all settings; thus, it is not setting specific. A
behavior may be interpreted at one time and not at another. Rather than a category, property, or
stage of behavior, play is a relative activity (Fromberg, 1992). Defining play has been difficult
because it occurs in such variety. There is some consensus that "play is voluntary, meaningful,
active, symbolic, rule bound and usually pleasurable, even when dealing with serious matters" for
young children (Fromberg, 1990, p.226). In this line of studies, researchers have considered the
child as solitary, playing with objects or imagination; as well as a social player with one or more
peers, children of varied ages, parent figures, and other adults (Fromberg, 1992). They have considered the immediate contexts in which play occurs.

Some researchers have attempted to define play by setting some criteria (Krasnor & Pepler, 1980; Rubin, et al., 1983; Saracho, 1991; Smith, Takhvair, Gore, & Vollstedt, 1985; Smith & Vollstedt, 1985; Takhvar & Smith, 1990). Based solely on speculation, these criteria tend to be intangible. For instance, Rubin et al. (1983) developed criteria to determine when observed behavior is play. Their six criteria for defining play as dispositional factors are; (a) intrinsic motivation; (b) orientation toward means rather than ends; (c) internal rather than external locus of control; (d) noninstrumental actions rather than instrumental actions; (f) freedom from externally imposed rules; and (g) active engagement. In addition, they suggest that motives for engaging in an activity provide clues to determine play. Rubin et al., (1983) claim that "applied additively, the features function to progressively restrict the domain of play" (p. 752). Thus, this line of argument provides no single definition of play. Rather, there are various overlapping criteria; the more of these criteria present, the more certain it is that an observer will regard the behavior as being play (Smith et al., 1985).

Kransnor and Pepler (1980) provide a fully explicit model. They proposed that four criteria, namely flexibility, positive affect, nonliterality, and intrinsic motivation, intersect to delimit play increasingly. Smith and Vollstedt (1985) investigated a set of criteria (intrinsic motivation, nonliterality, positive affect, flexibility, and means/ends distinctions) to identify a play activity by testing the Kransnor and Pepler model. Their results showed that only three of these criteria were employed to determine a play activity. Intrinsic motivation was disregarded. Most observers used a combination of nonliterality, positive affect, and flexibility was used in more than half of the episodes using these criteria. Obviously, observers viewed play as enjoyable, flexible, and, most typically, as "pretend." Smith and Vollstedt (1985) sanctioned that these criteria become a tentative definition of play, even though there are other criteria related to play. Specific criteria can facilitate the identification of play behavior, but it does not define play and it can also lead to dismissing some meaningful play episodes.
Smith et al. (1985) suggested that their model is plausible, but no empirical support is provided and the use of these criteria is questionable. Saracho (1991) also supported that their research has provided limited empirical support for selecting a set of characteristics to identify a play episode. In addition, Sutton-Smith and Kelly-Byrne (1984) have argued that play need not be flexible or voluntary.

Although no specific criteria may incorporate every belief about play or be conceptually pure, numerous experts have argued that play should be defined with diverse aspects focusing on its content, motive, and context rather than merely identifying several attributes because play, in a sense, defines itself. Context, especially, may include the physical environment, time, other children or adults present, and cultural sanctions and expectations.

Play developmental pattern. In an absence of agreement regarding the universal definition of play, many researchers have pursued investigations about the nature of children's play by examining developmental patterns of play (Bergen, 1987; Johnson et al., 1987; Pack, 1995; Smilansky & Shefatya, 1990). Through a variety of observational methods and analytical models, researchers and theorists have asserted play as a developmental phenomenon and provided taxonomies (Buhler, 1937; Howes, 1980; Howes & Matheson, 1992; Parten, 1932; Piaget, 1962; Rubin et al., 1976, 1978, 1983; Smilansky, 1968).

Piaget (1962) provided some fundamental theoretical underpinnings of children's play as sequential stages of play development. He suggested that interactions of children and actions upon the environment influence their development of play. Piaget (1963) viewed these interactions along with neurological maturity as the primary sources of developmental progress. According to Piaget, intellectual adaptations result from an equilibrium between the processes of assimilation and accommodation. In assimilation, children incorporate experiences into existing ways of thinking. In accommodation, the child's existing mental structures are reorganized to incorporate new aspects of the external environment. Intellectual adaptation occurs when the child accepts a new realization about external reality, while at the same time maintaining his or her mental structure intact. Play is
characterized by the primacy of assimilation over accommodation. In play a child assimilates experiences into existing mental structures.

Piaget (1962) outlined three stages of play in early cognitive development as practice play, symbolic play, and games with rules, corresponding to the sensorimotor, preoperational, and concrete operational stages of cognitive development, respectively. First, sensorimotor/practice play is characterized by a form of repetitive muscle actions (e.g., dropping a rattle repeatedly). This begins during the second quarter of the first year of life and continues as a major play mode in infancy and early toddler years. The child enjoys repeated exercise on any newly mastered motor ability for the mere pleasure of functioning. Second, symbolic play involves make-believe transformation of objects, people, or events (e.g., using a block as if it was a car). It occurs most frequently in the preschool through kindergarten years and declines at the beginning of concrete operations about age 6 or 7. Games with rules are identified by a structure and organization of activities with preestablished rules by the players. This type of play reaches a peak in the middle childhood. Subsequent research has confirmed that practice play decreases in the preschool years and symbolic play increases (Fein, 1975; Rubin et al., 1978) although later decrease in symbolic play for middle childhood has not been well-documented (Smilansky, 1968). Piaget's theory provides a coherent description of successive play development to cognitive abilities.

Like Piaget (1962), Vygotsky (1967) viewed play as a developmental activity which progresses from one stage to another; however, he did not consider play to be a natural by-product of adaptive intelligence. Instead, he viewed that play acts as an adaptive mechanism promoting cognitive growth, later abstraction processes. Play, therefore, is defined as children's creation of imaginary situations and is derived from real-life tensions. The emergence of play serves as a function of desires and needs which can neither be satisfied nor forgotten. In this regard, Vygotsky viewed pretend play as its appearance at a time when children must learn to postpone the gratification of impulses and accept the fact that certain desires will remain unsatisfied.

Smilansky (1968) cited the work of Piaget as one theoretical foundation used to create her categorical and observational scheme as functional play, constructive play, dramatic play, and
games with rules. She defined functional play as the routine and stereotypic use of play materials or simple motoric activity. Constructive play was characterized as the sequential and purposeful behavior resulting in a finished product. Dramatic play was defined as the thematic role play entailing the transformation of situations or objects. Games with rules were described as the acceptance of and adjustment to prearranged rules. She suggested that these categories are an age-related hierarchy. According to Smilansky, constructive play most commonly occurred in the preschool classroom. She also viewed sociodramatic play (i.e., pretend play in a group) as the highest play attainment of preschoolers.

There appear to be considerable problems with some aspects of Smilansky's categories. One of the main criticisms of Smilansky's categorical scheme is the interpolation of constructive play in the developmental hierarchy between functional and dramatic (Pack, 1995). The rationale for this ordering appears to be that the symbol use evident in dramatic play requires more advanced cognitive skills than does constructive play. Takhvar and Smith (1990) questioned theoretical underpinnings of constructive play. They argued that Smilansky had misinterpreted Piaget with the inclusion of constructive play in her hierarchy. Construction should probably not be considered as play because of its accommodative nature. They indicated that this distinction is important because if objects are manipulated to construct or to create something it suggests that the activity is accommodative rather than assimilative.

Constructive play as a developmental stage between functional and dramatic has been studied with inconclusive results (e.g., Christie & Johnson, 1987b; Pellegrini, 1984; Rubin et al., 1978). For example, Christie and Johnson (1987b) point out that constructive play may have both a functional (motoric) and a dramatic (representational) play components which allows objects to be explored, motor activities to be exercised, and aspects of reality to be expressed symbolically. Two cross-sectional studies (Rubin et al., 1978; Pellegrini, 1984) found that while functional play tended to decrease and dramatic play tended to increase over early childhood, there was little or no change in constructive play. Taken together, previous studies have argued the construct of constructive play as a valid research category.
A different view on play development is suggested by Parten's (1932) taxonomy of social play levels based on her examination of social development in preschool children in a nursery-school setting. The categories include six sequential social participations of unoccupied behavior, solitary play, onlooker behavior, parallel play, associative play, and cooperative play. She described onlooker behavior as a child observing the other children playing, unoccupied behavior as a child watching anything of momentary interest or playing with her own body, solitary play as a child playing alone, parallel play as a child playing independently but beside other children, associative play as a child playing with other children but each child acting her own wishes, and cooperative play as a child playing with other children with mutual regards or acting in complementary roles.

Three-year-olds were reported by Parten to engage in primarily unoccupied or onlooker activity or solitary play while 4-year-olds were primarily involved in parallel play, and 5-year-olds were primarily in associative and cooperative play. These categories are critiqued in several ways. First, parallel play was not a stage of play but was used as a preparatory or "warm up" phase before entry into more complex activities (Bakeman & Brownlee, 1980). Second, approximately 50% of children's solitary play involved educational and goal-directed activities (Moore, Evertson, & Brophy, 1974) and 60% involved constructive or pretend activities (Jonson & Ershler, 1981). Finally, 40% of preschoolers play was associative and cooperative (Rubin et al., 1976). Taken together, solitary play is not the least mature form of play. Solitary play requires the development of confidence, independence, and maturity. Researchers have suggested that solitary and cooperative play should be seen as more mature than parallel play (Johnson & Ershler, 1981).

Although categories of play development in both cognitive and social aspects have been questioned, a number of researchers and practitioners alike have used the play categories of Smilansky (1968), and Parten (1932) either independently or in combination (Johnson & Ershler, 1981). Rubin and his colleagues combined Parten's social participation scale and Smilansky cognitive play categories into a single instrument, allowing both dimensions of play development to be assessed simultaneously and to demonstrate theoretical understanding of play (Rubin et al., 1976). They nested four types of social participation (i.e., solitary play, parallel play, associative
play, cooperative play) with four types of cognitive play (i.e., functional play, constructive play, dramatic play, games with rules) to create 16 social-cognitive components of play (e.g., solitary-functional play, solitary-constructive play, solitary-dramatic play, parallel-functional play, parallel-constructive play, parallel-dramatic play, interactive-functional play, interactive-constructive play, interactive-dramatic play). Onlooker and unoccupied behaviors are classified as nonplay categories.

In the Parten-Smilansky play scale, a methodological problem in the use of Smilansky’s cognitive categories for observation research was resolved. That is, her original definitions give multiple unweighted criteria for distinguishing one category from another (Pack, 1995). The scheme has been criticized as an imprecise guide to an observer trying to classify episodes of playful behavior (Takhvar & Smith, 1990). Rubin et al. (1976) addressed this problem by shortening the definitions so as to give one defining criterion for each category of play. Based on this work, functional play is simple repetitive muscle movements with or without object; constructive play is manipulation of objects to build or create something; dramatic play is the substitution of an imaginary situation to satisfy the child’s personal needs and wishes; and games with rules are the acceptance of prearranged rules and the adjustment to these rules.

The Parten-Smilansky play scale has been modified in different ways and has been used to examine various aspects of children’s spontaneous social and play behaviors, especially in preschool classrooms (Johnson & Ershler, 1981; Pellegrini, 1984; Roper & Hinde, 1978; Rubin et al., 1978; Smith, 1978). For example, Rubin et al., (1978) combined associative and cooperative play into a category of group play so the adapted Parten-Smilansky matrix consisted of 12 play categories. Smith (1978) also modified associative play and cooperative play into a single category of interactive play because of the conceptual similarity of the two social play categories. A cognitive category of games with rules is also excluded from the Parten-Smilansky scale due to its low frequent occurrence during the preschool years; thus, the revised matrix has nine categories of social-cognitive play (Dunn & Herwig, 1992; Rubin & Maioni, 1975; Tejagupta, 1991). Subsequent research has shown that with these categorical definitions and refinements of Smilansky’s cognitive
dimensions of play and Parten's social participation categories, observers can be easily trained to high levels of interrater reliability (Pellegrini & Boyd, 1993).

Beginning with the early work of Parten (1932), developmental theorists have attempted to order their observations of children's peer play into meaningful developmental sequences (Howes & Matheson, 1992). When the play of preschoolers is observed, Parten's and similar play sequences do not form a developmental sequence according to Fein, Moorin, and Enslein (1982). Also, the Parten categories of social interaction have been combined with the Smilansky scheme to form a nested hierarchy, with the assumption that both sets of categories represent a "hierarchical universal" (Rubin, Maioni, & Hornung, 1976); however, this assumption is questioned (Takhvar & Smith, 1990). For example, constructive play is considered a more immature form of behavior than dramatic play (Rubin, 1982). Others argue that constructive play and dramatic play are alternative modes of activity characteristics of two-to six-year-old children (Takhvar & Smith, 1990).

Howes (1980) developed an observational scale, the Peer Play Scale, that examines children's social play behavior during free play, in greater detail than the Parten-Smilansky matrix. This scale focuses on two dimensions of peer play, such as the complexity of social interaction among children and the degree to which their activities are organized and integrated. The Peer Play Scale consists of 5 levels identified as: (a) simple parallel play, children engaging in similar activities but no social contact, (b) parallel play with mutual regard, children engaging in the same or similar activity and having social contact, (c) simple social play, children directing social behavior to one another, (d) complementary play with mutual awareness, children engaging in complementary action and mutual gaze or awareness of the other, and (e) complementary social play, children engaging in complementary actions and reciprocal social roles. Later, Howes and Matheson (1992) proposed a new developmental sequencing of young children's peer play based on the cognitive complexity of children's social activities. Two more categories, cooperative social pretend play and complex social pretend play, were added to the original Peer Play Scale. Cooperative social pretend play is defined as children playing complementary, nonliteral, or pretend roles (e.g., mother and baby) but without any planning or communicating about the meaning of the roles or the form that the play will take, and
complex social pretend play is determined when children actively plan their pretend play (e.g.,
naming, explicitly assigning roles, prompting the other child).

To determine whether these forms of play develop sequentially, Howes and Matheson (1992)
conducted a longitudinal study in which the play activities of a group of 1-to 2-year-olds were
repeatedly observed (at six-month intervals) over three years. They found that children developed
play forms in the expected sequences and at the expected ages. For example, by age of 21/2 to 3,
most children had progressed to cooperative social pretend play, and nearly half had displayed
complex social pretend play by age 31/2 to 4. Also, children's pattern of play, from emergence and
proportion of time in more complex play forms, was related to subsequent indices of social
competence. Children who developed cooperative social pretend play earlier or who spent a greater
proportion of time engaged in that play form as older toddlers showed earlier emergence of complex
social pretend play and spent a greater proportion of time in complex social pretend play as
preschoolers. Moreover, there was a clear relationship between the complexity of a child's play and
the child's social competence with peers: children who engaged in more complex play at any given
age were rated as more outgoing and prosocially inclined at the next observation period six months
later.

Based on the previous research, the Parten-Smilansky Scale has been used extensively to
examine age trends in young children's play behavior as well as to assess the correlation between
different forms of play and measures of social and cognitive development (Christie & Johnson,
1987). Howes' Peer Play scale has been used to investigate developmental patterns in young
Although the scales have been used in a number of research studies, they only explore children's
play and peer interaction in the indoor classroom setting. Research is needed to validate the social-
cognitive categories of children's play and of children's peer interaction in different settings (i.e.,
outdoor playground).
Physical Environment of Play

Physical environment has been traditionally defined as the stage or setting upon which the interplay of social and physical environments take place, while social environment involves interpersonal transactions between children and other persons in their social context (Wachs & Gruen, 1982). In other words, physical and social environments can be differentiated by the animate versus inanimate features of the environment (Wohlwill, 1983). The physical environment is postulated by inanimate objects, encompassing physical or sensory attributes whereas the social environment is represented by people, encompassing interactional and emotional stimuli. In this regard, the physical environment of play may include factors such as the place in which play occurs, the materials that are present in the place, and how the materials are arranged.

The physical environment of play seem to have direct influences in the play opportunities for children (Bergan, 1987; Phyfe-Perkins, 1980). Lewin (1931) proposed a rationale for the emphasis on features of the physical environment. Although children move in and out of certain environments, the influence of an environment remains since the interactions of children have been affected by the environment. How the child interacts is greatly affected by situational and environmental factors. Behavior (B) is a function of the interaction between the person (P) and the environment (E), or expressed symbolically in his classic equation: \( B = f(PE) \). He suggests that objects, such as equipment and materials, in the physical environment have certain valences that attract children positively or negatively considering the needs of that child at that moment, the stimulus and the context of the environment. For example, a child may wish both to play indoors by himself and to play outdoors with other children, or he may want to slide a climber but at the same time be afraid of it. Changing developmental levels, age, or psychological state at given times can affect children’s play behaviors.

Darvill (1982) modified Lewin’s (1931) model to a specific model for studying play behavior, that is, he transformed the variable in the original model of \( B \) to \( B_p \) (play behavior), \( P \) to \( P_c \) (playing child), and \( E \) to \( E_p \) (play environment). The modified model considers the child's play behavior (\( B_p \)) as a function of the relationships between the playing child (\( P_c \)) and the play environment (\( E_p \)) or in
the modified equation \( B_p = f(P_cE_p) \). Darvill's modification of Lewin model allows researchers to consider the environmental context and provision of stimulation in a broader perspective of play. In this regard, the framework of Lewin's and Darvill's model appears to evaluate the quality of children's play by simultaneously recognizing the important role of other influential factors (e.g., equipment, materials, peer) in children's play environments.

It appears that peer interactions in play settings afford a particularly rich environment (Berk & Winter, 1995) for Vygotsky (1967) theory that argues for a zone of proximal development, which is the "distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (p. 86). For example, a preschool age child typically has representational thinking, even if she has had limited experiences with peer interactions. Such a child would be expected to engage in pretend play with a peer as soon as she has acquired sufficient social interaction skills to cooperate in play with peers. In this play setting, the child must coordinate newly acquired and mature symbolic abilities with social interactive skills in order to engage in pretend play with a peer.

These theoretical underpinnings of the play environment allow researchers to recognize the importance of the interplay between children and materials. Children's contact with materials interacts with their social world in the play setting, with their real-world knowledge, and with their fantasy worlds (Reifel & Yeatman, 1993). A study by Shin (1994) provides support for empirical investigations for both children's symbolic play and the play environment. Shin investigated how preschool children engaged in symbolic play indoors and outdoors and compared the similarities and differences of preschool children's symbolic play across the two settings. Eight preschool children (four boys and four girls) were observed during indoor and outdoor free play time. The settings for the classroom consisted of six small partitioned areas for particular activities and one large area for group activities. In each area, there were various types of materials provided for particular activities. The type of playground at the center was a creative playground, which was developed to provide children with a varied, stimulating environment for play.
Results showed that differences in the play environments of indoor and outdoor settings (i.e., realism, structure, quantity, variety) resulted in qualitative differences in the content of symbolic play. The children most frequently used the sand on the playground for their symbolic play activities. Also, the symbolic play themes enacted outdoors varied according to the play area or equipment that was selected for symbolic play. Shin interpreted that the children felt freer to explore the world around them and transform the real world into the fantasy world which met their imaginative needs and interests on the outdoor playground. The author suggests that both indoor and outdoor settings have to be provided low-structure and low-realistic materials (e.g., cardboard boxes, blocks, blanket) which serve as pivots for transforming the real world around the children into the fantastic and flexible one which meets their imaginative needs and interest. Taken together, interactive stimuli in children's environment allows them to expand their repertoire of responses to environmental stimulation and provides feedback to recognize their effect on the environment (Hartle, 1989).

**Indoor play** There are a number of studies investigating the play environment that influences on children's play behaviors, especially in the classroom. Most of them have focused on play behavior in a preschool classroom setting as related to play materials: (a) toy realism and structure on children's dramatic play (Fromberg, 1992; Griffing, 1980; Johnson et al., 1987; McGhee, Etridge, & Benz, 1984; McLoyd, 1983; McLoyd, Thomas, & Warren, 1984; Smilansky, 1968), (b) the effect of play materials on social development (Fromberg, 1990; Rogers, 1985), and (c) play areas (Mann, 1984; Olszewski & Fuson, 1982; Pellegrini & Galda, 1982; Pellegrini, Galda, & Rubin, 1984).

Considering the degree of reliance on the play materials as a function of age, a number of studies have investigated the effect of toy realism and structure on children's dramatic play (Fromberg, 1992; Griffing, 1980; Johnson et al., 1987; McGhee et al., 1984; McLoyd, 1983; McLoyd et al., 1984; Shin, 1994; Smilansky, 1968). Realism refers to the degree to which a toy resembles its real-life counterpart. Structure refers to the extent to which toys have specific uses. High-realism toys are considered to be highly structured and to have very specific uses (Johnson et al., 1987). In this line of research, studying 3- to 6-year-old children, Smilansky (1968) reported that middle-class children, compared to lower-class children, engaged in more sociodramatic play, enacted a greater
variety of roles and richer episodes, and showed a stronger preference for low-realism toys (e.g.,
tubes, blocks, boxes and pipe cleaners) and less preference for high-realism toys (e.g., tea sets,
dolls, trucks). She contended that children find high-realism toys extremely satisfying emotionally
because they help the child to portray more exact, detailed action or role pretense, and contribute to
the sense that they really are performing the action or behaving like the adults being portrayed
(McLoyd et al., 1984).

In this vein, McLoyd (1983) examined the effects of high-structure versus low-structure
objects on various types and components of pretend play in a sample of 36 low-income,
predominantly African-American preschoolers. Twelve triads of children, equally divided by age and
sex, were observed in four 30-minute play sessions. In two of the sessions, high-structure or replica
objects (e.g., tea sets, dolls, trucks) were available; in the remaining two sessions, low-structure
objects (e.g., tubes, blocks, boxes, pipe cleaners) were provided. She found that high-structure toys
significantly increased noninteractive (solitary and parallel) pretend play in 3 1/2-year-old, but not 5-
year-old, triads. She also reported that these toys increased associative and total pretend play
(solitary, parallel, associative, and cooperative combined) in both age groups, but failed to increase
cooperative pretend play. Later McLoyd et al. (1984) investigated sequential dependencies in
solitary and interactive states of social organization as a function of age, sex, and types of toy in 12
triads of 3- to 5-year-old children. The results showed that triads were more likely to remain in
solitary play in the presence of high-specificity toys than in the pretense of low-specificity toys.
Taken together, the structure of play materials has influenced particular pretend situations which
promotes certain play behaviors and social interactions.

Some researchers have been interested in examining the effect of play objects on social
development (Fromberg, 1990; Rogers, 1985; Rubin, 1977). For example, Rogers (1985)
investigated the social behavior of 20 kindergarten children as they played with unit (small, solid,
hardwood) blocks. Results indicated that the children engaged in group, parallel, and solitary play
with both types of blocks, but group play was more likely to occur with large hollow blocks while
parallel and solitary play occurred more often with unit blocks. Children also spent more time playing
with large, hollow blocks. The results from this study suggest that large hollow block play may provide kindergarten children with opportunities and experiences that encourage social development.

Fromberg (1990) argues that social development is related to the use of play objects. The indicators of decontextualization are symbolic transformation, substitutions, and inventive acts, as children become less dependent on prototypical representation. Furthermore, decentration requires children to anticipate others' reactions and to adapt their behavior. An increasing ability to combine individual action sequences into multischeme combinations characterizes children's integration (Schickendanz, Schickendanz, Hansen, & Forsyth, 1993). As children's play integrates schemas or action sequences, they also increase their use of speech (Fromberg, 1992).

