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Preschoolers' Play Behaviors With Peers in Classroom and Playground Settings

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Abstract. The purpose of this study was to examine the relationship between different settings for young children's play behaviors with peers. Forty-one children from 2 to 5 years of age (twenty-one 2- and 3-year-olds and twenty 4- and 5-year-olds) enrolled in three child care programs participated in this study. The children were videotaped for five minutes each on four different days, both indoors and outdoors (total of 40 minutes). The Assessment Profile for Early Childhood Programs described the quality of the child care program, 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 into 16 categories of peer interaction. Results showed that the children were more likely to engage in the most complex form of peer play (i.e., interactive dramatic play) outdoors than indoors. In outdoor play, the older age group was more likely to interact with peers than was the younger age group. The outdoor playground offered older preschoolers particular types of play experiences (i.e., functional play and dramatic play) more readily than the classroom. These findings reinforce the importance of both the indoor and the outdoor environments for promoting more complementary play behaviors and peer interactions.

During the preschool years, children spend long periods of time in play with others. Peers are important social agents in young children's development and learning. Interactions with peers offer unique contributions to the growth of social and emotional competence, to the acquisition of social skills and values, and to the development of the capacity to form relationships with others (see Berndt & Ladd, 1993). Early childhood programs are one of the primary settings where young children meet peers, learn social skills, and form peer relationships.

Recent research on children's play seeks ways to promote peer interactions in educational settings (Dempsey & Frost, 1993; Howe, Moller, & Chambers, 1994; Lamb, Sternberg, Knuth, Hwang, & Broberg, 1994; Petrakos & Howe, 1996). Influences of the environment on children's play behaviors and development have been stated theoretically (Lewin, 1931; Piaget, 1962; Vygotsky, 1967) and investigated empirically (Hart, 1993; Wachs, 1985; Wohlwill, 1983). For example, Lewin (1931) proposed a rationale for emphasizing the ecological features of the physical environment that affect social interaction. Although children move in and out of certain envi-

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ronments, the influence of a particular environment potentially remains with the child, since the interactions of children have been affected by that environment. How the child interacts with people—as well as with objects—is greatly affected by situational and environmental factors. Lewin claimed that behavior (B) is a function of the interaction between the person (P) and the environment (E): $B = f(PE)$. The reasoning behind this approach is that, by understanding how children interact with the environment and persons within that environment, we can understand how the environment promotes children's play behaviors with peers. In this regard, children's play behaviors with peers can be evaluated by focusing on specific aspects of the play environment.

A number of studies have investigated the physical play environment that influences children's play behaviors with peers as both discriminative stimuli and reinforcers. Most of these studies have focused on peer interactions in the preschool classroom setting: 1) the physical arrangement of materials and learning centers (Howe et al., 1994; Petrakos & Howe, 1996), 2) the design and organization of classrooms (Field, Masi, Goldstein, Perry, & Parl, 1988; Howes & Rubenstein, 1981), and 3) the quality of program (Lamb et al., 1994; Teets, 1985). For example, Petrakos and Howe (1996) found that dramatic play centers designed for groups facilitated 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). Relatively few studies have examined how the outdoor play environment influences children's play behaviors with peers (e.g., Frost, 1986; Hart, 1993; Hartle, 1996; Henniger, 1985; Ladd, Price, & Hart, 1988). Studies of outdoor play have demonstrated that outdoor playgrounds stimulate as much or more social play as indoor environments do (Hartle, 1996; Henniger, 1985), and that play activities enhance indoor classroom learning (Hart, 1993). For example, on the outdoor playground, slides, sandboxes, and large toys designed for several children to use together facilitate children's peer play by allowing the children to talk with and physically contact each other (Wortham & Wortham, 1989). The nature of the outdoor play environment offers unique opportunities for continued exploration of peer relations in relatively unconstrained, child-directed social environments (Hart, 1993). However, these studies overlooked the possibility that the quality of the outdoor environment may have an important role in influencing children's peer play. Thus, it is necessary to consider the contextual features of the outdoor environment, as well as the classroom environment, by measuring the independent quality of children's indoor and outdoor play environments.

Several empirical studies have demonstrated that each play environment (classroom and playground) influences children's play behaviors in different ways (Green, 1933; Henniger, 1985; Pack, 1995; Sanders & Harper, 1976; Tizard, Philps, & Plewis, 1976a, 1976b). For example, while functional play such as swinging, climbing, and running was facilitated by outdoor play environments, constructive play and pretense play were more often fostered by indoor settings (Hartle & Johnson, 1993). Adults in these studies gave less information and made fewer suggestions to children in outdoor versus indoor environments, and there were fewer verbal initiations outdoors from both adults to children and children to adults. The outdoor play environment appeared to facilitate more fantasy play in older children than in younger children (Sanders & Harper, 1976). The indoor play environment seemed to promote more constructive play for children overall and more dramatic play for younger children (Henniger, 1985).

Based on previous studies, the purpose of this study was to examine different effects of the indoor and outdoor settings on the peer play of younger and older preschoolers. The second purpose of the study was to determine the influence of each play environment on children's play behaviors

with peers in different ways.

Taken together, these studies present several methodological limitations. First, previous researchers did not consider the contextual features of each setting (i.e., quality of indoor and outdoor environments) in their studies (e.g., Green, 1933; Henniger, 1985; Tizard et al., 1976a, 1976b). According to ecologically oriented psychologists, the interactive social context elicits and organizes certain kinds of behavior. The kinds of behavior that are elicited depend upon the characteristics of that setting. Thus, it is possible that indoor and outdoor play environments for children differ in quality and play opportunity. Research is needed to consider the contextual features of each setting to better understand the relationship of these play environments.

In addition, contextual factors of centers (e.g., facilities, equipment, amount of program structure) have been compared, since these factors are likely to affect the children in centers (e.g., Clarke-Stewart, 1984). The contextual factors are also related to quality of program, such as physical space, curriculum, caregiver-child interactions, indoor and outdoor play spaces, materials and activities, and health and safety. These features of the center environment have been measured by the Early Childhood Environment Rating Scale (Harms & Clifford, 1980) or the Assessment Profile for Early Childhood Programs (Abbott-Shim & Sibley, 1992). Thus, assessment of the quality of child care centers may provide more information about how the play environment of each center differently influences children's peer interactions.

Second, rather than relying on a single assessment approach, several 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). These more detailed examinations of peer interactions allow investigators to better understand 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). More research is needed to examine the effects of different settings (i.e., classroom and outdoor playground) on the same group of children's play behaviors with their peers. Finally, it has been common practice for researchers to combine behavioral data gathered from both indoor and outdoor play settings for analyses. These analyses overlook the effects of repeated measures analyses on children's behaviors, although the same children were observed in two different settings—classroom and playground (e.g., Henniger, 1985; Tizard et al., 1976a, 1976b). Without using repeated measures analyses, there is a substantial increase in error variance, since the effect of child differences becomes a source of the variance. Research is needed to consider the influence of the repeated measures effects due to child differences, and to obtain more representative explanations of the differences between children's play behaviors with peers in the classroom and on the playground.

The present study was designed to consider the contextual features of each setting and assess the quality of the child care center, in order to understand how the play environment of each center differently influences children's peer interactions. The researchers also examined the effects of different settings (i.e., classroom and outdoor playground) on the same group of children's play behaviors with their peers. Finally, in the present statistical analysis, each child was observed four times, one time per child on each of four different days. The models used accounted for this repeated measures structure by using each child as a natural blocking unit, with four repeated measures of each behavior on each child.