Other researchers have emphasized the relation of language development and play centers (Mann, 1984; Olszewski & Fuson, 1982; Pellegrini & Galda, 1982; Pellegrini et al., 1984). For example, Pellegrini (1984) described the ways children used elaborated language in two play centers and how the use of elaborated language changed for children of 4 and 5 years old. The ten 4-year-olds and ten 5-year-olds were observed in same-age and same-sex dyads on four occasions (twice in a constructive context and twice in a dramatic context) in an experimental playroom. The results indicated that children produce more elaborated language in dramatic play centers than in constructive centers. Children generated more linguistic verbs, physically absent tenses, and less exploration in the dramatic center than in the block center. In another similar study, Olszewski and Fuson (1982) reported that 3-and 4-year-olds in their study engaged in more verbal fantasy themes with high-feature dolls while 5-year-olds elicited greater verbal fantasy themes with low-feature dolls and with the absence of objects.

Based on the previous studies, children's toys and materials in the classroom have an impact on play behaviors, social interaction and social and language development of children. For example, when children are given unstructured materials rather than highly structured and specific uses, they engage in role plays and maintain elaborate play episodes for a long time. Research is needed to explore how materials and equipment on the outdoor playground have effect on play behaviors and peer interaction of young children.
Outdoor play  While there has been a moderate amount of research concerning the functional relationship between play and play objects (toys, materials) in the classroom, few research studies have examined the relationship between children's play and the outdoor setting (i.e., playground) (Frost & Klein, 1979; Frost & Sunderlin, 1985; Hartle, 1989; Hartle & Johnson, 1993; Henniger, 1985; Shin, 1994; Wardle, 1983). For example, Hartle (1989) investigated how the addition of housekeeping equipment, constructive equipment (e.g., blocks and trucks), and combined selection of housekeeping play props and constructive equipment on the outdoor setting affected children's play behaviors. There were four conditions (i.e., combined, exiting, constructive, housekeeping) set up in a consistent physical arrangement each fair weather day during the experimental period from October 26 to December 1. Four observations per condition were conducted for a total of 16 observations. 18 children (M = 53 months) were observed during outdoor free play time each day of the experiment. High-level pretense play, constructive play and children's choices of equipment and dialogue were observed by two researchers who scanned sections of the playground. Results showed that there was a wide variety in the amount of incidents of involvement in high-level pretense play. For example, the most frequently observed themes during high-level pretend play were police, army, restaurant, kitties or dogs, family, doctor/dentist. In this regard, children used various areas of the playground as bases for pretense themes.

Research concerning the outdoor setting has primarily focused on children's behavior on different types of playgrounds (Frost & Klein, 1979, 1983; Hayward, Rothenberg, & Beasley, 1974). Four orientations for children's play have been translated into playground design concepts and identified to characterize play locations and activities. These orientations are traditional, contemporary, adventure, and creative playgrounds. Traditional playgrounds consist of large, open areas covered with packed dirt, grass, or most often asphalt. Contemporary playgrounds are defined by Hayward et al. (1974) as playgrounds that are somewhat sculptured, frequently based on sand or concrete (or wooden pillars) emphasizing novel forms, textures, and different heights in aesthetically pleasing arrangements. Adventure playgrounds are play spaces that use the natural environment and an assortment of discarded materials as their equipment. Finally, creative playgrounds are
sometimes built through community involvement. These spaces incorporate reusable, discarded materials, such as tires and wheeled vehicles, as well as sand and water areas.

Campbell and Frost (1985) examined the effects of two types of playgrounds on the cognitive and social play behaviors of second-grade children. The playgrounds, defined as a traditional and a creative playground, were located on opposite sides of a private elementary school. The traditional playground provided conventional commercial playground equipment, such as seesaws, a merry-go-round, swings, a slide, and trapeze bars set. The creative playground was flat, mostly grassed, with a riding path, sand below the climbing structures and large shade trees along one side. A variety of riding, dramatic play, and game equipment were stored in a corner shack to which children had access during play. Subjects were 45 second-grade boys and girls. Each child was observed for ten seconds twice during free play time one day per week on each playground, for a total of ten weeks at the beginning of the school year. The play behaviors of children was coded by using the Parten (1932) social categories and the Smilansky (1968) adaptation of Piaget's (1962) cognitive categories.

Results indicated percentage of occurrence of each social and cognitive play category between the traditional and the creative playgrounds. The cognitive play on the traditional playground revealed that 77.9% of the play was functional, 0.2% of the play was constructive, and only 2% of the play was dramatic. On the creative playground, 43% of the play was functional, 3.9% of the play was constructive, and 37% of the play was dramatic. The social play on the traditional playground showed that 3.4% of the play was solitary, 29.5% of the play was parallel, 8.5% of the play was associative and 45.6% of the play was cooperative. In contrast, on the creative playground, 11% of the play was solitary, 12.6% of the play was parallel, 12.8% of the play was associative, and 50.2% of the play was cooperative. Campbell and Frost conclude that generally the creative playground encourages more complex cognitive and social play behaviors for school-age children than does the traditional playground.

In addition, they found significant the type of playground, equipment and materials. For example, on the traditional playground children selected action-oriented to swings, merry-go-rounds,
and seesaws over fixed apparatus and slides. On the creative playground, equipment or materials designed for functional play (i.e., slides, climbers, swings) were selected for play less than one of fourth of the time while equipment or materials designed for dramatic play (i.e., sand, loose materials, boat, car) were selected for more than half of the play. In this regard, creative designs (playgrounds), complex materials that can be used in various ways, and a variety of play materials or equipment would best serve the stimuli-seeker player (Hartle & Johnson, 1993).

In contrast, a study conducted by Hart and Sheehan (1986) with preschoolers reported contradictory findings. They examined the outdoor play of twenty 3-year-olds and twenty 4-year-olds attending a Midwest university laboratory school. The playground was divided into a traditional space and a contemporary space and both sides of the playground were equipped with some of the same types of equipment, such as a slide, a sandbox, and swings. The traditional space had more moveable equipment, such as tires and wooden crates and more open space, and the contemporary space had more emphasis on sculptured landscaping, less open space, and limited pieces of moveable equipment. Children from the two age groups had equal access to both sides of the playground for 7 weeks at the beginning of the school year and before the recorded playground observations began. The play behaviors of children were coded by using the Parten (1932) social categories and the Smilansky (1968) adaptation of Piaget's (1962) cognitive categories. During regularly scheduled outdoor time, the preschoolers were randomly alternated between the two playground areas and observers videotaped each individual child's play behavior until all the 40 children were filmed for 12 times for 30 seconds, a total of 360 seconds in each area. No differences were found in the cognitive and social play of the preschoolers on these two playgrounds. The findings showed that neither type of playground differentially influenced cognitive play, nor social play behaviors.

These findings support the research of Brown and Burger (1984). They compared three playgrounds rated as a more contemporary design with three playgrounds of a less contemporary design (i.e., traditional playground) using a 19-item rating scale divided into four categories, such as social/affective, cognitive, motor, and practical considerations (i.e., accessibility of the playground,
natural elements, storage and maintenance). A total of 72 preschoolers, 12 at each of six playgrounds, were observed; each child was observed continuously every 5 seconds for a 2-minute period for an unspecified number of days. The average total observation time per child was 27.7 minutes. Results showed no significant differences between the children’s social, language, or motor behaviors on the type of playground. They suggest that any differences in play behaviors were due not to the type of playground (i.e., contemporary playground, traditional playground), but rather to the type of equipment and physical arrangement.

Other approaches have been developed to describe the quality of playgrounds by considering the equipment and materials on the playground rather than the playground design (Kritchevsky, Prescott, & Walling, 1969; Nicholson, 1971; 1974; Phyfe-Perkins, 1980; Fukuchi, 1995). For example, Kritchevsky et al., (1969) present the variety and complexity of play equipment and materials. They define play spaces as potential units and play units, and they illustrate the content of these play spaces and investigate the relationship between the physical setting of day care and children’s behavior. Potential units are play spaces that are easy to add several kinds of play materials to, and they can be used for spatial variety. In contrast to potential units, play units are defined by Kritchevsky et al. as something to play with, such as a jungle gym. They classify play units according to their variety and complexity. Variety describes the kind of activity, and is a measure of the relative capacity of the space to elicit interest from children. Complexity describes the extent to which an environment contains “potential for active manipulation and alteration by children” (p. 10). They recognize play units as either a simple unit, complex unit, or super unit. A simple unit has “one obvious use and does not have subparts or a juxtaposition of materials which enable a child to manipulate or improvise” (p. 10). with the available materials. Examples are swings, a jungle gym, and tricycles. A complex unit has “sub-parts or juxtaposition of two essentially different play materials which enable to the child to manipulate or improvise” (p. 10). An example is a sand area with play materials (pails and shovels). A super unit has “one or more additional play materials (i.e., three or more play materials juxtaposed)” (p. 10). Examples are a sand box with play materials and water, and a jungle gym with movable climbing boards and a blanket.
Variety and complexity of equipment and materials are critical factors in promoting and sustaining children's interest in play, according to Kritchevsky et al. Based on the relative value of simple, complex, and super units for promoting children's play, they developed a method for approximating the number of play spaces that a classroom or playground offers children. They concluded that complex units would generally accommodate four children at once and that super units would be equal to two complex units. Thus, they assigned a value of 1 to simple units, a value of 4 to complex units, and a value of 8 to super units.

By determining the total number of play spaces of a classroom or playground, and the appropriate number of play spaces available to each child, the sum can be divided by the total number of children in the indoor or outdoor space. A ratio of the total number of play spaces to the number of children gives the approximate number of play spaces available to each child. For example, if the playground has 6 riding vehicles, 1 jungle gym with boards, and 1 sand area with play materials and water, the number of weighted play spaces would be 6, 4, and 8, respectively (see Table 1), and the total number of play spaces would be 18 (6 + 4 + 8 + 18) (see Table 1). If there are 9 children on the playground, the ratio of the total number of play spaces and the children would be 2:1 for this playground. Prescott (1981) argues that good space for free selection time requires 4 to 5 play spaces per child; therefore, a ratio of 2:1 or 2.5:1 is not sufficient.

Gerts and Bemdt (1982) used the rating system for play equipment developed by Kritchevsky et al. They examined the effects of the play features of amount, complexity, and arrangement of play resources on children's behavior during free play in the gymnasium of child care centers in a

<table>
<thead>
<tr>
<th>Number of play units</th>
<th>Type of unit</th>
<th>Number of play spaces</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 riding vehicles</td>
<td>simple = 1</td>
<td>6 X 1 = 6</td>
</tr>
<tr>
<td>1 jungle gym with boards</td>
<td>complex = 4</td>
<td>1 X 4 = 4</td>
</tr>
<tr>
<td>1 sand area with play materials &amp; water</td>
<td>super = 8</td>
<td>1 X 8 = 8</td>
</tr>
<tr>
<td>Total play spaces</td>
<td></td>
<td>18</td>
</tr>
</tbody>
</table>
Midwestern urban area. A baseline-treatment-return to baseline (A-B-A) design was used. Results showed that the average ratio of number of play spaces per child at baseline was low, 0.8:1 (center A) and 1.4:1 (center B) and that positive involvement with teachers, peers, and play equipment increased significantly from baseline to treatment. Fewer children were involved in conflicts on treatment days than on baseline days, but the difference was not significant.

Dunn (1993) measures the quality of indoor play space in accredited child care centers using the same rating system of Kritchevsky et al. Results indicated that the average ratio of number of indoor play spaces per child was 1.2:1. Dunn created a variety score by summing the number of different types of activities available. Her results indicated that the average variety score for the indoor play for these centers was 4.9.

In similar way, Fukuchi (1995) examined the quality of the outdoor play environment in five child care programs using the rating system of Kritchevsky et al. and teacher interactions in these settings with children during outdoor free play time. The five playgrounds were assessed in terms of equipment and materials at three different times, such as before outdoor play began, at the beginning of play and at the end of the 10 minute observation on 3 different days. Ten teachers were videotaped and audiotaped for at least 10 minutes on 3 different days. Results indicated that teachers with lower-quality playgrounds tended to add more materials and equipment for outdoor play than teachers with higher-quality playgrounds. Also, preschool teachers who provided a richer outdoor physical environment through adding equipment and materials were more likely to be involved in children's play using teaching strategies to enhance the psycho-social environment.

Based on previous studies, there are two current perspectives in regard to children's play behaviors on the outdoor playground, that is, the playground design and the quality of playground were discussed. The physical arrangements (i.e., complexity, variety, play space per child), especially, influence the quality of early childhood program and, in turn, the social interactions of children (Petrakos & Howe, 1996). For example, the dramatic play center designed as a super unit could be considered as higher quality than the play center of three juxtaposed materials (Kritchevsky et al., 1969). Also, teeter-totters or jungle gyms provide play opportunities for several children to
interact cooperatively resulting in more positive social interactions than tricycles or brooms (Doyle, 1977). In this regard, research is needed to explore peer interaction of children in different quality of physical settings, such as indoor classroom and outdoor playground.

**Peer Interaction**

Physical features of the environment such as space and materials are not the only ecological variables that affect play. Lewin (1931) proposed a rationale for an emphasis on features of the social environment as well as the physical environment. Although children move in and out of certain environments, the influence of an environment remains since the interactions of children have been affected by the environment. The child's interactions are greatly affected by both situational and environmental factors. Lewin represented this interaction as an equation, \( B = f(PE) \) where behavior is a function of the interaction between the person and the environment.

The individuals who inhabit a particular setting can also exert considerable influence on children's play behavior as early as 2 years of age (Christie & Johnson, 1987). For example, early peer contacts among toddlers initially occur around objects and become less object-oriented as their peer interactions increase. Mueller and Lucas (1975) argue that social knowledge and interactional skill arise directly out of asocial object play occurring in the presence of a peer. That is, young children's very awareness of peers as social beings is presumed to emerge as a consequence of fortuitously mutual object play. In contrast, Jacobson (1981) argued that object-centered play may enhance the development of peer social interaction during the second year; however, peer social interaction does not originate in an object-centered context.

According to Musatti (1993), "peer interactions among young children during play constitute the emergence of relations among processes of social interaction, the acquisition of knowledge about the social world, and cognitive processes related to the ability to use socially mediated knowledge" (p. 241). In a similar way, Piaget (1962) also stressed children's interactions with their peers as a source of cognitive development. He emphasized that peer interaction was important in helping the child become aware of alternative points of view and thus break out of his egocentric perspective.
Piaget also discussed how peer interaction could facilitate movement to higher stages of reasoning. That is, conceptual development is facilitated when children experience conceptual conflict or disequilibration, and subsequently re-establish equilibration (Pellegrini, 1984). Children experience conceptual disequilibration as a result of conflict between their views of the world and others' view of the world. Piaget claimed that lasting transformations in cognitive structures could occur as a result of social interaction, especially as a consequence of the conceptual conflicts that arise when children are exposed to peers who hold differing points of view. He argued that peers presented differing points of view to one another and that these differences served to make children aware of the relativity of perspectives and, thus, encouraged self-evaluation and development of their own beliefs. Presumably, "conflicts with peers are superior to adult-child conflicts, since the opinions of peers are not simply accepted, but instead are examined, wrestled with, and eventually incorporated into new and higher levels of understanding" (Louise, Kerwin, & Day, 1985, p. 215).

In contrast, Vygotsky (1962) claimed that adults and more capable peers facilitated cognitive growth by modeling appropriate problem solving methods and by helping children as they attempt to practice these approaches. Initially, more capable peers provide considerable extensive guidance and direction for the children, and only after children begin to master tasks do they turn over this control by demanding more independence from other children.

In order to show the manner in which children's individual development and learning occur within social interactions, Vygotsky (1978) introduced the notion of zone of proximal development (ZPD). Vygotsky suggested that children create their own ZPD within play, which is free from situational constraints whereby one object can now represent another. This allows the conceptual and imaginative activities of children to extend beyond their typical occurrences. Consequently, same age children engaging in mutual social pretend play might also stimulate each other to engage in more complex behavior than could be accomplished by the child who is engaged in solitary play or is not playing (Howes & Unger, 1989; Rubenstein & Howes, 1976). Furthermore, the collaborative activity of same age peers constructing play may serve to stimulate still more complex behavior.
The ability of children to engage in peer interaction is limited by their cognitive and linguistic capacities (Brownell, 1986; Howes, 1987, 1988; Muller & Lucas, 1975). For example, children do not engage in pretend play with peers before they have acquired representational thinking in the late toddler years, according to Piaget (1962). Similarly, children who are developmentally delayed and children with communication impairments demonstrate less complex peer interaction than their typically developing agemates (Crawley & Chan, 1982; Field, 1980; Lederberg, Ryan, & Robbins, 1986).

Children with limited exposure to peers during the infant and toddler periods generally proceed through developmental stages (i.e., infancy, early toddler, late toddler, preschool) rapidly if exposed to peers as preschoolers (Howes, 1987). For example, a preschool age child typically has representational thinking, even if she has had limited experiences with peer interactions. Such a child would be expected to engage in pretend play with a peer as soon as she has acquired sufficient social interaction skills to cooperate in play with peers. That is, a toddler must coordinate newly acquired and less mature symbolic abilities with social interactive skills in order to engage in pretend play with a peer. Therefore, because of limitations imposed by cognitive development, social pretend play represents a more difficult task for toddlers than for preschoolers (Howes, 1988).

Based on previous studies, children acquire initial knowledge of the social world and learn to use cultural mediation in interaction with others (Louise et al., 1985). For example, children continually try, modify, and discard behaviors as they develop their style and ability in social interactions with peers. Peers, thus, play a critical role in children's cognitive and social interactions by providing information and changing the functional complexity of the environment.

**Influences on peer interactions within the classroom** There are a number of studies investigating the physical environment of play influencing on children's peer interactions as both discriminative stimuli and reinforcers. Most of them have focused on peer interactions in a preschool classroom setting: (a) the physical arrangement of materials and centers (Howe et al., 1994; Petrakos & Howe, 1996; Rubin, 1977), (b) the design and organization of classrooms (Dreyer & Rigler, 1969; Field, Masi, Goldstein, Perry, & Parl, 1988; Howes & Rubenstein, 1981), (c) the quality
of program (Lamb et al., 1994; Teets, 1985), and the influence of teacher's preparation on children's social interaction with peers (Cassidy, Buell, Pugh-Hoese, & Russell, 1995; Clarke-Stewart & Gruber, 1984; Howes & Smith, 1995; Kontos, Hsu, & Dunn, 1994; Whitebook, Howes, & Phillips, 1990).

The physical arrangements of the materials used in the classroom appear to facilitate specific types of peer interactions and play behaviors (Christie & Johnson, 1987; Howe et al., 1994; Petrakos & Howe, 1996; Rubin, 1977). For example, Howe et al., (1994) examined the impact of novel dramatic play centers on the social play of preschool children in a daycare center. Forty-five preschool children of 2 1/2- to 5-year-olds were assigned to five play groups such as a hospital center, a bakery center, a pharmacy, a pirate ship (wooden rocking boat) and a pizzaria. The social play of the children was observed in the dramatic play center during four time periods: (a) two days during the week prior to the novel centers; (b) days one and three of each of the five novel centers; (c) two days during the week immediately following the novel centers; and (d) two days during the week one month after the novel centers. Observations were conducted during the last half hour of free play. Rubin’s Pretend Observation Scale was employed to record children's social play.

Results showed that the pizzaria center appeared to encourage more solitary play than the other centers. Higher frequencies of parallel play were observed in the bakery than the traditional housekeeping, hospital, pirate, and pizzaria centers. Social play was observed most frequently in the housekeeping center while the pirate and pizzaria centers produced the most rough-and-tumble play. They concluded that the physical environment, especially dramatic play centers should be structured so children are more likely to engage in peer interactions than in parallel or solitary play.

Later, Petrakos and Howe (1996) investigated the relationship between classroom learning centers that were designed to facilitate either solitary or group play behaviors and the influence of type of theme (e.g., train station) is related to preschoolers' social and cognitive play. Thirty-one 4- and 5-years-olds were selected from two preschool classrooms in the same urban day care center. The children were observed in the traditional housekeeping center, 1 week before, 1 week after, and during the implementation of the four intervention dramatic play centers (i.e., extended house-solitary, extended house-group, train station-solitary, train station-group). During the intervention
phase, the solitary-designed centers contained furniture and equipment designed to promote solitary 
interactions and individual utilization of materials (e.g., one chair at a table, one toolbox in the car 
center, single seating in the car). Group-designed centers contained furniture designed to promote 
group interactions (e.g., two or more chairs placed around a table, a vehicle with double seating). 
The children's social and cognitive play behaviors were observed by Rubin's play scale (1978). A 
time sampling procedure of a 10-second observation period was used and six 10-second 
observations were collected each day of observation on each child, a total of 360 seconds. 

Results revealed that the solitary-designed centers facilitated more solitary play interactions 
and group-designed centers facilitated more group play interactions. Specifically, group-designed 
centers facilitated children's social interactions when the children were able to focus on each other 
(e.g., double seating in the train) and to engage in complementary role play (e.g., ticket seller and 
buyer). In contrast, solitary-designed centers facilitated individual use of materials (e.g., single 
seating in the train) and limited social exchanges and role play behavior (e.g., tearing off a ticket 
from a ticket machine). Petrakos and Howe interpreted that the physical design of the dramatic play 
center influenced the kinds of opportunities available for children to engage in social behaviors. 
Also, there was the increase in the frequency of dramatic play in intervention centers compared with 
the pre- and post-housekeeping centers. However, there were differences between the two classes 
in exploratory and dramatic play. The authors speculate that classroom differences may have been 
the result of the unequal amount of time children were allowed to play in the dramatic play center 
prior to the implementation of the study. However, baseline classroom differences are possible in 
the quality of the two programs. Therefore, more research is needed before conclusions can be 
drawn. 

In a similar way, the nature or type of play equipment found in preschool environments may 
have an impact on the quality of children's peer interactions and behavior. Some types of play 
materials, including play-dog, sand, and water appear to elicit primarily nonsocial behavior (Rubin et 
al, 1983). For example, Rubin's (1977) observational studies show that when children use play-doh, 
sand, water, crayons, or paint most of their behavior (65% to 85% of observed time) can be
classified as solitary or parallel play. Other activities, such as house play, vehicle play and reading or number activities are primarily social in nature, and seem to elicit high levels of associative and cooperative play (Ladd & Coleman, 1993). In this regard, peer interactions are highly relevant to physical settings of the classroom.

Some researchers have examined the effect of the design and organization of classroom on children's peer interactions (Dreyer and Rigler, 1969; Field et al., 1988; Howes & Rubenstein, 1981; Rubin, 1977). For example, Howes and Rubenstein (1981) examined the relationships between peer behavior and situational constraints in the natural setting by observing the behaviors of toddlers and their peers in family and center day care settings. Forty toddlers between 18 and 22 months of age were observed during two hours of morning free play time. The specific length of observation per each child was not stated. Competent social interaction with peers was measured in terms of the frequency of socially directed behaviors between the target toddler and his or her peers, and the structure of peer play. The socially directed behaviors sampled were vocalizations, offering objects, smiling or laughing, exploratory or positive touches, imitating the others' behavior, taking objects, and physical aggression. The complexity of the toddlers' participation in the same or similar activities (peer play) was rated on a 5 point peer play scale.

Results showed that the structure of the physical environment was related to the types of play activities children pursued with peers. More sophisticated forms of play developed when children "used the spatial arrangement of the home to structure their play" (e.g., chasing each other along a path created by intersecting rooms) (Howes & Rubenstein, 1981, p. 392). In a similar way, Field et al., (1988) found that higher levels of peer interaction, including cooperative play and positive talk, occurred when child care centers are arranged into individual learning centers.

Other researchers have examined the effect of the quality of program on children's peer interactions in the classroom (Lamb et al., 1994; Teets, 1985). For example, Lamb et al. (1994) examined the relationship between alternative care and the quality of peer play experiences. Eighteen children 24- to 36-month-olds participated in this study. These children were observed 5 or 6 times over several weeks in the naturalistic context of family day care homes. The observers
alternated the order in which the Belsky and Walkers Checklist, the Howes Peer Observational Scale, and the Peer Observation Time-sampling were administered. Each measure was completed three times for each child during each 2 to 3 hour visit; however, specific time of day was not reported. Overall, the authors suggested that children who experienced high quality care both at home and in out-of-home care settings benefit in a variety of ways; they become more skilled in interactions with their peers.

Teets (1985) observed play behaviors of 39 2- and 3-year-old children by examining the quality of day care classroom. In this study, quality was defined in terms of a rating assigned by the use of the Environmental Inventory (Prescott et al., 1972), rating based on points derived from an assessment of five features of the environment: organization, complexity, number of places available to each child, variety and special problems. For each aspect of the environment, a numerical score was assigned. Scores were summed up, and an overall rating of 1 to 7 was assigned for the environment. A score of 1 represented the highest possible quality, a 7 indicated the poorest. Three classrooms were selected for this study, based on receiving either a score of 5, 6 or 7 on the Environmental Inventory. This study was conducted in three phases, lasting approximately two weeks each. During the first phase, children were observed in a low-quality condition. During the second phase, the classrooms were arranged to achieve a high-quality condition, and during the third phase, the classrooms again were arranged in a low-quality condition. The observers followed a 15-second look, 10-second record, and a 5-second orientation to the next child. Each child's behavior was coded as child-child interactions, teacher-child contacts, use of materials in appropriate areas, and level of involvement with materials.

Results indicated that changes in behavior were facilitated by alterations in the classroom environment. For example, there were positive changes in the areas of child-child interactions, teacher-child contacts, use of materials in appropriate areas, and level of involvement with materials. In the area of child-child interactions, especially, the increase in verbal interactions and decrease in onlooking and non-interactive behaviors were attributed by the author to the increase in variety of materials and improved organization in the classroom.
Teachers' preparation also is associated with children's peer interactions and classroom quality (Amett, 1989; Cassidy, Buell, Pugh-Hoese, & Russell, 1995; Clarke-Stewart & Gruber, 1984; Howes & Smith, 1995; Kontos, Hsu, & Dunn, 1994; Ruopp, Travers, Giants, & Coelen, 1979; Whitebook, Howes, & Phillips, 1990). The National Child Care Staffing Study (White et al., 1989) reported that the formal education was the best predictor of appropriate caregiving. Teachers with college degrees demonstrated more positive behaviors, such as sensitivity to children, and fewer negative behaviors, such as harshness and detachment. For teachers of preschool-aged (3-5 years of age) children, specialized training in child development/early childhood education was not as strong as a predictor of quality as was a 4-year degree. Clarke-Stewart and Gruber (1984) reported that children in child care settings who were the most socially competent had teachers with higher levels of education. Similarly, Chung (1994) found that children whose teachers demonstrated more developmentally appropriate practices were more likely to initiate learning-related conversations and respond to peers' statements. Taken together, children's play peer interactions are seen as the product of teachers preparation.

In summary, these studies have shown the influences of the physical environment of the classroom on children's peer interactions. For example, a delivery truck in the restaurant center, which allowed for a single driver, encouraged more solitary play, whereas the bakery center, which included baking equipment and play-dough presented in a row, encouraged more parallel play than other centers (Howe et al., 1994). These differences in children's peer interaction are also influenced by the different types of programs and the quality of the classroom. It leads research to explore how peer interactions are different as a function of the outdoor physical environment (i.e., outdoor playground).

Influences on peer interactions within the playground Several studies have examined the influence of the physical environment of play on children's peer interactions, especially on the outdoor playground activities (Fukuchi, 1995; Ladd et al., 1988; Pellegrini, 1992; Pellegrini et al., 1995). Such research has considered the natural setting (i.e., outdoor playground) as an appropriate
place for children to interact by providing a variety of areas, adequate spaces to avoid conflicts, and equipment that invites socialization (Frost, 1996).

Longitudinal studies have examined children's outdoor play behaviors and peer interactions concerning stability of play behaviors and of achievement over time (Ladd et al., 1988; Pellegrini, 1992). Ladd et al. (1988) investigated the relation between preschooler's playground behavior and peer status over a school year by exploring whether early behaviors predicted changes in peer status or vice versa. Twenty-eight 3 1/2- to 4 1/2-year-old children were observed on a common playground adjoining the preschool classrooms during three 6-week intervals, scheduled at the beginning (September-October), middle (December-January), and end of the school year (March-April). Children's playground behaviors and peer status were assessed. Children were observed in random order using a modified scan sampling procedure, and a total of 90 scans were collected per child at each time of assessment. Observers moved within hearing distance of a target child, focused for 4-5 seconds on the subject and his or her peers, and then coded each of the subject's behaviors in one of ten categories, such as cooperative play, social conversation, argue, rough play, parallel play, solitary play, onlooking, transition, teacher, and other.

Results showed that the beginning social behaviors were predictive of peer status 9 months later. For example, individual differences in cooperative play, which were assessed at the beginning of the school year and remained relatively stable over time, forecasted gains in social preference (peer acceptance) by the end of the school year. Children who played cooperatively with peers at the outset of the school year also tended to do so at later points in time, and this disposition was associated with long-term gains in peer acceptance. In contrast, early arguing behaviors predicted declining social preference scores (peer rejection) as early as midyear. The negative reputations of disagreeable children persist even after they change their behavior. In this regard, the authors interpreted that early social behaviors carry potential interactional costs or benefits and, as a consequence, influence the reputations of those who employ them.

Pellegrini (1992) conducted a longitudinal study to examine the extent to which social-cognitive aspects of children's kindergarten experience predicted success in first grade. Twenty-four
5-year-olds were observed on their school playground during the 25-45 minute recess period from October to May for 2 years. Individual child behavior was coded using scan-recording techniques where each child was observed for 5 seconds in a predetermined counterbalanced order. Each child was observed at least 112 times for each of the 2 years. Children's success in first grade was predicted by achievement (i.e., Metropolitan Readiness Test, Georgia Criterion Reference Test), a popularity measure and behavior with peers. Results showed that the kindergarten MRT accounted for 34 percent of the variance in first-grade GCRT, whereas the behavioral measures accounted for an additional 41 percent of the variance; they were accounted for 75 percent of the variance of first grade achievement. Also, kindergarten popularity and aggressive behavior on the playground predicted first graders' exhibition of aggressive behavior.

Further, peer interaction was positively related to school achievement whereas adult-directed behaviors were negatively related to achievement. Pellegrini interpreted that children who chose to initiate contact with adults, rather than peers, may have lacked the social skills to interact with their peers. He suggested that these results may be due to the special nature of the context of the school playground. For example, when children and an adult were together outside, children were either passive or silent or adult was talking, but when children were in the presence of peers, they were more likely to talk to each other.

Another approach has been developed to examine the interaction between children and teacher on the playground rather than the predictability of children's behavior and achievement. For example, Fukuchi (1995) examined the quality of the outdoor play environment in child care programs and teacher interactions in these settings with children during outdoor free play time. Ten head teachers from five child care programs were videotaped and audiotaped for at least 10 minutes on 3 different days. Playground measures were quality of outdoor playground, play area location and portable equipment and materials at three different times, such as before outdoor play began, at the beginning of play, and at the end of the 10 minute observation, using complexity, variety, number of play spaces per child, and loose parts items for each teacher on 3 different days. Teacher measures were teachers' behaviors and verbalizations, and teachers' demographic information.
Results indicated that teachers with lower-quality playgrounds tended to add more materials and equipment for outdoor play than teachers with higher-quality playgrounds. Preschool teachers who provided more materials for outdoor play time before children went to the playground or during outdoor play time were more likely to be involved in children's play by using both indirective and directive teaching strategies. They were less likely to be engaged in non-teaching activities than those who provided few items. Thus, preschool teachers who provided a more diverse outdoor physical environment by adding equipment and materials were more likely to be involved in children play using teaching strategies to enhance the psycho-social environment. In addition, teachers' behaviors and verbalizations differed by the specific playground play areas. For example, the preschool teachers were more likely to use indirective teaching strategies (e.g., acknowledging, modeling) in the sand area and the swing/slide area than the climber or open areas.

Based on this empirical evidence, interaction on the outdoor playground appears to promote learning and achievement, and to support interaction with peers. Specifically, the playground can elicit social competence, according to Pellegrini (1992). When young children are put into a playground with their peers, they typically exhibit high levels of social competence. Children who tend to interact with peers are more likely to be sophisticated on social-cognitive measures on the outdoor playground. It leads research to explore how children interact differently with peers in different settings (i.e., indoor classroom vs. outdoor playground).

Indoor and outdoor settings. There has been limited research reporting investigation concerning differences in peer interactions in the classroom and the outdoor playground settings (Green, 1933a, 1933b; Henniger, 1977, 1985; Pack, 1995; Tizard et al., 1976a, 1976b). Most of them have primarily focused on children's interactions with peers in different physical setting by using observation (Green, 1933a, 1933b; Henniger, 1977, 1985; Tizard et al., 1976a, 1976b) and observation plus interview (Pack, 1995).

Some studies have investigated the children's interactions with peers using observation in the classroom and on the playground (Green, 1933a, 1933b; Henniger, 1977, 1985; Tizard et al., 1976a, 1976b). The early work of Green (1933a, 1933b) assessed children's peer interaction in
indoor and outdoor environments. Observations were made outdoors during warmer weather and indoors when the weather was cold. Forty children of 2- to 5-year-olds were observed using Parten's play categories. Forty 30-second time-sampling observations were made of each child, with no child being observed more than once a day. The data was totaled across both indoor and outdoor environments. Green found that the amount of peer play increased linearly with age. For example, peer play displayed 35%, 50.4%, 65.4%, 79.5% for ages 2, 3, 4, and 5 respectively.

Tizard et al. (1976a, 1976b) investigated age, sex, and social class differences of preschoolers outdoors and indoors. One hundred and nine 3- and 4-year-olds were observed in 12 preschool centers. No description of the classroom and the outdoor environment of the centers was provided. The children had open access to the indoor and outdoor environments during the 10-minute observation period. Ten observations were made for each child using a modified version of Parten's (1932) play categories.

They found that two-thirds or more of the play of 3-year-olds and over half the play of 4-year-olds was solitary or parallel play. Associative play, 21% of all play, was the next most frequent category. Cooperative play was observed in only 16% of all the children's play observations. Girls spent considerably more time than boys playing with fixed physical equipment, such as climbing frames and swings while boys more often played with wheeled vehicles and larger outdoor construction materials. In the classroom, boys also were involved more often with miniature cars and garages and less often with miniature indoor equipment and dolls than were girls.

Tizard et al., (1976b) also examined the effect on children's interaction of the type of preschool center and the social class in the classroom and on the outdoor playground. Three different types of preschool center were selected; traditional nursery schools, nursery schools with a language program emphasis, and nursery schools intended for the care of the children of working mothers. Four examples of each type of center were chosen; in two the children came predominately from the professional middle-class, in the other two from the manual working-class. All children from each type of preschool center were 3- and 4-year-olds. Results showed significant differences of social class in the children's interactions and the quality of their play. For example,
working-class children were more than twice as likely as middle-class children to play outside, particularly with wheeled vehicles, while middle-class children more often than working-class children chose indoor activities such as paints and pattern-making. Also, working-class children more often engaged in solitary or parallel play and their games were shorter and less complex than middle-class children. In addition, there were differences in verbal communication indoors and outdoors.

Henniger (1977, 1985) investigated the relationships between preschooler's indoor and outdoor play in nursery school. A total of 28 preschoolers from two laboratory morning groups were observed for this study. Seven boys and six girls from the older group (5-year-olds) and eight boys and seven girls from the younger group (4-year-olds) participated in the study. The cognitive play categories as defined by Smilansky (1968) were used to assess children's cognitive play in the two environments. And, the social aspects of their play were measured by using modifications of Parten's (1932) play categories. Each child was observed during free play for a 30-second time interval. Children were observed a total of 20 times indoors and 20 times outdoors over a six week period. He does not report whether children were observed in the classroom and outdoors on the same day.

Results indicated that the indoor environment had a strong effect on constructive play whereas the outdoor environment stimulated nearly all the functional play. Cooperative play was observed in nearly equal frequencies in both environments. The only significant difference for the groups was the young children's preference for cooperative play indoors. The dramatic play of boys and the older children was strongly influenced by the outdoor environment, where both groups engaged in more play of this type. The author interpreted that some children are more socially inhibited in the indoor environment. For example, limitations of space, floor covering, and noise levels in the classroom may prevent the occurrence of the more active play, such as bouncing a ball, jumping up and down, and engaging rough and tumble.

Considering the procedures of this study, there are two limitations before conclusions can be drawn. Children were observed in each setting (i.e., classroom, playground) too short time to understand children's interactions with peers. That is, the peer interactions could be involved
interactions with teachers as well as children rather than only children. More precise and comprehensive assessments of young children's peer interaction needs to be forthcoming to determine the effect of the physical environment of play (i.e., classroom, outdoor playground). Also, it is important to sample every child's manner of interaction with peers, so observations need to begin only when a child is interacting with a peer (Howes, 1987). Rather than relying on a single assessment approach, many researchers have recommended using multimethod, multisource, and multisetting information to obtain comprehensive assessment of young children's peer interactions (e.g., Achenbach et al., 1987; Brown et al., 1996). For example, detailed examination of peer interactions has allowed investigators to better understand the variables that explain any obtained similarities and differences in children's social responding (e.g., behavioral differences exhibited in various settings or with different people) (Brown et al., 1996). In this regard, research needs to examine the effects of different settings (i.e., classroom, outdoor playground) on children's interactions with peers, using multiple methods and more precise and comprehensive assessments.

Another approach is using interviews with children to supplement direct observation which has been suggested as an alternative way to observe children's interactions and play behaviors (Smith et al., 1985; Pack, 1995). For example, Pack (1995) examined the differences between the indoor and outdoor play behavior of children when two different methods (i.e., observation and interview) were used. 30 kindergarten children were observed from one of two kindergarten programs at an elementary school during March, April, and May. Observation and observation plus interview conditions were used to collect data on social and cognitive play behaviors. The play behaviors were assessed in both the indoor and outdoor environments in both the observation only and observation plus interview conditions. Each child was observed at least 15-second 10 times indoors and 15-second 10 times outdoors in both conditions for a total of 40 observations per child.

The interview content and procedures are not reported; however, the combined methodology suggests that less functional play and more dramatic play were recorded in the observation and interview condition than in the observation only condition, especially on the outdoor environment. He found that the indoor environment appears to facilitate constructive play and the outdoor
environment seems to facilitate functional play. More solitary and parallel play occur indoors, while more group play takes place outdoors. Dramatic play for children at this age level appears to be facilitated equally by both indoor and outdoor environments.

Considering the procedures of this study, it needs to be viewed with caution because of confounding effects of the two variables, such as different settings (indoor vs. outdoor) and different methods (observation vs. interview). That is, the proportion of the variance in children's peer interaction is not clear either due to different settings or different methods. If this study examined the differences of settings, the variable, methods, is extraneous variable that differs systematically between the classroom and outdoor playground. Also, Pack does not report whether children were observed in the classroom and outdoors on the same day and how many children were assigned into each condition, such as observation only indoors, observation plus interview indoors, observation only outdoors, and observation plus interview outdoors. That is, the design of this study created order effects. Because each participant receives all conditions of the independent variables (settings, methods), the possibility arises that the order in which the conditions are received affects children's peer interactions. In this regard, research is needed to examine the effects of the classroom and outdoor playground on children's peer interactions with controlling extraneous variables.

In summary, there is limited research reflecting the nature and characteristics of play behaviors and peer interaction in the classroom and on the outdoor playground. Little is known about the contribution of play environment (i.e., indoor and outdoor) to the quality and quantity of children's play as well as teachers' planning of each setting. Research is needed to compare preschooler's peer interactions and play behaviors in indoor and outdoor environments.

Summary and Implications

Influences of environment on children's play behaviors and development are theoretically stated (Lewin, 1931; Darvill, 1982; Piaget, 1962; Vygotsky, 1967; Wachs, 1985) and empirically investigated (Green, 1933a, 1933b; Henniger, 1985, Pack, 1995; Sanders & Harper, 1976; Shin, 1994; Tizard, Philps, & Plewis, 1976a, 1976b; Wohlwill, 1983). According to Wohlwill (1983), the
The physical environment of play can influence development only when it is mediated by social environmental parameters (i.e., peer) (Wachs, 1985). In other words, the parameters of the physical play environment may serve to structure the nature of social interactions among peers (Wachs, 1985). For example, group-designed centers in the classroom facilitated children's social interactions by allowing children to focus on each other (e.g., double seating in the train) and to engage in complementary role play (e.g., ticket seller and buyer) (Petrakos & Howe, 1996). On the outdoor playground, slides, sandboxes and large toys (e.g., rocking boats, swings, climber) designed for several children to be together facilitated children's peer interaction by allowing children to talk and physically contact each other (Wortham & Wortham, 1989).

Despite these differences of peer interactions in different physical settings, many researchers have been interested in the effect of the indoor classroom environment on children's peer interactions, whereas few studies have investigated the physical environment of play influencing children's peer interactions, especially outdoor playground activities. In this regard, more research is needed to investigate children's peer interactions and play behaviors in the different physical environments and its effects on children's peer interactions.

In terms of implications, each environment is important in encouraging play behaviors and peer interactions. Teachers need to promote play behaviors and peer interaction by effectively arranging and planning each environmental setting (Mize, Ladd, & Price, 1985). Children restricted by reduced space and increased noise levels in the indoor setting would profit from use of the outdoors as an alternative learning environment. It remains then for educators to determine the best use of each setting for particular goals for young children.

Literature Cited


CHAPTER 2: DIFFERENCES OF PRESCHOOLER’S PLAY BEHAVIOR, AND PEER INTERACTION IN CLASSROOM AND PLAYGROUND SETTINGS

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Sook-Young Shim, Joan E. Herwig and Mack Shelley

Abstract

The relationship among different settings for young children’s play behaviors and peer interactions was examined. The participants were forty-one children from 2 to 5 years of age (21 2- and 3-year-olds and 20 4- and 5-year-olds) enrolled in three child care programs. The children were videotaped for 5 minutes each on 4 different days both indoors and outdoors. Program measures described the quality of the child care program (the Assessment Profile for Early Childhood Programs) and additional measures described the playground setting. Children’s play behaviors were categorized using the Parten-Smilansky Scale, which combines social play categories and cognitive play categories (Rubin, Watson, & Jambor, 1978) using 16 categories of play behavior. Children’s peer interactions were categorized using the Peer Play Scale (Howes & Matheson, 1992). Results indicated that all six classrooms and their related playgrounds were mediocre child care programs. Children were more likely to engage in parallel functional play and the highest form of peer play (i.e., social pretend play) and play behavior (i.e., interactive dramatic play) outdoors than indoors. The younger age group was more likely to be engaged in playing alone or interacting with adults, whereas the older age group was more likely to interact with peers. These findings reinforce the importance of both the indoor and the outdoor environment for promoting more complementary play behaviors and peer interactions. Finally, additional findings of relationships between the Parten-Smilansky Scale and the Peer Play Scale showed that the combination of the two scales provide a more valid and comprehensive assessment of children’s social interactions with peers in naturally occurring contexts.
Introduction

The role of children's play in their development has been a topic of considerable interest (Bredekamp, 1987; Fromberg, 1992; Johnson, Christie & Yawkey, 1987; Rubin, Fein & Vandenberg, 1983; Varga, 1992). Play researchers have continued to generate knowledge concerning the definition of play and identification of play developmental patterns (Began, 1987; Buhler, 1935; Howes, 1980; Howes & Matheson, 1992; Johnson et al., 1987; Pack, 1995; Parten, 1932; Piaget, 1962; Rubin, Maioni, & Hornung, 1976; Rubin, Watson, & Jambor, 1978; Smilansky & Shefatya, 1990; Smith, 1978; Takhvar & Smith, 1990). For example, Parten (1932) suggested a taxonomy of social play levels based on her examination of social development in preschool children in a nursery-school setting. The categories include six sequential social participation of unoccupied behavior, solitary play, onlooker behavior, parallel play, associative play, and cooperative play. She described onlooker behavior as a child observing the other children playing, unoccupied behavior as a child watching anything of momentary interest or playing with her own body, solitary play as a child playing alone, parallel play as a child playing independently but beside other children, associative play as a child playing with other children but each child acting her own wishes, and cooperative play as a child playing with other children with mutual regards or acting in complementary roles.

While developmental changes in play are evident with this scale, the interpretation of the play categories is less clear. Hartup (1983) disagreed with Parten’s classification of play as a hierarchical pattern, noting that solitary play is actually quite common throughout the preschool period and need not be considered immature. Other researchers have reported nonsignificant age effects for parallel play as an intermediate play stage (Harper & Huie, 1985; Johnson & Ershler, 1981; Smith, 1978). For example, Smith (1978) found that 2- and 3-year-olds went directly from solitary play to group play without showing a tendency for parallel play.

Rubin and his colleagues combined Parten’s social participation scale and Smilansky’s cognitive play categories into a single instrument, allowing both dimensions of play development to be assessed and to demonstrate a broader theoretical understanding of play (Rubin et al., 1976). They nested four types of social participation (i.e., solitary play, parallel play, associative play,
cooperative play) with four types of cognitive play (i.e., functional play, constructive play, dramatic play, games with rules) to create 16 social-cognitive components of play (e.g., solitary-functional play, parallel constructive play). Onlooker and unoccupied behaviors are classified as nonplay categories following the categories identified by Parten. The Parten-Smilansky play scale has been modified in different ways and has been used to examine various aspects of children's spontaneous social and play behaviors, especially in preschool classrooms (Johnson & Ershler, 1981; Pellegrini, 1984; Roper & Hinde, 1978; Rubin et al., 1978; Smith, 1978).

A number of researchers, however, have argued that the Parten and Parten-Smilansky play sequences do not form a developmental sequence (Fein, Moorin, & Enslein, 1982; Howes & Matheson, 1992; Rubin et al., 1976; Rubin & Krasnor, 1982; Takhvar & Smith, 1990). Rubin and Krasnor (1982) argue that constructive play is not a less mature form of behavior than dramatic play and Takhvar and Smith (1990) contend that constructive play and dramatic play are alternative modes of activity characteristic of 2- to 6-year-old children. Howes (1980) developed a developmental sequence for young children's play that examines their social play behavior in greater detail than the Parten-Smilansky play scale. This scale, the Peer Play Scale, focuses on two dimensions of peer play, that is, the complexity of social interaction among children and the degree to which their activities are organized and integrated. The Peer Play Scale consists of 5 peer play categories, identified as: (a) simple parallel play, children engaging in similar activities but no social contact, (b) parallel play with mutual regard, children engaging in the same or similar activity and having social contact, (c) simple social play, children directing social behavior to one another, (d) complementary play with mutual awareness, children engaging in complementary action and mutual gaze or awareness of the other, and (e) complementary social play, children engaging in complementary actions and reciprocal social roles.

Later, Howes and Matheson (1992) revised the scale to reflect the developmental sequencing of young children's peer play based on the cognitive complexity of children's social activities. Two more categories, cooperative social pretend play and complex social pretend play, were added to the original Peer Play Scale. Cooperative social pretend play is defined as children
playing complementary, nonliteral, or pretend roles (e.g., mother and baby) but without any planning or communicating about the meaning of the roles or the form that the play will take, and complex social pretend play is determined when children actively plan their pretend play (e.g., naming, explicitly assigning roles, prompting the other child).