Method

Participants

The participants were forty-one 2- to 5-year-old children (i.e., twenty-one 2- and 3-year-olds and twenty 4- and 5- year-olds)

enrolled in three child care programs located in a midwestern university community of 50,000. In child care center A, the participants were 8 (5 girls, 3 boys) 2- and 3-year-olds (M = 36 months, SD = 1.97), and 8 (5 girls, 3 boys) 4- and 5-year-olds (M = 57 months, SD = 2.25). In child care center B, the participants were 6 (1 girl, 5 boys) 2- and 3-year-olds (M = 44 months, SD = 1.68), and 8 (3 girls, 5 boys) 4- and 5-year-olds (M = 59 months, SD = 2.24). In child care center C, the participants were 7 (4 girls, 3 boys) 2- and 3-year-olds (M = 43 months, SD = .71), and 4 (2 girls, 2 boys) 4- and 5-year-olds (M = 54 months, SD = 1.03). Overall, the 2- and 3-year-olds ranged in age from 25 to 50 months (M = 41 months, SD = 5 months); the 4- and 5-year-olds ranged in age from 48 to 69 months (M = 57 months, SD = 5 months). There were 35 European-American children and 6 Asian children represented across the three child care centers.

Quality of Programs

Quality of child care program. The Assessment Profile for Early Childhood Programs (Abbott-Shim & Sibley, 1992) was used to describe the activities, organization, and overall quality of each child care classroom environment. The research version is an observation checklist designed for assessing the day-to-day quality of care provided to children, and is consistent with the National Academy of Early Childhood Programs' Accreditation Criteria. This instrument includes 87 dichotomous items that measure classroom materials and classroom arrangement, the activity plans and the variety of activities, multicultural awareness, variety of teaching strategies, independent learning and individualization, teacher attitudes, and child assessment. Correlation of the Assessment Profile with the Early Childhood Environment Rating Scale (Harms & Clifford, 1980) ranged from .74 to .78, with a median of .74 (Scarr, Eisenberg, & Deater-Deckard, 1994). The Assessment Profile was designed for indoor use only.

Each classroom was rated simultaneously and independently by the first author, and by a graduate student who was unaware of the research objectives. Intercoder reliability was established minimally at 92% for all three centers before data collection began. Intercoder reliability of the Assessment Profile between the two raters was calculated with the following formula: 1-[(number of Observer A judgments-number of Observer B judgements)/(number of Observer A judgments + number of Observer B judgments)] (Emmer & Millett, 1970). The reliability of the Assessment Profile was .94 for child care center A, .98 for child care center B, and .96 for child care center C.

Quality of child care playground. The outdoor play environment was evaluated for complexity and variety of equipment and materials, and for the number of play spaces per child, by using the protocols presented by Kritchevsky, Prescott, and Walling (1969). Complexity was coded into simple, complex, or super units, and weights were assigned to each unit as simple (weight=1), complex (weight=4), and super (weight=8). 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" (Kritchevsky et al., 1969, p. 10). Examples of simple units are swings, a jungle gym, and tricycles. A complex unit has "sub-parts or juxtaposition of two essentially different play materials which enable the child to manipulate or improvise" (Kritchevsky et al., 1969, p. 10). An example is a sand area with play materials (such as pails and shovels). A super unit has "one or more additional play materials (i.e., three or more play materials juxtaposed)" (Kritchevsky et al., 1969, p. 10). Examples are a sandbox with play materials and water, a jungle gym with movable climbing boards, and a blanket. The weightings reflected the number of children that each unit could accommodate. 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.

The weighted frequencies for each play unit were summed and then divided by the number of children present to create a score for play spaces per child. This number represents the potential number of play choices available to a child at a given outdoor playtime. Kritchevsky (1967) recommended that a minimum of 2.5 play spaces per child always be available. Prescott (1981) argued that good space for free selection time required 4 to 5 play spaces per child. In addition, the play environment was evaluated for variety; that is, how many different types of materials and equipment were available. A variety score was created by summing the number of different types of available activities.

The complexity, variety, and number of play spaces per child for each playground was evaluated by videotaping at two different times: before the children entered the playground (time 1) and 10 minutes after the children entered the playground (time 2). Each playground was rated for each measure by the same individuals as above, using written listings of outdoor playground equipment and materials from one day of videotaping. Intercoder reliability between the two raters was calculated with the following formula: (the proportion of observed agreements - the expected proportion of agreements)/(1 - the expected proportion of agreements) (Kotz, Johnson, & Read, 1988). Intercoder reliability, measured before the children entered the playground and 10 minutes after they began playing on the playground, was 1.00 and .94 for the playgrounds, respectively.