In summary, the Parten-Smilansky Play Scale has been used extensively to identify age trends in young children's play behavior as well as to examine correlations between different forms of play and measures of social and cognitive development in the classroom (Christie & Johnson, 1987). Howes' Peer Play Scale has been used to investigate developmental patterns in young children's peer interactions in the classroom (Farver, Kim, & Lee, 1995; Howes, 1980, 1987, 1988; Howes & Matheson, 1992). Although the scales have been used in a number of research studies, it appears that they have only explored children's play and peer interaction in the indoor classroom setting. Research is needed to assess those play behaviors and peer categories of preschoolers in different settings (i.e., the classroom and outdoor playground).

Recent interest in children's play seeks ways to promote play in educational settings (Dempsey & Frost, 1993; Darvill, 1982; Lamb, Stemberg, Knuth, Hwang, & Berberg, 1994; Howe, & Moller, & Chambers, 1994; Petrakos & Howe, 1996; Teets, 1985). Influences of the play environment on children's behavior and development have been theoretically proposed (Darvill, 1983; Lewin, 1931; Piaget, 1962; Vygotsky, 1967). Empirical studies have found that the physical environment of play seems to have direct influence on the play opportunities of children (Bradley, 1985; Tejagupta, 1991; Wachs & Gruen, 1982; Wachs, 1985; Wohlwill, 1983). For example, Lewin (1931) proposed a rationale for an emphasis on the ecological features of the physical environment that affect children's play. He argued that although children move in and out of a certain environment, the influence of any particular environment continues since the children's interactions have been affected by the environmental setting. Precisely how the child interacts is greatly affected by situational and environmental factors. Behavior is a function of the interaction between the person and the environment: \( B = f(PE) \) according to Lewin.
Darvill (1982) modified Lewin's model to a specific model for play behavior by transforming B to Bp (play behavior), P to Pc (the playing child), and E to Ep (play environment). This revised model considers a child's play behavior as a function of the relation between the playing child and the play environment, or $B_p = f(P_cE_p)$. In this regard, the range of factors, or variables, that are attributed to the environment of a play situation may be categorized as either a molecular or molar variable (Darvill, 1982). The molecular environment consists of within setting variables, whereas the molar environment consists of between setting variables. Thus, variables that can be introduced into the setting are molecular (e.g., equipment, peers, or arrangement of space), whereas variables that require the subject to be introduced are considered molar (e.g., culture, socioeconomic status, playground type, or settings) (Dempsey & Frost, 1993).

A study by Shin (1994) provides support for empirical investigations of different settings for both children's symbolic play and the play environment. The classroom setting consisted of six small partitioned areas for particular activities and one large area for group activities. The type of playground was considered a creative playground because it had tires, wheeled vehicles, and sand and water areas. She found that differences in the play environments of indoor and outdoor settings (i.e., realism, structure, quantity, variety) resulted in qualitative differences in the content of symbolic play. The children most frequently used the sand on the playground for symbolic play activities. Also, the symbolic play themes enacted outdoors varied according to the play area or equipment that was selected for symbolic play. In this line of research, Hartle (1989, 1996) argues that interactive stimuli in the children's environment allow them to expand their repertoire of responses to the environmental stimulation and provide feedback to recognize their effect on the environment.

Other prominent features of the play environment are the player's peers (Dempsey & Frost, 1993). A number of studies have investigated the physical play environment that influences children's peer interactions as both discriminative stimuli and reinforcers. Most of these studies have focused on peer interactions in the preschool classroom setting (Dreyer & Rigler, 1969; Lamb et al., 1994; Howe et al., 1994; Howes & Rubenstein, 1981; Petrakos & Howe, 1996; Rubin, 1977; Teets, 1985). For example, Petrakos and Howe (1996) investigated the relationship between classroom
learning centers that were designed to facilitate either solitary or group play behaviors and the influence of type of theme (e.g., train station) as related to the preschooler's social and cognitive play. Results indicated that the solitary-designed centers facilitated more solitary play interactions and group-designed centers facilitated more group play interactions. Specifically, group-designed centers facilitated children's social interactions when the children were able to focus on each other (e.g., double seating in the train) and to engage in complementary role play (e.g., ticket seller and buyer). In contrast, solitary-designed centers facilitated individual use of materials (e.g., single seating in the train) and limited social exchanges and role play behavior (e.g., tearing off a ticket from a ticket machine).

In contrast, few studies have examined the physical environment of play influencing children's peer interactions, especially children's outdoor playground activities (Frost, 1986; Fukuchi, 1995; Henniger, 1985; Ladd, Price, & Hart, 1988; Pellegrini, 1992; Pellegrini, Huberty, & Jones, 1995). Several studies have examined children's outdoor play behaviors and peer interactions concerning stability of play behaviors and achievement over time (Ladd et al., 1988; Pellegrini, 1992). Other research has investigated the interaction between children and their teacher on the playground (Fukuchi, 1995). This line of research indicates that outdoor playgrounds can stimulate as much or more social play as indoor environments (Frost, 1986), and may be especially beneficial for some types of children (Henniger, 1985). More research is needed to examine how the outdoor playground setting influences children's interactions with peers.

There have been limited empirical findings concerning differences in peer interactions in the classroom and outdoor playground settings (Green, 1933a, 1933b; Henniger, 1977, 1985; Pack, 1995; Sanders & Harper, 1976; Tizard, Philips, & Plewis, 1976a, 1976b). For example, Henniger (1985) used quantitative methods to compare play of preschoolers in indoor versus outdoor nursery school environments. He compared the play behaviors of 3- and 4-year-old children using social and cognitive play categories. He found that each environment was important in encouraging certain types of play. The indoor environment was associated with constructive play for all children, with dramatic play in younger children and girls, and with solitary play for all children. The outdoor
environment was linked to functional play and to dramatic play in older children and boys. In this line of research, Pack (1995) examined differences between the indoor and outdoor play behavior of children with two different research methods (i.e., observation and interview methods). The results, however, were confounded by including the interview method with observation because it is not clear whether the source of the explained proportion of the variance in children's peer interaction is due to differences of the settings or differences of the methods.

Taken together, these studies present several methodological limitations that need to be resolved before conclusions can be drawn. First, previous research did not consider the contextual features of each setting (i.e., indoors, outdoors) in which the data were collected (Green, 1933a, 1933b; Henniger, 1977, 1985; Pack, 1995; Sanders & Harper, 1976; Tizard et al., 1976a, 1976b). It is possible that there are different qualities between indoors and outdoors play environments for children (Dunn, 1993; Howes & Matheson, 1992). More research is needed to consider the contextual features of each setting to avoid potential confounding variables.

Second, previous research has not reported the effects of repeated measures research design on children's behaviors although the same children were observed in two different settings (i.e., classroom and playground) (Green, 1933a, 1933b; Henniger, 1977, 1985; Pack, 1995; Sanders & Harper, 1976; Shin, 1994; Tizard et al., 1976a, 1976b). This design results in substantially increased error variance because the effect of child differences becomes a source of variance. Research is needed to consider the influence of the repeated measures effects due to child differences in order to obtain better explanations of the differences of children's play behaviors and peer interactions in the classroom and on the playground.

Third, the children's interactions with peers could be interactions with children as well as teachers rather than only children during the observation period. A more precise and comprehensive assessment of young children's peer interaction needs to be forthcoming to determine the effect of the physical environment on play (i.e., classroom and playground).

Fourth, rather than relying on a single assessment approach, many researchers have recommended using multimethod, multisource, and multisetting information to obtain a
comprehensive assessment of young children's peer interactions (e.g., Achenbach, McConaughy, & Howell, 1987; Brown, Odom, & Holcombe, 1996). For example, detailed examination of peer interactions has allowed investigators to understand better the variables that explain the similarities and differences in children's social responding (e.g., behavioral differences exhibited in various settings or with different people) (Brown et al., 1996). Also, direct observation methodology has played a key role in research on children's interaction with peers and direct observation measures have been a primary component of multmethod assessments (Brown et al., 1996). Using operationally defined categories to observe and record the behavior of children in naturalistic or experimental settings can provide information that is standard across children and settings (Hartmann & Wood, 1990). In this regard, more research is needed to examine the effects of different settings (i.e., classroom, outdoor playground) on the same children's interactions with their peers, using multiple methods and more precise and comprehensive assessments.

Finally, previous researchers have used "live" observational coding systems to study children's play behaviors and peer interactions (e.g., Henniger, 1979; Pack, 1995; Sanders & Harper, 1976; Tizard et al., 1976a, 1976b). The coders observed children in the observation booth or followed the children on the playground to record their interactions using observation sheets, checklists, written or dictated running descriptions, or hand computers. Pepler and Craig (1995) argue that within child care settings, proximal observation of play behaviors and peer interactions are more reliable than observations coded from videotape because coders can make discriminations on the basis of the full context of the behavioral interactions. On the outdoor playground, however, the wide-ranging and subtle nature of children's complex and highly physical play limits the actual detail with coding systems and is a challenge for maintaining reliability (Asher & Gabriel, 1993). Wireless transmission systems (i.e., small microphones and lightweight transmitters) have solved these problems and provided rich verbal records of young children's play and peer interaction (e.g., Pepler & Craig, 1995). When lightweight wireless transmission systems have been used they minimally constrain participants and reduce observer reactivity. This methodology has been used successfully on the outdoor playground (e.g., Asher & Gabriel, 1993; Pepler & Craig, 1995), whereas little
research has been conducted this way in the classroom. More research is needed to use the wireless transmission system simultaneously in naturalistic settings, such as classrooms and playgrounds.

In summary, there is limited research reflecting the nature and characteristics of play behaviors and peer interactions in the classroom and on the outdoor playground. Little is known about the contribution of the play environment (i.e., indoor and outdoor) to the quality and quantity of children's play as well as the teachers' planning for each setting. The purpose of this study is to provide empirical evidence of children's play behaviors and peer interaction by examining the following specific objectives:

1. To examine the differences in preschooler's play behaviors between the indoor classroom and outdoor playground setting.
2. To examine the differences in children's play behaviors between older and younger preschoolers in their classroom and on the outdoor playground.
3. To examine the differences in preschooler's peer interaction between the indoor classroom and the outdoor playground setting.
4. To examine the differences in children's peer interaction between older and younger preschoolers in their classroom and on the outdoor playground.
5. To determine the differences in children's play behaviors and peer interactions among three child care centers.

Method

Participants

A total of 41 2- to 5-year-old children (i.e., 21 2- and 3-year-olds and 20 4- and 5-year-olds) enrolled in three child care programs in central Iowa participated in this study. The child care centers were organized so that the classrooms of children were divided by age (i.e., 2- and 3-year-olds in one classroom and 4- and 5-year-olds in another) with one adult serving as head teacher and the other adult as the paraprofessional in the classroom. The 2- and 3-year-olds ranged in age from 25 to 50 months (Mean = 41 months, SD = 5 months) and the 4- and 5-year-olds ranged in age from 48
to 69 months (Mean = 57 months, SD = 5 months). These age ranges are characteristic of enrollments in child care center classrooms during the summer before young children are moved to their next preschool classroom or are enrolled in kindergarten. Therefore, the present study incorporates the age range for the 2- and 3-year-old age group and the 4- and 5-year-old age group based on the placement for each child care center rather than the children’s actual ages. The children were videotaped for 5 minutes each on 4 different days both indoors and outdoors.

The directors of the child care programs were contacted to obtain permission to conduct this study in their programs. The preschoolers were recruited through parent letters distributed by the day care center directors or teachers. Permission for child involvement in child care program A was granted by 14 out of 20 2- and 3-year-old parents (70%) and 10 out of 14 4- and 5-year-old parents (71%). Permission of child care program B was received by 7 out of 9 2- and 3-year-old parents (77%) and 13 out of 18 4- and 5-year-old parents (72%). Permission of child care program C was given by 10 out of 14 2- and 3-year-old parents (71%) and 11 out of 17 4- and 5-year-old parents (65%). The overall permission rate was 71%.

Instruments

Three measures were used for this study. The program measures described the quality of the child care program, with additional measures to describe the playground. Another measure was used for describing children's play behaviors and the third measure was for peer interactions. The measures are described below.

Quality of child care program. The Assessment Profile for Early Childhood Programs (Assessment Profile) was used to evaluate the quality of the child care classroom environment in each classroom. The Assessment Profile (research form) is an observation checklist developed by Abbott-Shim and Sibley (1992) for assessing the day-to-day quality of care provided to children. The content of the Assessment Profile is consistent with the National Academy of Early Childhood Program Accreditation Criteria. It includes five subscales: Learning Environment, Scheduling, Curriculum, Interacting, and Individualizing; these include 87 criteria scored either “Yes” (observed), or "No" (not observed). The subscale measuring Learning Environment contains 17 categories
dealing with classroom materials and classroom arrangement. The subscale measuring Scheduling contains 15 items dealing with the activity plans and the variety of activities. The Curriculum subscale contains 22 categories related to multicultural awareness, variety of teaching strategies, independent learning, and individualization. The Interacting subscale contains 15 items focusing on teacher attitudes towards children, teacher responsiveness, guidance techniques, and children's reaction to the classroom climate. The Individualizing subscale contains 18 items measuring the use of child assessment that is the basis for the curriculum plan in identifying and meeting the needs of individual children.

Observation of the physical characteristics and interactions in the classroom and child records reviews were used to complete the Assessment Profile. Teacher interviews were used to record the child report data requested by the Assessment Profile and provide demographic information about their professional preparation. The total possible score is 87, with one positive score for each of the 87 items (see Appendix C).

Quality of child care playground While several instruments are available to assess the quality of child care classrooms (e.g., the Classroom Practice Inventory) (Hyson, Hirsh-Pasek, & Rescorla, 1990), these instruments do not include the child care playground. The outdoor play environment was evaluated for complexity and variety of equipment and materials, and number of play spaces per child using the protocols presented by Kritchevsky, Prescott, and Waling (1969).

Complexity of equipment The quantification of the outdoor preschool playgrounds follows the Kritchevsky et al. (1969) protocol for evaluating the quality of play spaces. Their operational definition for complexity of equipment is:

the extent to which they contain potential for active manipulation and alteration by children.

..., it is possible to discern three types of play units- simple, complex, and super, which vary both in their relative capacity to keep children interested, and in the relative number of children they can accommodate at one time. (p.10)

A simple play unit has one obvious use, such as swings, jungle gym, and tricycles, and it does not have sub-parts or a juxtaposition of materials that enable the child to manipulate or improvise.
complex play unit has sub-parts or a juxtaposition of two essentially different play materials that enable the child to manipulate or improvise. This category of play unit also includes single-function materials and objects that encourage substantial improvisation and/or have a considerable element of unpredictability, such as a sand box with digging equipment, a playhouse with equipment, and an area with animals. A super play unit is a complex unit that has one or more additional play materials (i.e., three or more play materials juxtaposed, such as a sand box with play materials and water, and a climber with slides and tires).

A play unit is categorized as either a simple, complex, or super unit. A simple unit is assigned a value of 1, a complex unit is assigned a value of 4, and a super unit is assigned a value of 8, using this protocol. Following the assignment of values for each play unit, the scores of the complexity of equipment and materials of the preschool playground are summed to obtain a total score. A higher complexity score indicates that there are more play spaces on the playground than those represented by a lower score.

**Variety of equipment** The operational definition for variety of equipment is: the number of different kinds of units (only in terms of differences in activity, regardless of whether they are simple, complex, or super)....and is a measure of the relative capacity of the space to elicit immediate interest from children. (Kritchevsky et al., p. 12)

The equipment categories used to determine the variety of equipment are rockers, climbing units, hanging units, wheel toys, slides, swings, low prototypical house, high prototypical house, single props, housekeeping center, building equipment, table toys, manipulative cars, books, digging area and equipment, animal with or without a cage, water pump, climbing tree, swimming pool, water table, and miscellaneous. Specific examples of each category are listed in Appendix C.

An equipment and material categories checklist is provided in Appendix C. Both equipment and material items are evaluated for variety. A variety score is summed across these categories.
Number of play spaces per child  Kritchevsky et al. devised a method for approximating what is called the number of play spaces for a particular classroom or playground based on the relative value of simple, complex, and super units of equipment and materials. The operational definition for number of play spaces per child is:

when the total number of play spaces of a yard or room is determined, this sum can be divided by the number of children expected to use the space....the ratio gives the approximate number of play spaces available to each child at any given time. (Kritchevsky et al., p.13)

The number of play spaces per child is determined by the total number of play spaces on a playground divided by the total number of children using the playground. The ratio of the total number of play spaces and children gives the approximate number of play spaces available to each child. Thus, the number of play spaces per child on the playground is calculated using the following formula:

\[
\frac{\text{# of play spaces}}{\text{per child}} = \frac{\text{total # of play spaces of playground}}{\text{total of children}}
\]

Play behaviors  Children's play behaviors were categorized using a modified form of the nested Parten-Smilansky Play Scale (Rubin et al., 1978). This scale combines social play categories (i.e., solitary play, parallel play, associative play, interactive play) with cognitive play categories (i.e., functional play, constructive play, dramatic play, games with rules). These categories were collapsed into three social play categories (i.e., solitary, parallel, interactive) and three cognitive play categories (i.e., functional, constructive, dramatic) (Dunn & Herwig, 1992; Pellegrini, 1984; Rubin & Maioni, 1975; Tejagupta, 1991). Therefore, the nested social-cognitive play scale consists of 9 play categories (i.e., (a) solitary-functional play, (b) solitary-constructive play, (c) solitary-dramatic play, (d) parallel-functional play, (e) parallel-constructive play, (f) parallel-dramatic play, (g) interactive-functional play, (h) interactive-constructive play, and (i) interactive-dramatic play). A nonplay category is included for other behaviors lacking the characteristics of social-cognitive play.
Operational definitions for child play behaviors with the 9-category nested social-cognitive play scale using illustrations from children's indoors and outdoors play are as follows:

(a) Solitary-functional play is determined when the player engages in repetitive or active physical movement alone. For example, the player jumps up and down, swings by himself, or examines a seashell found in the sandbox.

(b) Solitary-constructive play is determined when the player creates or constructs something else. For example, the player stacks blocks and makes a tower, or creates a tunnel in the digging area.

(c) Solitary-dramatic play is determined when the player performs fantasy actions and/or vocalizes alone. For example, the player pretends to drive her block as if it were a car.

(d) Parallel-functional play is determined when two or more players engage in the same, similar, or different repetitive physical movement in the same general location but there is no complementary action or vocalization. For example, one player rides a tricycle and another player throws and catches a ball, or one player waits for a turn to use the art table and another talks with other children at the same table.

(e) Parallel-constructive play is determined when two or more players create or construct the same, similar, or different products in the same general location but there is no complementary action or vocalization. For example, one player draws a picture while another player folds paper and makes an airplane, or one player makes a tunnel while another player digs a hole in the sandbox.

(f) Parallel-dramatic play is determined when two or more players engage in the same, similar, or different fantasy activities in the same general location but there is no complementary action or vocalization. For example, one player in the block area pretends to be a firefighter while another player pushes a block and makes sounds as if it were an airplane, or one player pretends to be a pony pulling a wagon around a tree while another player climbs the same tree and makes monkey sounds.

(g) Interactive-functional play is determined when two or more players engage in complementary repetitive or active physical movements. For example, two or more players engage
in rough-and-tumble play with one another or in digging sand with the borrowing and loaning of shovels, or the child may talk with or listen to other children or teachers.

(h) Interactive-constructive play is determined when two or more players create or construct something together. For example, two or more players stack blocks and talk about building a castle or two or more players rake pine cones and talk about carrying them to the playhouse.

(i) Interactive-dramatic play is determined when two or more players engage in complementary fantasy actions or vocalizations and role playing. For example, one player pretends to be a shopkeeper while another player pretends to be a shopper, or one player pretends to be a horse while another player pretends to be a wagon.

(j) The nonplay category includes behaviors and activities that lack the characteristics of the social-cognitive play categories identified above. For example, the participant watches or listens to others while they are making a lego structure.

Peer interaction. Children's peer interactions were categorized using the Peer Play Scale (Howes & Matheson, 1992). This scale examines relationships between peer play frequency, proportion, the highest level of play forms observed, and subsequent social competence with peers. This scale defines interaction as social behaviors directed to or from the target child and a peer partner or involvement in a mutual game. Social behaviors include smiles, offers, receives, aggression, and talking. A game is defined as mutual involvement in an activity with at least one turn-taking interactional structure.

The peer play scale consists of 5 play categories (i.e., (a) parallel play, (b) parallel aware play, (c) simple social play, (d) complementary and reciprocal play, and (e) social pretend play). Cooperative social pretend play and complex social pretend play were collapsed into social pretend play based on the reported low incidence of complex social pretend play for preschoolers (Farver, 1992; Howes, 1988). A nonplay category is included for other behaviors lacking the characteristics of peer play.

Operational definitions for child peer interactions using illustrations from preschooler's indoors and outdoors play are:
(a) Parallel play is determined when the child and at least one peer are playing with the same type of objects and are within approximately 3 feet of each other (with adjustments for more active games or toys) but have no mutual awareness. For example, two children are playing with unit blocks in the same area but they are not paying attention to one another.

(b) Parallel aware play is determined when parallel play is accompanied by social interest and is demonstrated by eye gaze and mutual awareness. For example, two children are playing with blocks in the same area and are paying attention to each other, or two or more children are digging a hole in the sand box and are glancing at one another.

(c) Simple social play is determined when the child and at least one peer are engaged in play with social interaction involving turn-taking. This type of play may be either verbal or non-verbal (i.e., physical gestures or facial expressions). For example, several children are taking turns pointing to their paintings displayed in the room, taking turns pouring sand into a bucket, digging sand while talking about their own interest, or talking about colorful leaves they found on a table.

(d) Complementary and reciprocal play is determined when the child and at least one peer engage in social play with a turn-taking structure and role reversal. Each child takes a turn at both roles. For example, children alternatively serve as readers of a book and listeners of the story, play hide and seek, throw and catch a ball, or exchange being driver and rider on a tricycle with an attached wagon.

(e) Social pretend play is determined when the child and peer partner engage in pretend play, such as acting or using objects in an "as if" manner and enacting complementary roles such as mother and baby. For example, child A picks up a tea cup, while child B asks "Would you like some tea?" and child B pours pretend tea from the teapot, or child A asks, "Let's pretend it's snowing and we're out in the cold," and child B pretends to be wearing a hat and mittens.

(f) The nonplay category includes behaviors and activities that lack characteristics of the peer play categories identified above. For example, the child is around the swing area and watches or listens to others while they are swinging.
Pilot Study

A pilot study was conducted involving 4 3- to 4-year-olds attending the Iowa State University Child Development Laboratory School. A group of 2 3-year-olds and a group of 2 4-year-olds in the same classroom, were videotaped following the procedures outlined below prior to the onset of the actual study. This study was completed to assess logistical difficulties, and to familiarize the videocamera operator with the procedures. The procedures were revised subsequently using information gathered from the pilot testing. For example, several children did not like to wear the small, wireless microphone and "fanny pack" with a ladybug on the front because they felt the pack bothered their play, especially on the outdoor playground. The pack was replaced with a soft, small backpack with a monkey face. Also, there were high percentages of occurrence for solitary play and interaction with an adult in the Howes Scale. Thus, the present study added the categories solitary play and interaction with an adult to the Howes Scale. The pilot study videotapes were used for training the coders and establishing interobserver agreement prior to coding the children's play behaviors and peer interactions.

Procedures

Each child was observed on four different days both in the child care classroom and on the playground on the same day (i.e., when a child was videotaped in the classroom during free play, then she was videotaped again on the playground the same day). Videotaping was scheduled during morning free play time when the child was expected to interact with both adults and peers in child-initiated activities. Each child was observed for 5 minutes during free play in the classroom and for 5 minutes on the playground. Each of the four period observations for each child was recorded on separate days during the summer. The preschoolers were observed in random order based on their birthday (i.e., a child with birthday closest to January), attendance, and willingness to participate on a given day. Each child was videotaped during free play in the classroom and on the playground the same day using a portable videocamera.

A wireless transmission system (32-1226 by Radio Shack) was used to record the children's audio interactions. The components of the wireless transmission system include a small tie-pin style
battery-generated condenser wireless microphone and recorder on the videocamera. Pepler and Craig (1995) provide the advantages of this equipment in observing children's interactions with peers. First, audiovisual observations enable the observer to see and hear all aspects of children's interactions on the playground. Second, this methodology offers a unique opportunity for researchers interested in children's social interaction to gain access to a world not normally privy to adults. Finally, this remote technology assured that the target child is free to roam on the playground, far from the camera, thereby decreasing reactivity. Thus, the audiovisual methodology is appropriate to make use of videotaping for obtaining behavioral samples more easily, especially in naturalistic settings such as classrooms and playgrounds (Asher & Gabriel, 1993).

The target child wore a wireless microphone and a lightweight transmitter, which detected the speech of the target child and the speech of children with whom the target child was interacting, despite their distance from the camera. With a zoom lens on the camera, the researcher could remain a distance from the target child while recording the child's behaviors at close range.

The researcher provided a small backpack with a monkey face for the transmitter that hung around the children's back. The microphone typically was attached to the children's clothing with a clip. The researcher in the classroom and on the playground carried a list of names of children to be observed. On locating a target child, the researcher approached the child and asked, "Do you want to make a movie with this monkey for 10 minutes?" Each child was filmed for more than 5 minutes to permit each child to resume play; thus, coding began after the first few seconds of the videotaped segment lapsed. All of the children knew they were being filmed.

Each classroom was rated by two trained observers using the Assessment Profile for Early Childhood Programs (Abbott-Shim & Sibley, 1992) during the days when the videotaping was occurring. A morning was needed to complete the Assessment Profile in each classroom. The assessment items requiring answers from the teacher or documents for review were sought before the children arrived or when the teacher was available. To avoid disrupting the classroom activities and the teachers' or children's orientations, the observer minimized interactions with the preschoolers and staff during the assessment.
The quality of playground for each child care center was assessed for the complexity and variety of the equipment and materials, and number of play spaces. The child care center playgrounds were videotaped at two different times (i.e., before children entered the playground (time 1) and when they were playing on the playground (time 2)). Using the playground equipment and materials list developed by Fukuchi (1995), the author and the coder evaluated the recorded listing of outdoor playground equipment and materials using the measures of complexity, variety, and play spaces per child.

For the Smilansky-Parten Scale, the 20 5-minute videotaped observations were divided into 15 20-second intervals for both indoor and outdoor play. The total observation time per child was 20 minutes in the classroom and 20 minutes on the playground. Thus, the child's behavior was coded for every 20 seconds of the 20-minute observation period (i.e., 60 20-second intervals in the classroom and 60 20-second intervals on the playground). Behaviors were coded as present (1) or absent (0) within each interval. When two or more behavior categories occurred for approximately equal amounts of time, the more complex category was coded. For the measure of play behaviors, interactive-dramatic play was considered the most complex play category, followed in descending order of complexity by interactive-constructive play, interactive-functional play, parallel-dramatic play, parallel-constructive play, parallel-functional play, solitary-dramatic play, solitary-constructive play, and the solitary-functional play and nonplay categories.

For the Peer Play Scale, the 5-minute samples were divided into 15 20-second intervals for both indoor and outdoor play (i.e., same time intervals described above for analyzing the Parten-Smilansky Play Scale). The total observation time per child was 20 minutes in both the classroom and on the playground. Thus, the child's peer interactions were coded for every 20 seconds of the total 20-minute observation period (a total of 60 20-second intervals). Similarly, when two or more behavior categories occurred for approximately equal amounts of time, the more complex category was coded. For the measures of peer play behaviors, social pretend play was considered the highest level of play, then in descending order of play level were complementary and reciprocal play, simple social play, parallel aware play, parallel play, solitary, and interaction with an adult and nonplay
categories. Each category on the peer play scale was mutually exclusive. Peer interactions were coded as present (1) or absent (0) within each interval.

**Analyses**

**Interobserver reliability** To establish interobserver reliability, the observers were trained in coding the data using videotapes from the pilot study (see Appendix D). During the coder training phase, discrepancies in coding were discussed and solutions were agreed upon mutually. Conventions were added to the coding manual as needed for situations relating to a particular playground. Interobserver reliability was .94 for the Parten-Smilansky Scale and .92 for the Peer Play Scale before the actual data coding process began.

Scott's coefficient of interobserver agreement was computed to measure interobserver reliability of categorical data and to indicate the proportion of agreements corrected for chance agreement for the Parten-Smilansky Play Scale, the Peer Play Scale, and the quality of outdoor playground. Scott's coefficient of interobserver agreement is defined as

\[
\frac{(Po - Pe)}{(1 - Pe)}
\]

where Po is the proportion of observed agreements while Pe is the expected proportion of agreements (Kotz, Johnson, & Read, 1988; Scott, 1955). For this study, agreement was determined when the coders had identical scores on the same play behavior or peer interaction category interval on the child measures. A disagreement was determined when there was disagreement on coding a play behavior or peer interaction category interval.

Reliability for the coding of the play behaviors and peer interactions was obtained by randomly selecting four children's videotapes from each child care center (i.e., 2 from each 2- and 3-year-old age group and 2 from each 4- and 5-year-old age group). A total of 12 children's videotapes were coded by two observers for 40 minutes per child first using the Parten-Smilansky Scale (i.e., 20 minutes indoors and 20 minutes outdoors) and later the Peer Play Scale (i.e., 20 minutes indoors and 20 minutes outdoors). The Scott statistics for the play behavior measure and the peer interaction measure were .94, and .96, respectively.
One videotape of outdoor playground for each program was randomly selected for coding by two observers. Each videotape was coded for the two different periods, i.e., before children entered the playground (time 1), and when they were playing on the playground (time 2). The Scott statistics for the quality of outdoor playground at the two times were 1.00 and .94, respectively.

Observation using the Assessment Profile for Early Childhood Programs (Abbott-Shim & Sibley, 1992) was completed by two observers, both of whom were trained in using this assessment and had early childhood teaching experience. Interobserver reliability was based on the formula suggested by Emmer and Millett (1970): AGREEMENT = 1 - [(A - B)/(A + B)]. The expression (A - B)/(A + B) is calculated by obtaining the difference between the two observers' scores and then dividing the difference by the sum of the observers' scores. In this formula, the A term is always the larger number. The reliability of the Assessment Profile between these two raters was .94 for child care center A, .98 for child care center B, and .96 for child care center C. Both raters evaluated each child care center simultaneously and independently.

Statistical analyses. Before beginning to analyze the data, univariate analyses were employed to evaluate the distributions of the dependent variables (i.e., 9 variables of the Parten-Smilanksy Scale and 7 variables of the Peer Play Scale). All dependent variables displayed a skewed distribution (i.e., relatively few scores fell at the higher end of the distribution). To adjust the statistical analysis to evaluate properly these non-normal data, each dependent variable was dichotomized (i.e., if the play behavior or peer interaction is present, a score of 1 is assigned, and a score of 0 is assigned for the absence of the play behavior or peer interaction). For example, it was possible for the 15 behaviors to occur as 15 incidences of parallel functional play which were treated as value of 1 during the 5 minutes (15 20-second intervals). Or 9 incidences of solitary functional play and 6 incidences of interactive constructive play were separately treated as a value of 1, that is, 1 incident of solitary functional play and 1 incident of interactive constructive play during the 5 minutes (15 20-second intervals). Consequently, all dependent variables were treated as dichotomous, with values of 1 (play behavior or peer interaction occurrence) and 0 (play behavior or peer interaction nonoccurrence).
When the dependent variable can have only two values and the model contains either
categorical or continuous independent variables, it is appropriate to use logistic regression rather
than analysis of variance because analysis of variance was not designed for use with categorical
dependent variables (e.g., Capaldi, Crosby, & Stoolmiller, 1996; Levine, 1995; Joshi & MacLean,
1994; Pulkkinen, 1996). Unlike some other alternative ways of dealing with non-normal dependent
variables, logistic regression has the advantage of being a modeling technique, allowing the present
study to explain the pattern of observed frequencies. Main effects incorporated into the model for
each dependent variable included: setting, age group, child care center, and child differences. The
number of observational units for each model consisted of 328 play episodes (41 children X 4
different days X 2 dichotomous values). The child difference variable was used in each model as a
blocking effect to adjust for repeated measures on each child (4 different days). The number of
degrees of freedom for analyzing the effect of the child variable was 37, due to complex linear
dependencies in the structure of the data. Appropriate interaction terms also were added to these
models, such as setting by age, setting by child care center, and setting by age group by child care
center.

Results

This chapter presents the findings of the analyses of the quality of child care classrooms,
quality of the outdoor playground, educator characteristics, differences of play behaviors, differences
of peer interactions, and, in addition, the relationships between the Parten-Smilansky Scale and the
Peer Play Scale. Simple descriptive statistics were performed on quality of child care programs and
quality of the outdoor playground to determine the contextual features of each child care program. A
logistic regression model was used to test for differences in play behaviors and peer interactions at
the .05 level of significance. Kendall's Tau-b correlation analyses were performed to estimate
relationships between the Parten-Smilansky Scale and the Peer Play Scale at the .0001 level of
significance.
Quality of Child Care Classrooms

The quality of the child care classroom environment was measured by the Assessment Profile for Early Childhood Programs (Abbott-Shim & Sibley, 1992). Raw scores and their percentages for the total items and subscales of the total Assessment Profile for the classrooms are presented in Table 1. The total percentages ranged from 48% to 78%. In the Learning Environment subscales, the 2- and 3-year-old age group in Center A received the lowest score (29%), whereas the 4- and 5-year-old age group in Center B had the highest score (82%). In the Scheduling subscale, the 4- and 5-year-old age group in Center C had the lowest score (40%), while the 4- and 5-year-old age group in Center B received the highest score (93%). In the Curriculum subscale, the 2- and 3-year-old age group in Center B had the lowest score (32%), whereas the 2- and 3-year-old age group in Center C received the highest score (68%). In the Interacting subscale, the 2- and 3-year-old age group in Center B received the lowest score (52%), while the 4- and 5-year-old age group in Center B had the highest score (100%). In the Individualizing subscale, the 4- and 5-year-old age group in Center C received the lowest score (27%), whereas the 4- and 5-year-old age group in Center B had

Table 1

<table>
<thead>
<tr>
<th>Subscales</th>
<th>Total Items (Total Possible Scores)</th>
<th>Center A</th>
<th>Center B</th>
<th>Center C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2/3 yr&lt;sup&gt;d&lt;/sup&gt;</td>
<td>4/5 yr&lt;sup&gt;d&lt;/sup&gt;</td>
<td>2/3 yr&lt;sup&gt;d&lt;/sup&gt;</td>
<td>4/5 yr&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>Learning Environment</td>
<td>17</td>
<td>17</td>
<td>11</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(29%)</td>
<td>(55%)</td>
<td>(82%)</td>
</tr>
<tr>
<td>Scheduling</td>
<td>15</td>
<td>15</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(60%)</td>
<td>(93%)</td>
<td>(93%)</td>
</tr>
<tr>
<td>Curriculum</td>
<td>22</td>
<td>22</td>
<td>7</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(50%)</td>
<td>(32%)</td>
<td>(64%)</td>
</tr>
<tr>
<td>Interacting</td>
<td>15</td>
<td>15</td>
<td>8</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(60%)</td>
<td>(52%)</td>
<td>(100%)</td>
</tr>
<tr>
<td>Individualizing</td>
<td>18</td>
<td>18</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(44%)</td>
<td>(50%)</td>
<td>(61%)</td>
</tr>
<tr>
<td>Total Score</td>
<td>87</td>
<td>87</td>
<td>49</td>
<td>68</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(48%)</td>
<td>(56%)</td>
<td>(78%)</td>
</tr>
</tbody>
</table>

<sup>d</sup> = years
the highest score (61%). In the total Assessment Profiles scores, the 4- and 5-year old age group in Center B received the highest score (78%), whereas the 2- and 3-year-old age group in Center A had the lowest score (48%).

Quality of Child Care Playgrounds

The quality of the outdoor play environment was evaluated for complexity and variety of equipment and materials, and number of play spaces per child at two different times (i.e., before the children entered the playground (Time 1) and when they were playing on the playground (Time 2)) (see Table 2). In child care centers A and B, the 2- and 3-year-old age groups simultaneously shared the playground with the 4- and 5-year-old age group. Center C simultaneously shared the playground with all age groups most days, i.e., the toddlers (not involved in this study), the 2- and 3-year-old age group, and the 4- and 5-year-old age group. As shown in Table 2, once children and teacher were playing on the playground, the teachers basically did not increase the complexity or variety of equipment and materials at Center B, although at Center A one item (i.e., complexity) was removed, and at Center C one item (i.e., variety) was added. The ratios of outdoor play space per child during outdoor play for each child care center were 1.06, 0.71, and 1.78, respectively.

Table 2
Average score for variety and complexity of equipment and materials, and play space per child at 2 times on one day at each child care center

<table>
<thead>
<tr>
<th></th>
<th>Center A</th>
<th>Center B</th>
<th>Center C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>T1</td>
<td>T2</td>
<td>T1</td>
</tr>
<tr>
<td>Complexity</td>
<td>37</td>
<td>36</td>
<td>24</td>
</tr>
<tr>
<td>Variety</td>
<td>8</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>Ratio of Play</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Space per Child</td>
<td>0</td>
<td>1.06</td>
<td>0</td>
</tr>
</tbody>
</table>

N = 6 playground observations

Educator Characteristics

Education and Certification of Child Care Program Teachers: The teachers reported their highest level of education completed and current teacher licensure (see Table 3). Two teachers in the child care centers had attended high school and earned a diploma as the highest level of
education completed, and one teacher had an associate degree. Two teachers had a bachelor's degree, and one teacher in the child care program had graduate credits beyond a master's degree.

Three teachers in the program had no teacher licensure, one teacher had an elementary education licensure, one teacher had a substitute teacher license, and one teacher had both K-6 licensure and prekindergarten licensure.

**Total teaching experience** The teachers of the 4- and 5-year-old age group had the most years of teaching experience. All three teachers of the 4- and 5-year-olds had 6-11 years of teaching experience. One of the teachers of the 2- and 3-year-old age group had 15 years of teaching experience and the other two were in their first year of teaching.

**Differences of Classrooms, Settings, and Child Care Centers**

Children's play behaviors and peer interactions in the three child care centers were analyzed to determine differences between the two age groups, indoors and outdoors, and the child care centers using a logistic regression model. The logistic regression equation explained four independent variables: setting (indoor vs. outdoor), age group (2- and 3-year-old age group vs.

**Table 3**

Teachers' highest level of education, licensure(s), and teaching experiences of three child care programs

<table>
<thead>
<tr>
<th>Education</th>
<th>2-and 3-year-old teachers</th>
<th>4-and 5-year-old teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td>High school diploma</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>A.A./A.S.</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>B.A./B.S.</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>M.A./M.S.</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Teacher Licensure/s</th>
<th>2-and 3-year-old teachers</th>
<th>4-and 5-year-old teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Elementary Ed (K-8grds #10)</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Prekindergarten (# 53)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>El Ed + Pre K</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Substitute</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Teaching Experience</th>
<th>2-and 3-year-old teachers</th>
<th>4-and 5-year-old teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 1 year</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6-12 years</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>13-15 years</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

N = 6
4- and 5-year-old age group), child differences, and child care center (three child care programs). As a categorical independent variable, the effect of each child care center was compared to the average effect of all three child care centers. Each dependent variable in the logistic regression model had a value of either 1 or 0 (Wright, 1995). The logistic regression coefficient (B) is interpreted as follows: if the coefficient is positive, then the probability of occurrence of the event measured by the dependent variable is increased for that value of the independent variable relative to other values of the independent variable; if the coefficient is negative, then the probability of the event is decreased. The significance of each term in the model is evaluated by the Wald statistic, which has a chi-square distribution and is equal to the square of the ratio of the coefficient (B) to its standard error (se) \[ \chi^2 = \left( \frac{b}{se} \right)^2 \]. Sixteen equations were analyzed (i.e., each of the nine categories of the Parten-Smilansky Scale and each of the seven categories of the Peer Play Scale). It is reasonable to set the alpha level at .05 to test for significance within each model because simultaneous comparisons of the effects of the independent variables were conducted within each model for a given dependent variable; however, when comparisons are made across the dependent variables, then the Bonferroni correction is used to adjust the protected level of significance to .05 by using a significance criterion for each variable of \( \alpha = \frac{.05}{9} = .0056 \) for the 9 play behaviors and \( \alpha = \frac{.05}{7} = .0071 \) for the 7 peer interactions.

**Differences in Play Behaviors** For the Parten-Smilansky Scale, as shown in Table 7, three of the nine categories of play behavior had model effects that were significant beyond the \( p \leq .05 \) level: solitary functional play (SF), parallel functional play (PF), and interactive dramatic play (ID) (see Appendix A, Tables 14 to 16). The model correctly predicted 74.39 % of the occurrence or nonoccurrence of the children’s solitary functional play (244/328 play episodes); children’s solitary functional play was correctly predicted in 57.81% of such play episodes (74/128), whereas 85% of nonoccurrences of solitary functional play (170/200) were correctly predicted (see Table 4). The variables of setting, age group, child differences, and child care centers, and relevant interaction terms in this model accounted for about 25% of the total variance in solitary functional play behavior,
Table 4

Prediction for solitary functional play of the Parten-Smilansky Scale

<table>
<thead>
<tr>
<th></th>
<th>Predicted</th>
<th>Observed</th>
<th>not engaged</th>
<th>engaged</th>
<th>Percent Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>not engaged</td>
<td></td>
<td>170</td>
<td>30</td>
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<td>85.00</td>
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<tr>
<td>engaged</td>
<td></td>
<td>54</td>
<td>74</td>
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<td>57.81</td>
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<tr>
<td>Overall</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>74.39</td>
</tr>
</tbody>
</table>

measured as a ratio of chi-square values for the model (see Table 7).

As shown in Table 7, in the solitary functional play model there were significant interaction effects of setting and age group, and of setting with age group and child care center. The 4- and 5-year-old age group was more likely than the 2- and 3-year-old age group to be engaged in solitary functional play outdoors (\(p = .0307\)). The 2- and 3-year-old age group in Center A was more likely to be engaged in solitary functional play outdoors than the average across all three centers (\(p = .0419\)).

The model correctly predicted 76.83% of the occurrence or nonoccurrence of the children's parallel functional play (252/328 play episodes); children's parallel functional play was correctly predicted in 74.05% of such play episodes (117/158), whereas 79.41% of nonoccurrences of parallel functional play (135/170) were correctly predicted (see Table 5). The variables of setting, age group, child differences, and child care centers, and relevant interaction terms in this model accounted for

Table 5

Prediction for parallel functional play of the Parten-Smilansky Scale

<table>
<thead>
<tr>
<th></th>
<th>Predicted</th>
<th>Observed</th>
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<th>engaged</th>
<th>Percent Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>not engaged</td>
<td></td>
<td>135</td>
<td>35</td>
<td></td>
<td>79.41</td>
</tr>
<tr>
<td>engaged</td>
<td></td>
<td>41</td>
<td>117</td>
<td></td>
<td>74.05</td>
</tr>
<tr>
<td>Overall</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>76.83</td>
</tr>
</tbody>
</table>

about 31% of the total variance in parallel function play behavior, measured as a ratio of chi-square values for the model (see Table 7).

As shown in Table 7, in the parallel functional play model there were significant main effects of setting and child care centers for parallel functional play. Parallel functional play was displayed
more often outdoors than in the classroom ($p = .0001$). The child care centers showed a significant average effect on parallel functional play ($p = .0425$). Children in Center A were more likely to be engaged in parallel functional play than the average across all three centers ($p = .0148$). There were significant interaction effects of setting and age group on parallel functional play. The 4- and 5-year-old age group was engaged in more parallel functional play on the playground than indoors ($p = .0404$).

The model correctly predicted 78.35% of the occurrence or nonoccurrence of the children's interactive dramatic play (257/328 play episodes); children's interactive dramatic play was correctly predicted in 36.14% of such play episodes (30/83), whereas 92.65% of nonoccurrences of interactive dramatic play (227/245) were correctly predicted (see Table 6). The variables of setting, age group, child differences, and child care centers, and relevant interaction terms in this model accounted for about 18% of the total variance in interactive dramatic play behavior, measured as a ratio of chi-square values for the model (see Table 7).

As shown in Table 7, in the interactive dramatic play model the significant main effect for interactive dramatic play was that of setting. Children were more likely to engage in interactive dramatic play outdoors than indoors ($p = .0287$). There also were significant interaction effects of setting and child care centers, and of setting with age group and child care center. Children in Center B were more likely to engage in interactive dramatic play on the outdoor playground than the average across all three centers ($p = .0208$). The 2- and 3-year-old age group in Center B was more likely to be engaged in interactive dramatic play outdoors than in the classroom ($p = .0316$).

Table 6

<table>
<thead>
<tr>
<th>Predicted</th>
<th>Observed</th>
<th>Percent Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>engaged</td>
</tr>
<tr>
<td>not engaged</td>
<td>227</td>
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<td>engaged</td>
<td>53</td>
<td>30</td>
</tr>
<tr>
<td>Overall</td>
<td>280</td>
<td>48</td>
</tr>
</tbody>
</table>
Table 7

Summary of significant findings of logistic regression predicting children's play behaviors in setting, age group, and child care centers

<table>
<thead>
<tr>
<th></th>
<th>SF</th>
<th>SC</th>
<th>SD</th>
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</thead>
<tbody>
<tr>
<td><strong>Setting</strong></td>
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<td>Childcare (A)</td>
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</tr>
<tr>
<td>Childcare (B)</td>
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<td>----</td>
</tr>
<tr>
<td>Age</td>
<td>----</td>
<td>----</td>
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</tr>
<tr>
<td>Child</td>
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<td>----</td>
</tr>
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<td>Setting × Age</td>
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<td>Setting × Childcare</td>
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<tr>
<td>Setting × Childcare (A)</td>
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<tr>
<td>Setting × Childcare (B)</td>
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<td>----</td>
</tr>
</tbody>
</table>

-2 log likelihood  
Model $\chi^2$ (df)  
$R^2$

<table>
<thead>
<tr>
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<th>438.77</th>
<th>251.02</th>
<th>115.70</th>
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</thead>
<tbody>
<tr>
<td>Model $\chi^2$ (df)</td>
<td>111.70 (46)</td>
<td>116.30 (46)</td>
<td>53.29 (46)</td>
</tr>
<tr>
<td>$R^2$</td>
<td>.25</td>
<td>.46</td>
<td>.46</td>
</tr>
</tbody>
</table>

Note. SF = Solitary Functional Play; SC = Solitary Constructive Play; SD = Solitary Dramatic Play; PF = Parallel Functional Play; PC = Parallel Constructive Play; PD = Parallel Dramatic Play; IF = Interactive Functional Play; IC = Interactive Constructive Play; ID = Interactive Dramatic Play. Pseudo-$R^2$ is calculated as the ratio of model chi-square (equivalent to sum of squares for model) to -2 log likelihood (equivalent to total sum of squares).
<table>
<thead>
<tr>
<th>PF</th>
<th>PC</th>
<th>PD</th>
<th>IF</th>
<th>IC</th>
<th>ID</th>
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</tr>
<tr>
<td>454.26</td>
<td>387.38</td>
<td>82.47</td>
<td>186.56</td>
<td>375.34</td>
<td>371.07</td>
</tr>
<tr>
<td>140.25 (46)</td>
<td>142.15 (46)</td>
<td>41.23 (46)</td>
<td>78.81 (46)</td>
<td>136.55</td>
<td>67.60 (46)</td>
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<tr>
<td>.31</td>
<td>.37</td>
<td>.50</td>
<td>.42</td>
<td>.36 (46)</td>
<td>.18</td>
</tr>
</tbody>
</table>
In summary, three of the nine categories of play behavior (i.e., solitary functional play, parallel functional play, interactive dramatic play) showed significant differences in the Parten-Smilansky Scale. Children were more likely to engage in both parallel functional play and interactive dramatic play on the outdoor playground than in the indoor classroom. There was a significant effect of centers on parallel functional play; children in Center A were more likely to engage in parallel functional play than the average across all three centers. Of these results, only the main effect of setting on parallel functional play \((p \leq .0001)\) meets the Bonferroni criterion of protected 95% simultaneous confidence.