Teacher Questionnaire. Teachers completed a brief questionnaire that reported their highest level of education, current teacher licensure, and teaching experiences. Two teachers were high school graduates, one teacher had an associate's degree, two teachers had bachelor's degrees, and one teacher had graduate credits beyond a master's degree. Three teachers in the programs had no teacher licensure, one teacher had elementary teacher licensure, one teacher had a substitute teacher license, and one teacher had both K-6 licensure and pre-kindergarten-kindergarten licensure. The three teachers of the 4- and 5-year-olds had the most years of teaching experience, with a range of 6 to 11 years of teaching young children. 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.

Instruments

The Parten-Smilansky Play Scale. Children's play behaviors were categorized using a modified form of the nested Parten-Smilansky Play Scale (Rubin, Watson, & Jambor, 1978). This scale combines social play categories (i.e., solitary play, parallel play, group 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 play, parallel play, interactive play) and three cognitive play categories (i.e., functional play, constructive play, dramatic play) (e.g., Dunn & Herwig, 1992; Pellegrini, 1984). Therefore, the nested social-cognitive play scale consists of 9 play categories: 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 (see Table 1). A nonplay category was included for behaviors lacking the characteristics identified in the social-cognitive play categories. The set of categories did not represent a hierarchy of the play behaviors.

Procedures

Each child was observed on four different days, both in the child care classroom and on the playground. For example, a child was videotaped for 5 minutes in the classroom during free play, and again for 5 minutes on the playground the same day. Each of the four sets of classroom and playground observations was recorded on separate days during the summer. The preschoolers were videotaped in random

order based on their birthday (i.e., starting with the birthdays beginning in January), attendance, and on their willingness to participate on a given day.

The target child wore a wireless microphone on her collar and a small animal-shaped backpack, containing a lightweight transmitter, during the videotaping. The wireless transmission system detected the speech of the target child and of individuals nearby, while a video camera eqiuipped with a zoom lens recorded from a distance. The researcher carried a list of names of children to be observed. After locating a target child, the researcher approached the child and asked whether she would like to make a movie with her monkey (backpack). Each child was filmed for more than the minimum 5 minutes, to permit each child to resume play after putting on the backpack; thus, coding began after the first few seconds of each videotaping segment had lapsed.

In preparation for peer play coding, a number code and time was superimposed on all videotapes, using a date and time generator. An audiotape provided time signals to record behavior and interaction categories every 20 seconds for the 5-minute observation period. There was a one-minute interval lapse after every 20-second interval of videotaped observations, to allow time to record children's play behaviors and peer interactions.

Videotapes of play behaviors with peers were evaluated using a time-sampling procedure (i.e., recording behavior at predetermined time intervals) for interactions occurring during the 20-second time interval. Reliability for the coding of the play behaviors was obtained by randomly selecting two children's videotapes from each age group at each child care center. Using 30% of the videotapes, children's play behaviors with peers were coded by two observers for 40 minutes per child, using the Parten-Smilansky Scale (i.e., 20 minutes indoors and 20 minutes outdoors).

Table 1
Definitions of Play Behavior

Play Behavior	Definitions
Solitary-functional play	When the player engages in repetitive or active physical movement alone
Solitary-constructive play	When the player creates or constructs something else
Solitary-dramatic play	When the player performs fantasy actions and/or vocalizes alone
Parallel-functional play	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
Parallel-constructive play	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
Parallel-dramatic play	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
Interactive-functional play	When two or more players engage in complementary repetitive or active physical movements
Interactive-constructive play	When two or more players create or construct something together
Interactive-dramatic play	When two or more players engage in complementary fantasy actions or vocalizations and role playing
Nonplay category	Behaviors and activities that lack the characteristics of the social-cognitive categories identified above

For the Parten-Smilansky Scale, 4 days of the 5-minute videotaped observations for both indoor and outdoor play (a total of 20 minutes indoors and 20 minutes outdoors per child) were divided into 20-second intervals for purposes of further analysis. Thus, the child's behavior was coded for every 20 seconds of the 20-minute observation period; that is, for sixty 20-second intervals in the classroom and sixty 20-second intervals on the playground. Play 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 example, interactive-dramatic play was considered to be 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.

Before the actual data process began, interobserver reliability was 94%, using the following formula: (the proportion of observed agreements - the expected proportion of agreements)/(1 - the expected proportion of agreements) (Kotz et al., 1988). Interobserver reliability was computed by Kappa statistics across the settings, age groups, and child care centers. Kappa values were .89, .91, .89 for the setting, age groups, and child care centers, respectively. Kappa values ranged from .89 to .93, with a mean of .91 per play behavior category.

Statistical Analyses

Before beginning more complex data analysis, univariate analyses were employed to evaluate the distributions of the dependent variables (the 9 variables of the Parten-Smilanksy Scale). All dependent variables displayed a skewed distribution, with relatively few scores falling at the higher end of the distribution. Therefore, each dependent variable was dichotomized. If a peer interaction was present, a score of 1 was assigned, and a score of 0 was assigned for the absence of that form of peer interaction.

When the dependent variable can have only two values and the model contains either categorical or continuous independent variables (or a mix of categorical and continuous variables), it is appropriate to use logistic regression rather than analysis of variance, least-squares regression, or related linear models methods, because such least-squares methods were not designed for use with categorical dependent variables. Unlike some other alternative ways of dealing with a nonnormal dependent variable, logistic regression has the advantage of being a modeling technique that allows the present study to explain in depth how the patterns of observed variation in the outcome measures are structured by the set of predictor variables.

The estimated logistic regression coefficient (b) is interpreted as follows. If the estimated logistic regression coefficient is positive, then the probability of occurrence of the event, as 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 that the outcome of the event with the negative coefficient will occur is decreased, compared to the average effect across all outcome categories. 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 estimated coefficient (b) to its standard error (se): $X^2 = (b/se)^2$.

Nine equations were analyzed for each of the nine categories of the Parten-Smilansky Scale. It is reasonable to set the alpha (Type I error) level at .05 to test for significance within each model, because simultaneous comparisons of the effects of the independent variable were conducted within each model for a given dependent variable; when comparisons are made across the dependent variables, however, the Bonferroni correction should be used to adjust the protected level of significance to .05 by using a significance criterion of alpha

= .05/9 = .0056 for the nine Parten-Smilanksy play behavior outcome measures when comparisons are made across the dependent variables.

Main effects were incorporated into the prediction model for each of the nine dependent variables for the factors of setting (indoor vs. outdoor), age group (2- and 3-year-olds vs. 4- and 5-year-olds), child care center (Center A, Center B, and Center C), and child differences. Our models were estimated so that the effect of each child care center was compared to the average effect of all three child care centers. The child difference variable was used in each model as a blocking effect to adjust for repeated measures on each child, since each child was observed on four different days, to avoid representing one child as four different children. 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. The number of observational units for each model consisted of 328 play episodes (41 children x 4 different days x 2 dichotomous values). The statistical interaction terms added to these models were setting by age, setting by child care center, and setting by age group by child care center.

Results

Quality of Programs

The Assessment Profile for Early Childhood Programs observational measure was used to understand how the quality of the classroom environment influences children's peer interactions. The results showed that the total score for quality of child care classrooms ranged from 42 to 68 (see Table 2). This finding indicates that all three programs were lower quality for both the younger and the older age groups.