There also were significant interaction effects of setting and age group, and of setting with age group and child care centers on children's play behaviors. The 4- and 5-year-old age group was more likely to be engaged in both solitary functional play and parallel functional play on the outdoor playground than in the classroom. The 2- and 3-year-old age group in Center A was more likely to show solitary functional play outdoors, whereas the younger age group in Center B was engaged in interactive dramatic play more often outdoors than in the classroom.

**Differences in Peer Interactions**

For the Peer Play Scale, as shown in Table 12, four of the seven categories of peer interaction had model effects that were significant beyond the \(p \leq .05\) level: solitary play (ST), parallel aware play (PA), social pretend play (SP), and interaction with an adult (IA) (see Appendix A, Tables 17 to 20). The model correctly predicted 73.78% of the occurrence or nonoccurrence of the children's solitary play (242/328 play episodes); children's solitary play was correctly predicted in 69.88% of such play episodes (116/166), whereas 77.78% of nonoccurrences of solitary play

<table>
<thead>
<tr>
<th>Predicted</th>
<th>Observed</th>
<th>not engaged</th>
<th>engaged</th>
<th>Percent Correct</th>
</tr>
</thead>
<tbody>
<tr>
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<td>126</td>
<td>36</td>
<td></td>
<td>77.78</td>
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<tr>
<td>engaged</td>
<td>50</td>
<td>116</td>
<td></td>
<td>69.88</td>
</tr>
<tr>
<td>Overall</td>
<td></td>
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<td>73.78</td>
</tr>
</tbody>
</table>
(126/162) were correctly predicted (see Table 8). The variables of setting, age group, child differences, and child care centers, with relevant interaction terms, in this model accounted for about 23% of the total variance in solitary play, measured as a ratio of chi-square values for the model (see Table 12).

As shown in Table 12, in the solitary play model there was a significant interaction effect of setting, age group, and child care centers for solitary play. The 2- and 3-year-old age group in Center A was more likely to be engaged in solitary play outdoors than the average across all three child care centers (p = .0348).

The model correctly predicted 71.34% of the occurrence or nonoccurrence of the children’s parallel aware play (234/328 play episodes); children’s parallel aware play was correctly predicted in 84.43% of such play episodes (179/212), whereas 47.41% of nonoccurrences of parallel aware play (55/116) were correctly predicted (see Table 9). The variables of setting, age group, child differences, and child care centers, and relevant interaction terms, in this model accounted for about 19% of the total variance in parallel aware play centers, measured as a ratio of chi-square values for the model (see Table 12).

Table 9

Prediction for parallel aware play of the Peer Play Scale

<table>
<thead>
<tr>
<th>Predicted</th>
<th>Observed</th>
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<th>engaged</th>
<th>Percent Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>not engaged</td>
<td>55</td>
<td>61</td>
<td></td>
<td>47.41</td>
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<tr>
<td>engaged</td>
<td>33</td>
<td>179</td>
<td></td>
<td>84.43</td>
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<tr>
<td>Overall</td>
<td></td>
<td></td>
<td></td>
<td>71.34</td>
</tr>
</tbody>
</table>

As shown in Table 12, in the parallel aware play model the main effect of age group was significant for parallel aware play. The 4- and 5-year-old age group was more likely than the 2- and 3-year-old age group to be engaged in parallel aware play (p = .0432).

The model correctly predicted 80.49% of the occurrence or nonoccurrence of the children’s social pretend play (264/328 play episodes); children’s social pretend play was correctly predicted in
Table 10

Prediction for social pretend play of the Peer Play Scale

<table>
<thead>
<tr>
<th>Predicted</th>
<th>Observed</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>not engaged</td>
<td>engaged</td>
<td>Percent Correct</td>
</tr>
<tr>
<td>not engaged</td>
<td>228</td>
<td>20</td>
<td>91.94</td>
</tr>
<tr>
<td>engaged</td>
<td>44</td>
<td>36</td>
<td>45.00</td>
</tr>
<tr>
<td>Overall</td>
<td>272</td>
<td>56</td>
<td>80.49</td>
</tr>
</tbody>
</table>

45% of such play episodes (36/80), whereas 91.94% of nonoccurrences of social pretend play (228/248) were correctly predicted (see Table 10). The variables of setting, age group, child differences, and child care, with relevant interaction terms, in this model accounted for about 21% of the total variance in social pretend play, measured as a ratio of chi-square values for the model (see Table 12).

As shown in Table 12, in the social pretend play model the main effect of setting was significant for social pretend play. Children were more likely to engage in social pretend play outdoors than in the classroom (p = .0073). There was a significant interaction effect on social pretend play of setting with age group and child care center. The 2- and 3-year-old age group in Center B was more likely to be engaged in social pretend play on the outdoor playground than indoors (p = .0391).

The model correctly predicted 69.82% of the occurrence or nonoccurrence of the children’s interaction with an adult (229/328 play episodes); children’s interaction with an adult was correctly predicted in 64.54% of such play episodes (91/141), whereas 73.80% of nonoccurrences of interaction with an adult (138/187) were correctly predicted (see Table 11). The variables of setting, age group, child differences, and child care centers, and relevant interaction terms in this model accounted for about 16% of the total variance in interaction with an adult, measured as a ratio of chi-square values for the model (see Table 12).
Table 11

Prediction for interaction with an adult of the Peer Play Scale

<table>
<thead>
<tr>
<th>Predicted</th>
<th>Observed</th>
<th>not engaged</th>
<th>engaged</th>
<th>Percent Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>not engaged</td>
<td>138</td>
<td>49</td>
<td>83.80</td>
<td></td>
</tr>
<tr>
<td>engaged</td>
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<td>91</td>
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<tr>
<td>Overall</td>
<td></td>
<td></td>
<td>69.82</td>
<td></td>
</tr>
</tbody>
</table>

As shown in Table 12, in the interaction with an adult model there was a significant interaction effect of setting and age group on interaction with an adult. The 2- and 3-year-old age group was more likely to be engaged in interacting with an adult in the classroom than outdoors ($p = .0420$).

In summary, four of the seven categories of peer interaction (i.e., solitary play, parallel aware play, social pretend play, interaction with an adult) showed significant differences in the Peer Play Scale. Children were more likely to engage in social pretend play on the outdoor playground than in the classroom. The 4- and 5-year-old age group was more likely than the 2- and 3-year-old age group to show parallel aware play. Of these results, only the main effect of setting on social pretend play ($p = .0073$) very nearly meets the Bonferroni criterion for protected 95% simultaneous confidence.

There was a significant interaction effect of setting and age group, and one for setting with age group and child care centers on peer interactions. The 2- and 3-old age group was more likely to be engaged in interacting with an adult in the classroom than on the outdoor playground. The 2- and 3-old age group in Center A was more likely to be engaged in solitary play outdoors, whereas the younger age group in Center B was more likely to show social pretend play outdoors than indoors.

Additional Findings:
Relationships between the Parten-Smilansky Scale and the Peer Play Scale

Kendall's Tau-b correlational analyses were conducted on the relationships between the Parten-Smilansky Scale and the Peer Play Scale. Since this correlational analysis was conducted on a fairly large variable set (i.e., 9 variables of the Parten-Smilansky Scale and 7 variables of the Peer Play Scale), it was necessary to control for experimental-wise error rate at some reasonable level.
Table 12

Summary of significant findings of Logistic regression predicting children's peer interactions in setting, age group, and child care centers

<table>
<thead>
<tr>
<th></th>
<th>ST</th>
<th>PP</th>
<th>PA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Childcare</td>
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<td>Setting X Age</td>
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<tr>
<td>Setting X Childcare</td>
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<td>Setting X Childcare (A)</td>
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<td>Setting X Age X Childcare (B)</td>
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</tr>
<tr>
<td>-2 log likelihood</td>
<td>454.65</td>
<td>453.48</td>
<td>426.19</td>
</tr>
<tr>
<td>Model $\chi^2$ (df)</td>
<td>106.10 (46)</td>
<td>117.17 (46)</td>
<td>80.11 (46)</td>
</tr>
<tr>
<td>$R^2$</td>
<td>.23</td>
<td>.26</td>
<td>.19</td>
</tr>
</tbody>
</table>

Note. ST = Solitary Play; PP = Parallel Play; PA = Parallel Aware Play; SS = Simple Social Play; CR = Complementary and Reciprocal Play; SP = Social Pretend Play; IA = Interaction with an Adult. Pseudo-$R^2$ is calculated as the ratio of model chi-square (equivalent to sum of squares for model) to -2 log likelihood (equivalent to total sum of squares).
<table>
<thead>
<tr>
<th>SS</th>
<th>CR</th>
<th>SP</th>
<th>IA</th>
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<tr>
<td>231.13</td>
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<td>448.23</td>
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<tr>
<td>.39</td>
<td>.44</td>
<td>.21</td>
<td>.16</td>
</tr>
</tbody>
</table>
This was done using the Bonferroni procedure, which involves dividing the number of 63 comparisons into the usual alpha level of 0.05 to determine the protected level of alpha for summary conclusions among the correlational results. Therefore, only results having p-values ≤ .0008 are considered to be significant.

Correlations between the Parten-Smilansky Scale and the Peer Play Scale yielded fifteen significant findings (see Table 13). Solitary play was found to be positively related to solitary functional play ($r = .68$) and solitary constructive play ($r = .34$), whereas it was negatively associated with interactive constructive play ($r = -.22$) and interactive dramatic play ($r = -.18$). Parallel play was found to be positively related to parallel functional play ($r = .26$) and parallel constructive play ($r = .26$), whereas it was negatively associated with interactive dramatic play ($r = -.22$). Parallel aware play was found to be positively related to parallel functional play ($r = .32$).

Simple social play was positively associated with interactive functional play ($r = .26$) and interactive constructive play ($r = .32$), whereas it was negatively associated with solitary functional play ($r = -.21$). Social pretend play was found to be positively related to solitary dramatic play ($r = .21$) and interactive dramatic play ($r = .95$), whereas it was negatively associated with parallel constructive play ($r = -.18$). Interaction with an adult was positively related to interactive functional play ($r = .23$).

In summary, the present findings indicated that the two scales were positively related to each other. For example, solitary play was associated with solitary functional play and solitary constructive play. Parallel play was positively related to parallel functional play and parallel constructive play. Simple social play was positively associated with interactive functional play, interactive constructive play, and interaction with an adult. Social pretend play was positively related to solitary dramatic play and interactive dramatic play. Interaction with an adult was found to be positively related to interactive functional play.

Categories of the two scales also were negatively related to each other. Solitary play was negatively related to interactive constructive play and interactive dramatic play. Parallel play was
Table 13

Kendall Correlation Coefficient and 2-tailed Significance between the Parten-Smilansky Scale and the Howes Scale

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**Note.** * p < .05. ** p < .01. *** p < .001. **** p < .0001.

SF = Solitary Functional Play; SC = Solitary Constructive Play; SD = Solitary Dramatic Play; PF = Parallel Functional Play; PC = Parallel Constructive Play; PD = Parallel Dramatic Play; IF = Interactive Functional Play; IC = Interactive Constructive Play; ID = Interactive Dramatic Play; ST = Solitary Play; PP = Parallel Play; PA = Parallel Aware Play; SS = Simple Social Play; CR = Complementary and Reciprocal Play; SP = Social Pretend Play; IA = Interaction with an Adult
negatively associated with interactive dramatic play. Social simple play was negatively associated with solitary functional play. Social pretend play was negatively related to parallel constructive play.

**Discussion**

This study examined the differences in preschoolers' play behaviors and peer interactions between older and younger preschoolers, indoor classroom and outdoor playground settings, and three child care centers. In addition, relationships between the Parten-Smilansky Scale and the Peer Play Scale were explored. This section describes program characteristics (i.e., the quality of classroom and playground) and educator characteristics and summarizes the results of the differences of play behaviors and peer interactions for each independent variable (i.e., age group, setting, child care center). Limitations of the study are presented in the following section as well as in this section.

**Program Characteristics**

Children's play behaviors and peer interactions were observed in classroom and playground settings of various quality across the three child care centers. The quality of the child care classroom environment was evaluated by using the Assessment Profile for Early Childhood Programs (Abbott-Shim & Sibley, 1992). The classroom assessment results showed that each classroom environment in all three child care programs differed in quality. That is, the older age group in one program received the highest total score (78%), whereas the younger age group in another center had the lowest total score (48%). The quality of the three child care centers was mediocre for both age groups. This finding is consistent with works of previous researchers, who found that the average quality of child care programs was only minimally adequate (Dunn, 1993; Howes & Matheson, 1992; Howes & Smith, 1995; Kontos et al., 1994; Peisner-Feinberg, Bernier, Clifford, Culkin, Howes, Kagan, & Rustici, 1996).

It was observed that the younger age group at one child care center was not provided either social pretend play (i.e., dramatic play) materials or equipment in the classroom. According to Dunn (1993), an appropriately prepared environment is important for children to actively explore and interact with materials and peers. Child care classrooms with less than excellent quality may
interfere with the development of peer interactions, especially social pretend play (Howes & Matheson, 1992). Peisner-Feinberg et al. (1996) found that "seven in ten centers are providing mediocre care, which may compromise children's abilities to enter school ready to learn" (p. 2).

Vandell and Powers (1983) found that children in high quality centers were more likely to engage in positive social interactions and behaviors than children enrolled in moderate and low quality centers, who displayed more solitary and unoccupied behavior. Similarly, Chung (1994) reported that children in developmentally inappropriate kindergartens were less likely to be engaged in interactions with peers, materials, and teachers during free time.

The child care programs in this study used only one playground for all children enrolled at the center, for example, one playground was shared with three age groups simultaneously (i.e., the toddlers, and the younger and older age groups). The playgrounds of two centers were used by both the younger and older age groups. The outdoor play environment was evaluated for complexity and variety of equipment and materials, and number of outdoor play spaces per child using the protocols presented by Kritchevsky et al. (1969). The teachers basically did not alter or add to the complexity and variety of equipment and materials available either before, or during the outdoor play time. These findings indicate that the teachers did not actively plan for or provide an enriched outdoor play environment for their preschoolers through the selection and addition of items, substances, and arrangements. Their observed practice is more similar to recess time in elementary schools (Pellegrini, 1995) rather than quality outdoor play time for preschoolers and kindergartners (Fukuchi, 1995; Ladd et al., 1988).

Fukuchi (1995) has argued that the amount and variety of addition of materials and equipment are important factors for improving the quality of playgrounds during preschool outdoor play in child care centers. Preschool teachers who provide a more varied, adaptable outdoor environment are also more likely to enhance the play environment of the children through their verbal interactions and behaviors. In addition, the ratio of play spaces per child at these centers was insufficient (1.06, 0.71, and 1.76, respectively) according to Prescott's (1981) argument that good space for free selection time requires 4 to 5 play spaces per child. This finding is consistent with the
work of Gets and Berndt (1982) who examined the number of play spaces in a gymnasium (0.8 and 1.2) and the work of Dunn (1993) who studied classroom play spaces (1.2). Fukuchi (1995), however, found that the average number of outdoor play spaces per child was 3.1 for Time 1, 4.0 for Time 2, and 4.1 for Time 3 in six child care playgrounds. Holloway and Reichart-Erickson (1988) reported that when the outdoor area was inadequate, children spent more time observing others. In this regard, it is necessary to provide enough space to play without interfering with others and variety of play materials and equipment to enhance children's peer interaction (Holloway & Reichart-Erickson, 1988; Phyfe-Perkins, 1980; Smith & Connolly, 1980).

These findings support the importance of the classroom and playground environments in encouraging play behaviors and peer interactions. Teachers need to facilitate or promote play behaviors and peer interaction by providing varied and age-appropriate materials and equipment and effectively arranging and planning each environmental setting (Mize, Ladd, & Price, 1985).

Traditionally, the preschool classroom (i.e., the indoor environment) has received priority in planning for materials, equipment, and activities, and less attention has been paid to the outdoor environment (Henniger, 1977). Preschool curriculum guidelines include limited consideration of outdoor play (The National Association for the Education of Young Children, 1987), and too often outdoor play time has been seen as recess time for young children and teachers without the provision of movable materials and equipment for more optional exploration (Brown & Burger, 1984). Additional attention and planning given to the outdoor environment by the teachers could be used to promote a safe, healthy, risk-taking (Henniger, 1994), and challenging environment by offering materials and equipment that would promote preschoolers' play and peer interaction.

Educator Characteristics

Although head teacher characteristics for this study were not analyzed statistically, it is noteworthy to discuss their professional qualifications as they varied in their academic preparation, teacher licensure, and years of teaching experience. Most teachers reported some education beyond high school, an average of 2 years post-high school education similar to that found by Dunn (1993) and Peisner-Feinberg et al. (1996). Teacher licensure was approximately the same for both
age groups. Teachers of the older age group had the most years of preschool teaching experience, whereas some teachers in the younger age group were in their first year of teaching.

Many researchers have argued that teacher preparation (i.e., teaching experiences, education, and licensure) is an important factor that directly influences the quality of child care programs and children's social interaction (Arnett, 1989; Cassidy, Buell, Pugh-Hoese, & Russell, 1995; Clarke-Stewart & Gruber, 1984; Howes & Smith, 1995; Kontos et al., 1994; Ruopp, Travers, Glantz, & Coelen, 1979; Whitebook, Howes, & Phillips, 1990). The National Child Care Staffing Study (White et al., 1990) reported that the formal education of teachers was the best predictor of appropriate caregiving. Clarke-Stewart and Gruber (1984) reported that children in child care settings who were the most socially competent had teachers with higher levels of education. Similarly, Chung (1994) found that children whose teachers demonstrated more developmentally appropriate practices were more likely to initiate learning-related conversations and to respond to peers' statements. Taken together, children's play behaviors and peer interactions are seen as highly influenced by the teachers academic preparation, specifically in early childhood education/child development.

**Differences of Play Behaviors and Peer Interactions**

The play behaviors and peer interactions of children were analyzed using the Parten-Smilansky Scale (Rubin et al., 1978) and the Peer Play Scale (Howes & Matheson, 1992). There were main effects for age group and setting, whereas no main effects were found for child differences and child care center. This may be attributed to a heavy loss of degrees of freedom from the error component of the model, and possible collinearity between child differences and the child care center variable. A salient age effect was found for peer interactions. The older age group was more likely than the younger age group to show social interest and pay attention to peers, known as parallel aware play. This finding is consistent with previous research that found older children had a preference for peer interaction (Greenwood, Walker, Todd, & Hops, 1981; Hartup, 1983; Pellegrini, 1992).
Main effects of setting were found for both play behaviors (i.e., parallel functional play, interactive dramatic play) and peer interactions (i.e., social pretend play). Interaction effects were found for setting and age group effects for play behaviors (i.e., parallel functional play), and setting, age group, and child care center for play behaviors and peer interactions (i.e., interactive dramatic play, social pretend play). Children were more likely to engage in parallel functional play and interactive dramatic play outdoors than in the classroom. The older age group was more likely to be engaged in both types of solitary and functional play on the outdoor playground. These findings are consistent with the work of Henniger (1985), who found that older children were more likely to show functional play and dramatic play on the outdoor playground. Pack (1995) reported that the outdoor environment seems to facilitate functional play, also. The younger age group was more likely to be engaged in interacting with an adult indoors. This finding supports the work of Brown and Burger (1984), who found that preschool teachers seldom interacted with children on the playground. Tizard et al. (1976a, 1976b) found that there were fewer verbal initiations outdoors from both adults to children and children to adults. Cullen (1993) reported that a majority of 5-year-old children (62.5%) perceived outdoor play as something they did by themselves without the assistance of adults, while 37.5% of the children referred to specific forms of help from a teacher, such as help with obtaining or shifting equipment, or help when they were hurt. These findings reinforce the importance of outdoor play for contributing to children's play behaviors.

Children also were more likely to engage in the highest form of peer play (i.e., social pretend play), according to Howes and Matheson (1992), outdoors than indoors. There are plausible explanations for the occurrence of social interaction with peers outdoors. The videotapes revealed that children engaged in more social pretend play using their imagination on the outdoor playground, whereas the classrooms tended to offer some dramatic play materials and equipment. For example, on the outdoor playground there were more low-realism play materials (e.g., an empty house, tree, jungle gym), while the classrooms tended to have high-realism materials and equipment (e.g., trucks, dolls, tea set). The low-realism materials may encourage children to engage in more social interaction with peers in social pretend play (Berk & Winsler, 1995; Fromberg, 1990, 1992; Hartle,
Shin (1994) indicated that children felt freer to explore the world around them and to transform the real world into the fantasy world that met their imaginative needs and interests on the outdoor playground.

Interaction effects of setting, age group, and child care center were found both for play behaviors and peer interactions. Results showed that the younger age group in one program (A) was engaged in interactive dramatic play and social pretend play, whereas the younger age group in another program (B) displayed playing alone more often outdoors than in the classroom. This finding is attributed to the classroom environmental setting. That is, the younger age group did not have either social pretend play (i.e., dramatic play) materials or equipment in the classroom; consequently, this age group was more likely to show dramatic play on the outdoor playground than indoors. These findings support the work of Phillips, McCartney, and Scarr (1987), who found that overall quality of the child care environment affected children's social competence and adjustment. Also, Howes (1990b) and Holloway and Reichart-Erickson (1988) found a correlation between children's social competence with peers and the quality of their child care programs. It is interpreted that the differences in play behaviors and peer interactions between child care programs are related to the quality of the classroom and playground.

There are several limitations to this study. Although this study used the child difference variable in the analyses as a blocking effect to adjust the model for repeated measures, there were no significant effects of blocking on children's play behaviors and peer interactions. This may be attributed to limited sample size and a heavy loss of degrees of freedom from the error component of the model, and possible collinearity among the model effects. According to Wright (1995), larger samples are required in a logistic regression because standard errors for maximum likelihood coefficients are large-sample estimates. A minimum of 50 cases per predictor variable (i.e., independent variable) is recommended. Further research is needed to consider the influences of sample size and child differences on interpretation of differences in play behaviors and peer interactions in the classroom and on outdoor playgrounds.
Second, the present study used interval-sampling to analyze children's play behaviors and peer interaction following the methodology of similar research (e.g., Field, Masi, Goldstein, Perry, & Parl, 1988; Henniger, 1985; Howes, 1988; Howes & Matheson, 1992; Pellegrini, 1984, 1992; Tizard et al., 1976a, 1976b). This method is limited, however, in revealing direct social interactions between children. For example, recording an event as social interaction requires that a social initiation from one child be followed by a social response from another child. Odom and Ogawa (1992) argue for using continuous interval recording (i.e., 5-minute periods). This procedure requires that scoring the social interaction in the second interval is based on a behavior from the previous interval. In addition, it is ambiguous to define the interaction, either as occurring in both intervals or in the later interval only. Event sampling may provide useful information of an interchange of social behavior that occurs between different children. Thus, information on another aspect of children's peer interaction can be obtained.

Third, the child care programs in this study used only one playground for all children enrolled. This may have resulted in confounding the effects of child, age group, and environmental setting. For example, in the classroom, children's play behaviors and peer interactions were observed in the same-age setting, whereas on the outdoor playground they were videotaped in the mixed-age setting. Also, this mixed-age outdoor setting may have influenced children's play behaviors and peer interactions. It is speculative whether younger children are more likely to interact and learn by observing competent older peers and whether older children engage in more extended and complex activities when they are not interacting with younger children (Bailey, Burchinal, & McWilliam, 1993; Goldman, 1981). In this regard, it is necessary to provide age appropriate and individually appropriate outdoor settings to promote children's peer interactions. Also, research is needed to examine children's play behaviors and peer interactions in same-age outdoor settings to compare with those of the classroom.

Finally, this study investigated only three child care programs, that is, six classrooms and their related playgrounds. Research conducted on a large sample size is needed to examine differences between classroom and playground settings for facilitating children's play behaviors and
peer interactions. In addition, the child care programs used in this study were mediocre. This lack of developmentally appropriate programs may have affected children's play behaviors and peer interactions. Research is needed to compare the play behaviors and peer interactions of high-quality child care programs with those of lower-quality child care programs.

**Relationships between the Parten-Smilansky Scale and the Peer Play Scale**

Correlational analyses between the Parten-Smilansky Scale and the Peer Play Scale showed positive and negative relationships with each other. For example, social pretend play was positively related to solitary dramatic play and interactive dramatic play, whereas it was negatively related to parallel constructive play. The relationships result from differences in the operational definitions of the Parten-Smilansky Scale and the Peer Play Scale. The definition of parallel play in the Peer Play Scale is restricted to children's peer interaction compared to parallel functional play, parallel constructive play, and parallel dramatic play in the Parten-Smilansky Scale. For instance, parallel play is observed when a child and at least one peer are playing with the same type of objects and are within approximately 3 feet of each other, whereas parallel functional play is determined when two or more players engage in the same, similar, or different repetitive physical movement in the same general location but there is no complementary action or vocalization.

The definition of simple social play in the Peer Play Scale is similar to interactive functional play and interactive constructive play in the Parten-Smilansky Scale. However, the definition of simple social play involves only social interactions with peers, whereas the definition of interactive functional play in the Parten-Smilansky Scale includes interaction with peers as well as with adults. Overall, the combination of the two scales provide a more valid and comprehensive assessment of children's social interaction with peers in naturally occurring contexts.

A contribution of the present study was the use of a multimethod, multisource, and multisetting information assessment approach to obtain a more comprehensive understanding of young children's peer interactions (e.g., Achenbach et al., 1987; Brown et al., 1996). Direct observation measures of children in the classrooms and playgrounds were also used as a primary component of this multimethod assessment (Brown et al., 1996). In addition, this study considered
the contextual features of each setting (i.e., indoors, outdoors) by measuring the qualities between indoor and outdoor play environments for children. Finally, the present study used a wireless transmission (an observational coding system) in the classroom as well as on the outdoor playground, whereas other studies have used it only on the outdoor playground (e.g., Asher & Gabriel, 1993; Pepler & Craig, 1995). Wireless transmission systems (i.e., small microphones and lightweight transmitters) have provided rich verbal records of young children’s play and peer interaction (e.g., Pepler & Craig, 1995). This lightweight wireless transmission system minimally constrains participants and reduces observer reactivity.

Summary and Implications

In this study, the contextual features of all six classrooms and their related playgrounds were mediocre child care programs for both age groups. There was one main effect of peer interactions for age. The older age group was more likely to engage in parallel aware play. Second, the effects of setting were found for play behaviors and peer interactions. Children were more likely to engage in parallel functional play, interactive dramatic play, and social pretend play outdoors than in the classroom. The older age group was more likely to be engaged in functional play on the outdoor playground. The younger age group was more likely to be engaged in interacting with an adult indoors. Children also were more likely to engage in the highest forms of peer play (i.e., social pretend play) outdoors than indoors. This finding reinforces the importance of the outdoor environment for establishing a peer culture (Dempsey & Frost, 1993).

Third, the younger age group at one child care center was engaged more often in interactive dramatic play outdoors than in the classroom. This finding is attributed to the classroom environmental setting. That is, the younger age group was not provided either social pretend play (i.e., dramatic play) materials or equipment in the classroom; thus, this age group was more likely to show dramatic play on the outdoor playground than indoors. However, these findings need to be presented cautiously due to the limitations of the effects of repeated measures, confounding effects of age group and setting, and limited number of child care programs.
Finally, correlational analyses between the Parten-Smilansky Scale and the Peer Play Scale showed both positive and negative relationships. For example, social pretend play was positively related to solitary dramatic play and interactive dramatic play, whereas it was negatively associated with parallel constructive play. Overall, the combination of the two scales provide a more valid and comprehensive assessment of children's social interaction with peers in naturally occurring contexts.

These findings support the importance of the playground environment in encouraging children's play behaviors and peer interactions. Teachers need to promote play behaviors and peer interaction by effectively arranging and planning for both environmental settings. Curriculum planners' decisions for age appropriate and individually appropriate portable materials for outdoors are critical because the playground is often used by several age groups of children. Also, children are more likely to engage in both interactive dramatic play and social pretend play and they occur more often outdoors than indoors. It is necessary for teachers to facilitate social pretend play outdoors by providing different materials and equipment (i.e., cardboard boxes, blanket, hats). In addition, children restricted by reduced space and increased noise levels in the indoor setting would profit from use of the outdoors as an alternative learning environment.

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GENERAL CONCLUSIONS

The purpose of this dissertation was to examine the difference of preschooler's play behaviors and peer interactions in classroom and playground settings. Chapter 1 of the dissertation presents the research literature concerning the influence of physical play environment on children's play behaviors and peer interactions (Green, 1933a, 1933b; Darvill, 1982; Dempsey & Frost, 1993; Henniger, 1985; Lewin, 1931; Pack, 1995; Piaget, 1962; Sanders & Harper, 1976; Shin, 1994; Tizard, Philps, & Ptewis, 1976a, 1976b; Vygotsky, 1967; Wachs, 1985; Wohlwill, 1983). Lewin (1931) proposed a "General Law" to explain the relationships among a person, the environment and the behavior of the person. That is, all behavior (B) is a function of the relationship between the person (P) and the environment (E), or B = f(PE). Darvill (1982) modified Lewin's model by emphasizing play behavior (Bp) as a function of the playing child (Pc) and the play environment (Ep), or Bp = f(PcEp). In this line of research, Wachs (1985) and Wohlwill (1983) hypothesize that the physical environment of play can influence development only when it is mediated by social environmental parameters (i.e., peer, adult). In other words, the parameters of the physical play environment may serve to structure the nature of social interactions among peers (Wachs, 1985). Some research has investigated the relationship among different settings (i.e., indoors vs. outdoors) for both children's play and the play environment (Darvill, 1982; Hartle, 1989; Reifel & Yeatman, 1993; Shin, 1994), whereas other studies have emphasized the player's peers as a feature of the play environment (Dempsey & Frost, 1993; Howe, Moller, & Chambers, 1994; Howes & Matheson, 1992; Howes & Rubenstein, 1981; Johnson & Ershler, 1981; Parten, 1932; Petrakos & Howe, 1996; Piaget, 1962; Rubin & Krasnor, 1980; Rubin, Maioni, Hornung, 1976; Rubin, Watson, & Jambor, 1978; Smith, 1978; Vygotsky, 1967; Wachs, 1985). In this regard, it is necessary to investigate the influences of the play environment (e.g., indoors, outdoors) and the social environment (e.g., peers) on children's play behaviors and interactions with peers.

In Chapter 2, an empirical study concerning the effects of play environment on play behaviors and peer interactions of preschoolers is presented. The objectives of the study were to (1) examine the differences of preschooler's play behaviors between indoor classroom and outdoor...
playground setting, (2) examine the differences of children's play behaviors between older and younger preschoolers in their classroom and on the outdoor playground, (3) examine the differences of preschooler's peer interaction between indoor classroom and outdoor playground setting, (4) examine the differences of children's peer interaction between older and younger preschoolers in their classroom and on the outdoor playground, and (5) determine the differences of children's peer interaction between three child care centers. Forty-one children in two age groups (i.e., 2- and 3-year-olds and 4- and 5-year-olds) enrolled in three child care programs in central Iowa participated in this study. The children were observed for 5 minutes each on 4 different days both indoors and outdoors. The total observation time per child was 20 minutes in the classroom and 20 minutes on the playground.

The quality of child care program and playground was described by using the Assessment Profile for Early Childhood Programs (Abbott-Shim & Sibley, 1992) and the quality of playground was measured by using protocols presented by Kritchevsky, Prescott, and Walling (1969). Children's play behaviors were categorized using the Parten-Smilansky Scale (Rubin et al., 1978), which combines social play categories (i.e., solitary play, parallel play, and interactive play) and cognitive play categories (i.e., functional play, constructive play, and dramatic play). Children's peer interactions were categorized using the Peer Play Scale (Howes & Matheson, 1992). The peer play scale consists of 7 play categories (i.e., (a) solitary play, (b) parallel play, (c) parallel aware play, (d) simple social play, (e) complementary and reciprocal play, (f) social pretend play, and (g) interaction with an adult).

Results indicated that each classroom environment in each child care program differed in quality. The teachers basically did not alter or add to the complexity and variety of equipment and materials available either before or during the outdoor play time. Overall, all six classrooms and their related playgrounds were mediocre child care programs. The teachers varied in their academic preparation, teacher licensure, and years of teaching experience. Logistic regression analyses were performed on the categories of the Parten-Smilansky Scale and the Peer Play scale. The older age group was more likely to interact with peers. Children were more likely to engage in parallel
functional play, interactive dramatic play, and social pretend play outdoors than in the indoor classroom. The older age group was more likely to display functional play on the outdoor playground, whereas the younger age group was more likely to be engaged in interacting with an adult indoors. Children also were more likely to engage in the highest form of peer play (i.e., social pretend play) and play behavior (i.e., interactive dramatic play) outdoors than indoors. These findings reinforce the importance of the outdoor environment for establishing a peer culture (Dempsey & Frost, 1993). The younger age group in one program was engaged in interactive dramatic play more often outdoors than in the classroom, whereas the younger age group in another program was more likely to show playing alone. This finding is attributed to the classroom environmental setting. That is, one classroom for the younger age group did not have either social pretend play (i.e., dramatic play) materials or equipment in the classroom, therefore, this age group was more likely to show dramatic play on the outdoor playground than indoors. Correlational analyses between the Parten-Smilansky Scale and the Peer Play Scale showed positive and negative relationships with each other. For example, solitary play was positively associated with solitary functional play and solitary constructive play, whereas it was negatively related to interactive constructive play and interactive dramatic play. Overall, the combination of the two scales provide a more valid and comprehensive assessment of children's social interaction with peers in naturally occurring contexts.

The present study supports the importance of classroom and playground environments in encouraging play behaviors and peer interactions; however, more research needs to be conducted to investigate further various contributions of the physical play environments for children's social interaction with peers.

Literature Cited


APPENDIX A: SUPPLEMENTARY TABLES
### Logistic regression predicting solitary functional play occurrences in setting, age group and child care center

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-2 Log Likelihood (Total Sums of Squares) 438.77
-2 Log Likelihood (Sums of Squares due to Error) 327.07
Model Chi-Square (Sums of Squares) 111.43

**Note.** Agegp = Age group
Table 15

Logistic regression predicting parallel functional play occurrences in setting, age group and child care center

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-2 Log Likelihood (Total Sums of Squares) | 454.26 |
-2 Log Likelihood (Sums of Squares due to Error) | 314.06 |
Model Chi-Square (Sums of Squares) | 140.20 |

Note. Agegp = Age group
Table 16

Logistic regression predicting interactive dramatic play occurrences in setting, age group and child care center

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-2 Log Likelihood (Total Sums of Squares) 371.07
-2 Log Likelihood (Sums of Squares due to Error) 303.47
Model Chi-Square (Sums of Squares) 67.60

Note. Agegp = Age group
Table 17

Logistic regression predicting solitary play occurrences in setting, age group and child care center

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-2 Log Likelihood (Total Sums of Squares) 454.65
-2 Log Likelihood (Sums of Squares due to Error) 348.55
Model Chi-Square (Sums of Squares) 106.11 46 .0001

Note. Agegp = Age group
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-2 Log Likelihood (Total Sums of Squares) 426.19
-2 Log Likelihood (Sums of Squares due to Error) 346.08
Model Chi-Square (Sums of Squares) 80.11

Note. Agegp = Age group
Table 19

Logistic regression predicting social pretend play occurrences in setting, age group and child care center

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-2 Log Likelihood (Total Sums of Squares) | 364.43 |
-2 Log Likelihood (Sums of Squares due to Error) | 286.12 |
Model Chi-Square (Sums of Squares) | 78.31 |

Note. Agegp = Age group
Table 20

Logistic regression predicting interaction with an adult occurrences in setting, age group and child care center

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-2 Log Likelihood (Total Sums of Squares) 448.23
-2 Log Likelihood (Sums of Squares due to Error) 375.55
Model Chi-Square (Sums of Squares) 72.69 46 .0073

Note. Agegp = Age group
APPENDIX B: CORRESPONDENCE
June 1996

Dear Director;

As an Early Childhood Education doctoral candidate in Human Development and Family Studies at Iowa State University, I am interested in learning about children’s peer interaction and play behavior in the indoor classroom and on the outdoor playground. Many early childhood educators have emphasized children’s learning and growth through play activities in the classroom settings. Through peer interactions during play, children reflect on their own feelings and develop a greater understanding of the feelings of others. The degree to which children are influenced by their peers depends on their age and different physical environments of play (i.e., classroom and outdoor playground). Few studies have been conducted children’s interactions with peers in the classroom and on the outdoor playground. The proposed study will provide insight into our understanding of children’s peer interactions during play in preschool children’s classroom and playground.

This study involves videotaping children of 3- and 4-year-olds during morning free play time and outdoor play, approximately 20 minutes in both the classroom and outdoor playground. No special activities or interactions will be expected for the children in your child care program during the videotaping. The videotaping will be done in an unobtrusive manner although, undoubtedly, the children will be aware when the videotaping is occurring as it may be necessary for the child to wear a small, wireless microphone. The nature of this study will be unknown to the children. All individual data will remain confidential, only group data will be presented. Results of the study will be presented in a summary report in journal articles and at professional meetings.

I am seeking your permission to observe children of 3 and 4 year olds at your child care center to participate in this study beginning summer 1996. All information will be kept confidential. No program, teacher or child will be identified by name in the final research report. Results of the study will be presented in a Doctoral dissertation, in journal articles, and at professional meetings.

Thank you, in advance, for your support of this study. If you have any questions, please contact us at (515) 292-3987 or 294-6230.

Sincerely

Sook-Young Shim
Graduate Student

Joan E. Henwig, Ph.D.
Major Professor in Charge of Research
The purpose and the general nature of the research procedures have been explained to me. As children in this child care program participate in this study, I understand that children will be videotaped during free play in the classroom and on the playground. I understand that neither the program, the teachers, nor these children will be identified by name and all information will be kept confidential. Finally, I understand that these children are free to withdraw from this study at any time.

I am willing for ___________________________ to participate in this study
(Name of child care center)
as described in the accompanying letter.

I am not willing for ___________________________ to participate in this study
(Name of child care center)
as described in the accompanying letter.

__________________________    ________________________________
Director's Signature                Name of Early Childhood Program

__________________________
Date
June 1996

Dear Teacher;

As an Early Childhood Education doctoral candidate in Human Development and Family Studies at Iowa State University, I am interested in learning about children’s peer interaction and play behavior in the indoor classroom and on the outdoor playground. Many early childhood educators have emphasized children’s learning and growth through play activities in the classroom settings. Through peer interactions during play, children reflect on their own feelings and develop a greater understanding of the feelings of others. The degree to which children are influenced by their peers depends on their age and different physical environments of play (i.e., classroom and outdoor playground). Few studies have been conducted children’s interactions with peers in the classroom and on the outdoor playground. The proposed study will provide insight into our understanding of children’s peer interactions during play in preschool children’s classroom and playground.

This study involves videotaping children of 3- and 4-year-olds during morning free play time and outdoor play, approximately 20 minutes in both the classroom and outdoor playground. No special activities or interactions will be expected for the children in your program during the videotaping. The videotaping will be done in an unobtrusive manner although, undoubtedly, the children will be aware when the videotaping is occurring as it may be necessary for the children to wear a small, wireless microphone. The nature of this study will be unknown to the children. All individual data will remain confidential, only group data will be presented. Results of the study will be presented in a summary report in journal articles and at professional meetings.

I am seeking your permission to ask you questions about your professional background and experiences. All information will be kept confidential. No program, teacher or child will be identified by name in the final research report. Results of the study will be presented in a Doctoral dissertation, in journal articles, and at professional meetings.

Thank you, in advance, for your support of this study. If you have any questions, please contact us at (515) 292-3987 or 294-6230.

Sincerely

Sook-Young Shim
Graduate Student

Joan E. Henwig, Ph.D.
Major Professor in Charge of Research
TEACHER PERMISSION FOR STUDY OF CHILDREN’S PEER Interaction IN PHYSICAL ENVIRONMENT

The purpose and the general nature of the research procedures have been explained to me. I understand that any questions regarding the study will be answered. I understand that neither the program, the teachers, nor these children will be identified by name and all information will be kept confidential. Finally, I understand that I can withdraw from this study at any time.

____________ I am willing to participate in this study.

____________ I am not willing to participate in this study.

______________________ ____________________________
Teacher’s Signature Name of Early Childhood Program

______________________ ____________________________
Age Group/Classroom Date
June 1996

Dear Parent;

As an Early Childhood Education doctoral candidate in Human Development and Family Studies at Iowa State University, I am interested in learning about children's peer interaction and play behavior in the indoor classroom and on the outdoor playground. Many early childhood educators have emphasized children's learning and growth through play activities in the classroom settings. Through play, young children enjoy the company of their peers. The children learn sharing, cooperating and understanding of other people's thought and emotions from peers. The way in which children are influenced by their peers depends on their age and different settings for play (i.e., classroom and outdoor playground). Few studies have been conducted examining children's interactions with peers in the classroom and on the outdoor playground. The proposed study will provide insight into our understanding of children's peer interactions during play in children's preschool classroom and playground. I need your help in getting approval for your child to participate in my study about preschoolers and play.

This study involves videotaping children of 3- and 4-year-olds during morning free play time and outdoor play, approximately 20 minutes in both the classroom and outdoor playground. No special activities or interactions will be expected for your child or the teacher during the videotaping. The videotaping will be done in an unobtrusive manner although, undoubtedly, the children will be aware when the videotaping is occurring as it will be necessary for your child to wear a small, wireless microphone and "fanny pack" with a ladybug on the front. All individual data will remain confidential, only group data will be presented. Results of the study will be presented in a summary report in journal articles and at professional meetings.

I am seeking your permission to observe your preschooler at his/her child care center. All information will be kept confidential. No program, teacher or child will be identified by name in the final research report. Results of the study will be presented in a doctoral dissertation, in journal articles, and at professional meetings.

Thank you, in advance, for your support of my study. If you have any questions, please contact us at (515) 292-3987 (home) or 294-6230 (office).

Sincerely

Sook-Young Shim
Graduate Student

Joan E. Herwig, Ph.D.
Major Professor in Charge of Research
The purpose and the general nature of the research procedures have been explained to me. If my preschool child participates in this study, I understand that any questions regarding the study will be answered. I understand that neither the child care program nor my child will be identified by name and all information will be kept confidential. Finally, I understand that my child is free to withdraw from the study at any time.

I am willing for my child to participate in this study.

I am not willing for my child to participate in this study.

__________________________  ______________________
Parent’s Signature          Date

__________________________  ______________________
Child’s Name                Child’s Age

__________________________  ______________________
Name of Early Childhood Program  Child’s Teacher
APPENDIX C: INSTRUMENTS
Outdoor Preschool Playground Equipment & Materials Recording Form

Program Code: Date: Recorder Name:
Time: Temperature: # of Children Present:
# of Adults present:

<table>
<thead>
<tr>
<th></th>
<th>Time 1</th>
<th></th>
<th>Time 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before Outdoor Play</td>
<td>During Outdoor Play</td>
<td></td>
</tr>
<tr>
<td>Complexity</td>
<td>(+ )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variety</td>
<td>(+ )</td>
<td></td>
<td></td>
</tr>
<tr>
<td># of Play Spaces per Child</td>
<td>/ =</td>
<td>/ =</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Time 1</th>
<th></th>
<th>Time 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before Outdoor Play</td>
<td>During Outdoor Play</td>
<td></td>
</tr>
<tr>
<td>Complexity:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>Variety:</td>
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<td></td>
<td></td>
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<tr>
<td>Total _____</td>
<td></td>
<td>___ + ___</td>
<td></td>
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</table>
### Outdoor Preschool Playground Equipment and Determination of Variety

* Category used in determining variety

<table>
<thead>
<tr>
<th>Category</th>
<th>Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large Rockers*</td>
<td>rocking board, candle board, teeter-totter, bench glider, swing house, tube rocker</td>
</tr>
<tr>
<td>Small Rockers*</td>
<td></td>
</tr>
<tr>
<td>Climbing Units*</td>
<td>climbing steps, jungle gym, monkey bars, tree stump, two ramps with bench between, jumping board, hanging bar(s), rings</td>
</tr>
<tr>
<td>Hanging &amp; Swing Units*</td>
<td></td>
</tr>
<tr>
<td>Wheel Vehicles*</td>
<td>tricycle, pedal car, wagon</td>
</tr>
<tr>
<td>Slides*</td>
<td>sliding pole, slide</td>
</tr>
<tr>
<td>Swings*</td>
<td>swing, double and single, tire swing, bench swing</td>
</tr>
<tr>
<td>Empty House Type (no idea)*</td>
<td>large, hollow empty crate, crawl barrel, tunnel</td>
</tr>
<tr>
<td>Empty House Type (idea)*</td>
<td>play house, tent, teepee</td>
</tr>
<tr>
<td>Single Props*</td>
<td>sawhorse, movable partitions, board, ladder</td>
</tr>
<tr>
<td>House Type*</td>
<td>play house equipment, table with dolls and doll clothes, stuffed animals, theater</td>
</tr>
<tr>
<td>Building Equipment*</td>
<td>building blocks, wood crates, sawhorse, pile of bricks</td>
</tr>
<tr>
<td>Table Toys*</td>
<td></td>
</tr>
<tr>
<td>Manipulatable Cars, Trucks, Figures*</td>
<td></td>
</tr>
<tr>
<td>Books*</td>
<td></td>
</tr>
<tr>
<td>Digging Area and Equipment*</td>
<td>sand, dirt on ground or table</td>
</tr>
<tr>
<td>Animal*</td>
<td>(with or without cage)</td>
</tr>
<tr>
<td>Water Pump*</td>
<td>water outlet, water pump</td>
</tr>
<tr>
<td>Climbing Tree*</td>
<td></td>
</tr>
<tr>
<td>Swimming Pool and Equipment*</td>
<td>swimming pool</td>
</tr>
<tr>
<td>Water Table*</td>
<td></td>
</tr>
<tr>
<td>Art Equipment*</td>
<td>paint, chalk, brushes, paper</td>
</tr>
<tr>
<td>Miscellaneous*</td>
<td>ball*, tire*, bubbles*, fishing*, hoop*, basket hoop*, merry-go-round*, basket hoop*, parachute*</td>
</tr>
</tbody>
</table>
**Outdoor Preschool Playground Equipment and Determination of Variety**