The Kritchevsky protocols were used to assess how the quality of the outdoor play environment influences children's peer interactions. The results revealed that once children and teachers were present on the playground (time 2), teachers were not likely to modify the outdoor play environment (see Table 3). The ratios of outdoor play space per child for each child care center were 1.06, .71, and 1.78, respectively. The playground environments did not provide either sufficient play space per child for children (Kritchevsky, 1967; Prescott, 1981), or complexity and variety of equipment. There are inconsistent patterns for complexity and number of play spaces across the centers. Complexity is higher for Center A, while the number of play spaces is

Table 2
Rating Scores and Percent on Assessment Profile for Early Childhood Programs by Age Group

	Total Items[a]	Center A		Center B		Center C	
Subscale		2/3 years	4/5 years	2/3 years	4/5 years	2/3years	4/5years
Learning environment	17	5 (29%)	7 (41%)	11 (65%)	14 (82%)	10 (59%)	12 (70%)
Scheduling	15	9 (60%)	11 (73%)	14 (93%)	14 (93%)	13 (87%)	6 (40%)
Curriculum	22	11 (50%)	13 (59%)	7 (32%)	14 (64%)	15 (68%)	13 (59%)
Interacting	15	9 (60%)	12 (80%)	8 (52%)	15 (100%)	14 (93%)	11 (73%)
Individualizing	18	8 (44%)	9 (50%)	9 (50%)	11 (61%)	6 (33%)	5 (27%)
Total score	87	42 (48%)	52 (60%)	49 (56%)	68 (78%)	58 (67%)	47 (54%)

a = Total possible scores.
Note. Each percent in each subscale is calculated by the ratio of raw scores to total items.

higher for Center C, although the quality is similarly low across all three centers.

Differences in Play Behaviors With Peers

The primary findings from applying the logistic regression analysis for assessing specified main effects and statistical interaction components to the models for each of the Parten-Smilansky play categories are summarized in Table 4. The counts and percentage for the play categories across the primary variables (i.e., indoor vs. outdoor; younger vs. older age group; A, B, and C child care center) are presented in the Appendix.

For the Parten-Smilansky Play Scale, logistic regression was used to examine the effect of setting (indoor vs. outdoor), age group (2- and 3-year-olds vs. 4- and 5-year-olds), and child care centers (Center A, Center B, and Center C) on the nine play categories. Solitary functional play, parallel functional play, and interactive dramatic play of the nine play behavior categories were significant beyond the $p < .05$ level (see Table 4). In logistic regression, the coefficient for an independent variable, such as "setting," can be interpreted as an odds ratio of the relative likelihood of two different outcomes of play behaviors.

In the solitary functional play model, there were significant statistical 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 ($b = 1.35$, $p < .05$). This means that, when the setting changes from indoors to outdoors, and when comparing the older age group children to the younger age group children, the likelihood of solitary functional play increases by a rate of 1.35 times. By exponentiating the Naperian base of the logarithm (2.72) by the value of the coefficient estimate (that is, by raising 2.72 to the power of 1.35), we can conclude that the likelihood of solitary functional play is about 3.86 times as high in the outdoor setting and in the presence of older children. In addition, 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 ($b = -1.64$, $p < .05$).

There were significant main effects for setting and child care centers in the parallel functional play model. The value of the estimated coefficient for the effect of setting on parallel functional play is 1.81 ($b = 1.81$; $p < .0001$). This means that when the setting changes from 0 (indoor) to 1 (outdoor), assuming that the other independent variables remain the same, the logarithm of the odds ratio of parallel functional play occurring increases by 1.81 compared to the alternative outcome of no parallel functional play. Exponentiating 2.72 to the power of 1.81, we can conclude that the outdoor setting results in about 6.1 times as great a frequency of parallel functional play compared to an indoor setting, after adjusting for the effects of the other components of the model. The child care centers showed a significant average effect on parallel functional play ($p < .05$). In particular, children in Center A were significantly more likely to be engaged in parallel functional play than the average

Table 3
Average Scores for Variety and Complexity of Equipment and Materials, and Play Space per Child, at Two Times on One Day at Each Child Care Center

	Center A		Center B		Center C	
	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2
Complexity	37	36	24	24	25	25
Variety	8	8	9	9	8	9
Ratio of play space per child	0	1.06	0	0.71	1.25	1.78

Note. N = 6 observations.

across all three centers (b = 3.47, p < .05). Exponentiating the parameter estimate for the Center