1 = Before Outdoor Play 2 = During Outdoor Play

<table>
<thead>
<tr>
<th>Teacher Code:</th>
<th>Time 1</th>
<th>Time 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Date</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Large rocker</strong></td>
<td>see-saw, tube rocker, rocking board</td>
<td></td>
</tr>
<tr>
<td><strong>Small rockers</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Climbing units</strong></td>
<td>climbing steps, jungle gym, rings, monkey bars, hanging bar(s)</td>
<td></td>
</tr>
<tr>
<td><strong>Hanging &amp; swing units</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Wheel vehicles</strong></td>
<td>tricycle, pedal car, wagon</td>
<td></td>
</tr>
<tr>
<td><strong>Slides</strong></td>
<td>sliding pole, slide</td>
<td></td>
</tr>
<tr>
<td><strong>Swings</strong></td>
<td>swing, tire swing, bench swing</td>
<td></td>
</tr>
<tr>
<td><strong>Empty house type (no idea)</strong></td>
<td>large, hollow empty crate, crawl barrel, tunnel</td>
<td></td>
</tr>
<tr>
<td><strong>Empty house type (idea)</strong></td>
<td>play house, tent, teepee</td>
<td></td>
</tr>
<tr>
<td><strong>Single props</strong></td>
<td>movable partitions, board, ladder</td>
<td></td>
</tr>
<tr>
<td><strong>House type</strong></td>
<td>play house equipment, table with dolls and doll clothes</td>
<td></td>
</tr>
<tr>
<td><strong>Building equipment</strong></td>
<td>building blocks, wood crates, pile of bricks</td>
<td></td>
</tr>
<tr>
<td><strong>Table toys</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Manipulatable cars/trucks/figures</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Books</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Digging area/equipment</strong></td>
<td>sand, dirt on ground or table</td>
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</tr>
<tr>
<td><strong>Water pump</strong></td>
<td>water outlet, water pump</td>
<td></td>
</tr>
<tr>
<td><strong>Climbing tree</strong></td>
<td></td>
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<tr>
<td><strong>Swimming pool</strong></td>
<td>swimming pool</td>
<td></td>
</tr>
<tr>
<td><strong>Water table</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Art equipment</strong></td>
<td>paint, chalk, brushes</td>
<td></td>
</tr>
<tr>
<td><strong>Ball</strong></td>
<td>ball, frisbee</td>
<td></td>
</tr>
<tr>
<td><strong>Tire</strong></td>
<td></td>
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<tr>
<td><strong>Bubbles</strong></td>
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<tr>
<td><strong>Fishing</strong></td>
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<tr>
<td><strong>Basket hoop</strong></td>
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<td></td>
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<tr>
<td><strong>Merry-go-round</strong></td>
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<tr>
<td><strong>Hoop</strong></td>
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<tr>
<td><strong>Musical instrument</strong></td>
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<tr>
<td><strong>Parachute</strong></td>
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<tr>
<td><strong>Total</strong></td>
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</tr>
</tbody>
</table>
CHILD AND TEACHER INFORMATION

Name ___________ Age Group ________________

Program ___________ Classroom ______________

Age _______________ Date of enrollment in this program ________________

Date of enrollment in this classroom ________________

Total # of Children in this program ___________ Boys ________ Girls ________

Highest level of education completed:

1. _____ High School Diploma
2. _____ CDA
3. _____ A.A./A.S. Title ________________
4. _____ B.A./B.S. Title ________________
5. _____ B.A./B.S. + _____ post degree credits
6. _____ M.A./M.S. Title ________________
7. _____ M.A./M.S. + _____ post degree credits

Teacher licensure/s is:

1. _____ None
2. _____ Elementary Ed (K-8grds #10)
3. _____ Prekindergarten/K (# 53)
4. _____ Early Childhood (Birth - 8 years)
5. _____ Early Childhood Special Ed (Birth - 6 years)
6. _____ Other ________________

Years of teaching experience completed (exclude this year)

1. Day Care (fullday)
   birth - 2 years __________
   3 - 4 years _____________
   5 - 6 years _____________
   7- and older age __________
2. Preschool (1/2 day) ____________
3. Kindergarten ________________
   Total ___________________
CHILDREN OBSERVATION FORM

The Parten-Smilansky Play Scale
(Rubin, Watson & Jambor, 1978)

9 Social-Cognitive Categories of Play

<table>
<thead>
<tr>
<th>Cognitive play</th>
<th>Solitary (S)</th>
<th>Parallel (P)</th>
<th>Interactive (I)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functional (F)</td>
<td>SF</td>
<td>PF</td>
<td>IF</td>
</tr>
<tr>
<td>Constructive (C)</td>
<td>SC</td>
<td>PC</td>
<td>IC</td>
</tr>
<tr>
<td>Dramatic (D)</td>
<td>SD</td>
<td>PD</td>
<td>ID</td>
</tr>
</tbody>
</table>

Operational Definition:

Social categories of play

Solitary play (S) Playing alone (e.g., no involvement with teachers or peers)
Parallel play (P) Playing while other(s) surrounding also
Playing with similar or different materials and/or activities but no sign of cooperative engagement
Interactive play (I) Playing with other(s) i.e., children or teachers, in a cooperative manner (e.g., borrowing and loaning of play materials, following one another with trains or wagons, engaging in similar if not identical activity, talking or listening to other children or teachers, actively involving with other children- a division of labor, taking of different roles by the various group member)

Cognitive categories of play

Functional play (F) Repetitive muscle movements (e.g., rolling, banging or shaking toys/objects), including active physical movements (e.g., jumping, wrestling, rolling over, tossing partner in the air), or just talking with other teachers or children, clean-up, eating, riding toys
Constructive play (C) Using objects or materials to make something (e.g., building blocks, creating a tunnel in sandbox, stacking and arranging objects, cutting and pasting, drawing, painting, putting puzzles together)
Dramatic play (D) Role-playing (e.g., pretending to be a doctor or a superhero) and/or make-believe transformations (e.g., using a block as a car, pretending to drive a car by using arm movements, pretending to paint a house)

Nonplay category

Behaviors or activities that lack the characteristics of social-cognitive play. Examples include talking, watching, listening, reading books, doing school-related work.
CHILD RECORDING SHEET

Frequency of Social-Cognitive Play

ID Number: 
Subject Code: 3B 3G 4B 4G
Location: Indoor

Coding Behavior: 9 categories of play and 1 category of nonplay
SF SC SD = Solitary Play: Functional, Constructive, Dramatic
PF PC PD = Parallel Play: Functional, Constructive, Dramatic
IF IC ID = Interactive Play: Functional, Constructive, Dramatic
NP = Nonplay

Day 1/Indoor Classroom
Interval Length: 20 seconds
Total time: 5 minutes (15 20-second intervals)

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<tr>
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Indoor Classroom Score

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<th>Code</th>
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<td>ID</td>
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<tr>
<td>NP</td>
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</tr>
</tbody>
</table>

Num of Agr | Num of Disagr | Reliability

* Num: Number
* Agr: Agreement
* Disagr: Disagreement
CHILD RECORDING SHEET

Frequency of Social-Cognitive Play

ID Number: Date:
Subject Code: 3B 3G 4B 4G Time:
Location: Indoor Outdoor Coder Name:

Coding Behavior: 9 categories of play and 1 category of nonplay
SF SC SD = Solitary Play: Functional, Constructive, Dramatic
PF PC PD = Parallel Play: Functional, Constructive, Dramatic
IF IC ID = Interactive Play: Functional, Constructive, Dramatic
NP = Nonplay

Day 1/Outdoor Playground
Interval Length: 20 seconds
Total time: 5 minutes (15 20-second intervals)

<table>
<thead>
<tr>
<th>00:20</th>
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Outdoor Playground Score

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* Num: Number
* Agr: Agreement
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CHILDREN OBSERVATION FORM

The Peer Play Scale (Howes & Matheson, 1992)

7 Peer Play Categories

Solitary Play (ST)  Complementary and Reciprocal Play (CR)
Parallel Play (PP)  Social Pretend Play (SP)
Parallel Aware Play (PA)  Interaction with Adult (IA)
Simple Social Play (SS)

Operational Definition:

Solitary Play (ST)  Playing alone, with no eye gaze or mutual interest in objects with any peer (i.e., reading a book alone or moving a toy car back and forth for a period of time).

Parallel Play (PP)  Engaging in the same activity but not acknowledging each other (i.e., 2 children both playing blocks in same area but not paying attention to each other; no eye contact)

Parallel Aware Play (PA)  Involving similar activities and engaging eye contact; children are aware and imitate of each other's play (i.e., 2 children both playing blocks in same area and are paying attention to each other; imitation of each other's play)

Simple Social Play (SS)  Engaging in the same or similar activity and talking, smile, offering, and receiving toys or, or otherwise engaging in social interaction- a turn taking structure (i.e., taking turns pointing to pictures in a book, taking turns pour sand into a bucket, taking about some leaves they have found, digging sand with talking about their own interest)

Complementary and Reciprocal Play (CR)  Engaging in social game with a turn-taking structure and role reversal (i.e., run and chase, hide and seek, throw and catch a ball, tickling each other, peek-a-boo)

Social Pretend Play (SP)  Engaging in fantasy play- acting or using objects in an “as if” manner, engaging in scripted pretend play, enacting complementary roles such as mother and baby (i.e., Child A picks up the tea cup, child B asks “Would you like some tea?”, child B pours pretend tea from the tea pot; “I’m the doctor.” The car hit you but don’t die; “Let’s pretend it’s snowing and we’re out in the cold”)

(g) Interaction with adults (IA)  Ask, talk and smile to adult, or read book with adult (i.e., child ask teacher to get a wagon or ball, teacher ask the child to share a toy each other or child play with teacher's hair.

Nonplay  Lacking characteristics of the social-cognitive play categories identified above (i.e., watching or listening to others while they are making a Lego structure
CHILD RECORDING SHEET

Frequency of Peer Play

ID Number: Date:
Subject Code: 3B 3G 4B 4G Time:
Location: Indoor Outdoor Coder Name:

Coding Behavior: 7 categories of peer play

ST = Solitary Play
PP = Parallel Play
PA = Parallel Aware Play
SS = Simple Social Play
CR = Complementary and Reciprocal Play
SP = Social Pretend Play
IA = Interaction with Adult

Day 1/Indoor Classroom
Interval Length: 20 seconds
Total time: 5 minutes (15 20-second intervals)

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Indoor Classroom Score

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* Num: Number
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CHILD RECORDING SHEET

Frequency of Peer Play

ID Number: Date:
Subject Code: 3B 3G 4B 4G Time:
Location: Indoor Outdoor Coder Name:

Coding Behavior: 7 categories of peer play

ST = Solitary Play
PP = Parallel Play
PA = Parallel Aware Play
SS = Simple Social Play
CR = Complementary and Reciprocal Play
SP = Social Pretend Play
IA = Interaction with Adult

Day 1/Outdoor Playground
Interval Length: 20 seconds
Total time: 5 minutes (15 20-second intervals)

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Outdoor Playground Score

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APPENDIX D: CODING MANUAL FOR PRESCHOOL OUTDOOR PLAYGROUND,

PLAY BEHAVIORS AND PEER INTERACTIONS
PART I. Quality of Outdoor Preschool Playgrounds

Equipment and materials will be recorded by determining the complexity and variety of play spaces, and the number of play spaces per child.

The change in the quality of playgrounds will be analyzed during three observation periods (Time 1, Time 2, and Time 3).

Time 1: First, the materials and equipment on the preschool playground before the teacher adds items for the day will be assessed.

Time 2: Second, equipment and materials on the playground will be recorded during the program, that is, what materials and equipment are added by the teacher before the children go out on the playground.

Time 3: Third, equipment and materials will be recorded after the children go back to the classroom.

1. Complexity of Equipment

The quantification of outdoor play resources follows the Kritchevsky et al. (1969) guidelines for evaluating the quality of play spaces.

A play unit will be categorized as either a simple unit, complex unit or super unit.

A simple unit will be assigned a value of 1,
A complex unit will be assigned a value of 4,  
A super unit will be assigned a value of 8,

Then the total scores of the complexity of equipment and materials of the playground for each of the three time periods will be summed. Higher complexity scores mean that there are more play spaces for the children on the playground than is implied by lower scores.

The operational definition for complexity of equipment is "the extent to which they contain potential for active manipulation and alteration by children. Elaborating on this distinction, it is possible to discern three types of play units—simple, complex, and super, which vary both in their relative capacity to keep children interested, and in the relative number of children they can accommodate at one time" (Kritchevsky et al., 1969 p.10).
Simple Play unit: A play unit has one obvious use and does not have sub-parts or a juxtaposition of materials which enable the child to manipulate or improvise.

Examples: Swings
    Jungle gym
    Rocking horse
    Tricycles
    Balls
    Hoops

Complex Play Unit: A play unit with sub-parts or juxtaposition of two essentially different play materials which enable the child to manipulate or improvise. Also included in this category are single-play materials and objects which encourage substantial improvisation and/or have a considerable element of unpredictability.

Examples: Sand table with digging equipment
    Swing with sand
    Playhouse with supplies
    All art activities such as dough, paints, or chalk
    An area with animals such as a dog, guinea pigs, or ducks

Super Play Unit: A complex unit which has one or more additional play materials, i.e., three or more play materials juxtaposed.

Examples: Sand box with play materials and water
    Climber with slide and tire
    Dough table with tools
    Tunnels, large crates and tires

2. Variety of Equipment

Equipment and materials also will be analyzed by variety. The total amount of variety will be summed across these categories.

The operational definition for variety of equipment is "the number of different kinds of units (only in terms of differences in activity, and regardless of whether they are simple, complex, or super)... and is a measure of the relative capacity of the space to elicit immediate interest from children" (Kritchevsky et al., 1969 p. 12).

* Category used in determining variety (see attached table).

Large rockers* and smaller rockers*:
    rocking board, cradle board, teeter-totter, bench glider, spring horse, tube rocker

Climbing units* and hanging and swing units*:
    climbing steps, jungle gym, two ramps with bench between, monkey bars, tree stump,
    jungle board, hanging bar(s), rings

Wheel toys*:
    tricycles, pedal car, wagon

Slides*:
    sliding pile, slide

Swings*:
    swings, double and single, tire swing, bench swing

Empty house type (no idea)*:
    large, hollow empty crate, crawl barrel, tunnel

Empty house type (idea)*:
    play house, tent, teepee

Single props*:
    sawhorse, movable partitions, board, play house equipment
House type*: play house (well stocked), playhouse equipment (one piece with props or several pieces), table with dolls and doll clothes, stuffed animals, empty play house (raised and reached by ladder), theater
Building equipment*: building blocks, group of wood crated (manipulatable), sawhorse with boards and boxes, pile of bricks
Table toys*
Manipulatable cars, trucks, figures*
Books*
Digging area and equipment*: sand, dirt, water on ground or table
Animal* (with or without cage)
Water pump*: water outlet water pump
Climbing tree*
Swimming pool*
Water table*
Art equipment*: paint, chalk, brushes
Miscellaneous: ball (frisbee)*, tire*, bubbles*, hoops*, basket hoops*, parachute*, merry-go-round*

3. Number of Play Spaces per Child

Number of play spaces per child is determined by the total number of play spaces of a playground divided by the total number of children in the area. The ratio of the total number of play spaces and children gives the approximate number of play spaces available to each child.

\[
\text{Number of play spaces per child} = \frac{\text{total \# of play spaces of playground}}{\text{total \# of children}}
\]

PART II. Play Behaviors and Peer Interaction in Classrooms and on Playgrounds

1. Children's Play Behaviors

Child play behaviors are categorized by using a two-dimensional play model of Parten-Smilansky Play Scale modified by Rubin, Watson and Jambor (1978). This scale combines the social play categories (i.e., solitary play, parallel play and interactive play) with the cognitive play categories (i.e., functional play, constructive play and dramatic play). The nested social-cognitive play or the Parten-Smilansky Play Scale, therefore, consists of 9 categories of play as (a) solitary-functional play, (b) solitary-constructive play, (c) solitary-dramatic play, (d) parallel-functional play, (e) parallel-constructive play, (f) parallel-dramatic play, (g) interactive-functional play, (h) interactive-constructive play, and (i) interactive-dramatic play. A nonplay category is included for other behaviors or activities lacking the characteristics of the social-cognitive play, i.e., onlooker, reading a book.

(a) Solitary-functional play is determined when the player engages in repetitive or active physical movement alone.

Examples: Player jumps up and down.
Player swings by himself.
Player examines a seashell located on a table.
Player moves a toy car back and forth for a period of time.
Player walks or runs alone.
(b) Solitary-constructive play is determined when the player creates or constructs something else.

Examples: Player stacks blocks and makes a tower. 
Player creates a tunnel in the sandbox. 
Player makes a story with a doll. 
Player draws pictures or puts puzzles pieces together. 
Player makes a house for an ant or ladybug.

(c) Solitary-dramatic play is determined when the player performs fantasy actions and/or vocalizes alone.

Examples: Player pretends to drive her block as if it were an imaginary car. 
Player pretends to perform a surgery for an ant. 
Player pretends to be kitty looking for mommy.

(d) Parallel-functional play is determined when two or more players engage in the same, similar or different repetitive physical movement in the same general location but there is no complementary action or vocalization.

Examples: One player rides a tricycle and another player throws and catches a ball. 
One player waits for a turn to use the art table and another talks with other children at the same table. 
One player jumps up and down while other player(s) may bounce a ball. 
Players swing together, but no talking each other. 
One player slides down while other player(s) climbs up stairs.

(e) Parallel-constructive play is determined when two or more players create or construct the same, similar or different products in the same general location but there is no complementary action or vocalization.

Examples: One player draws a picture while another player folds paper and makes an airplane. 
One player makes a tunnel while another player digs a well in the sandbox. 
One players cuts out play-dough to make cookies while other player(s) may mold the play-dough to be an animal.

(f) Parallel-dramatic play is determined when two or more players engage in the same, similar or different fantasy activities in the same general location but there is no complementary action or vocalization.

Examples: One player pretends to be a firefighter while another player pushes a block and makes sounds as if it was an airplane while in the block area. 
One player pretends to be a pony pulling a wagon around a tree while another player climbs the same tree and makes sounds as if she was a tiger. 
One player pretends to be a dog while other player(s) pretend to be a mother but their roles are not reciprocal.

(g) Interactive-functional play is determined when two or more players engage in complementary repetitive or active physical movements.

Examples: Two or more players engage in rough-and-tumble play with one another or in digging sand with a borrowing and loaning of shovels. 
The child may talk with or listen to other children or teachers. 
The child may read a book with teachers and other children.
Two or more players sing a song together listening a tape.
Two or more players push a wagon or swing by taking turns.
Two or more players measure bean to be equal.

(h) Interactive-constructive play is determined when two or more players create or construct something together.

Examples: Two or more players stack blocks and talk about building a castle
Two or more players dig a hole and talk about making a tunnel.
Two or more players cut and roll play-dough together and talk about their works.
Two or more players put puzzle pieces together.
Two or more players make a story together with a doll or doll house.

(i) Interactive-dramatic play is determined when two or more players engage in complementary fantasy actions or vocalizations and role playing.

Examples: One player pretends to be a shopkeeper while another player pretends to be a shopper.
One player pretends to be a horse while another player pretends to be a wagon.
Players assign different functions to dinosaurs as it were a daddy and son.

(j) The nonplay category includes behaviors and activities that lack characteristics of the social-cognitive play categories identified above.

Examples: The participant watches or listens to others while they are making a Leo structure.
The child read a book alone.

2. Peer Interaction

Child's peer interaction are categorized using the Peer Play Scale of Howes and Matheson (1992). This scale examines relationships between peer play frequency, proportion, the highest level of play forms observed, and subsequent social competence with peers. The peer play scale, therefore, consists of 6 play categories, i.e., (a) solitary (b) parallel play, (c) parallel aware play, (d) simple social play, (e) complementary and reciprocal play, (f) social pretend play and (g) interaction with adult.

(a) Solitary play is determined when the child is playing alone, with no eye gaze or mutual interest in objects with any peer.

Examples: Player reads a book alone.
Player moves a toy car back and forth for a period of time.

(b) Parallel play is determined when the child and at least one peer are playing with the same type of objects and are within approximately 3 feet of each other (with adjustments for more active games or toys) but have no mutual awareness.

Examples: Two children are playing with unit blocks in same area but they are not paying attention to one another.
Two children are swing but they are no eye gaze.
Two children draw pictures but they are not paying attention to one another

(c) Parallel aware play is determined when parallel play is accompanied by a social interest and is demonstrated by eye gaze and mutual awareness.
Examples: Two children are playing blocks in the same area and are paying attention to each other.
Two or more players make a tunnel and look at each other's.

(d) Simple social play is determined when the child and at least one peer are engaged in play with social interaction involving a turn-taking structure. This type of play may be either verbal or non-verbal (i.e., physical gestures or facial expressions).

Examples: Several children are taking turns pointing to their paintings displayed in the room, taking turns pouring sand into a bucket, digging sand.
Two or more children are talking about their own interest or talking about some leaves they have found on a table.
Two or more children run with smile each other.
Two children are fighting and crying each other to get a toy.

(e) Complementary and reciprocal play is determined when the child and at least one peer engage in social play with a turn-taking structure and role reversal. Each child takes a turn at each role.

Examples: Children alternatively serve as readers of a book and listeners of the story.
Children play hide and seek.
Children throw and catch a ball.
Children play basket ball with a turn.
Children tickle each other.
Children exchange being driver and rider on a tricycle with an attached wagon.

(f) Social pretend play is determined when the child and peer partner engage in pretend play, such as acting or using objects in an “as if” manner and enacting complementary roles such as mother and baby.

Examples: Child A picks up the tea cup, child B asks “Would you like some tea?”, child B pours pretend tea from the tea pot, or child A asks, “Let’s pretend it’s snowing and we’re out in the cold,” child B pretend wearing hat and mutton.
Child A pretends to be grandmother, child B asks “I’m a big basket ball player. Watch me, grandmother?” Child A responds “Good job, honey.”
Child A pretends to be doctor to give a shot to child B who pretends a patient.
Two or more children pretend to make a magic, such as making clouds, rain, rainbow and butterfly.

(g) Interaction with adults is determined when the child ask, talk and smile to adult, or when adult gives a something (including warning) to the child or reads book to the child or other peers.

Examples: Child ask teacher to get a wagon or ball.
Teacher ask the child to share a toy each other.
Child play with teacher's hair.

(j) The nonplay category includes behaviors and activities that lack characteristics of the social-cognitive play categories identified above.

Examples: The participant watches or listens to others while they are making a Leo structure.
NAME OF AUTHOR: Sook-Young Shim

DATE AND PLACE OF BIRTH: March 2, 1967, Seoul, Korea

DEGREES AWARDED:

- M.S. in Human Development & Family Studies (Early Childhood Education), Iowa State University, 1994
- M.S. in Child Study, Sookmyung Women's University, 1991
- B.S. in Child Study, Sookmyung Women's University, 1989

DISSERTATION TITLE: Play behaviors and peer interactions of preschoolers in classroom and playground settings

HONORS AND AWARDS:

- Research Excellence Award, Graduate College, Iowa State University, 1994

PROFESSIONAL EXPERIENCE:

- Teaching Assistant, Department of Child Study, Sookmyung Women's University, 1989-1990
- Research Assistant, Department of Human Development and Family Studies, Iowa State University, 1995
- Teaching Assistant, Department of Human Development and Family studies, Iowa State University, 1995-1996
- Teaching Assistant, Department of Human Development and Family studies, Iowa State University, 1997
- Instructor, Department of Early Childhood Education, Kyung-ju Junior College, Korea, 1991-1992
- Instructor, Department of Early Childhood Education, Sang-ji Junior College, Korea, 1992
- Instructor, Department of Early Childhood Education, Sang-gi Junior College, Korea, 1991

REFEREED PRESENTATIONS AT PROFESSIONAL MEETINGS: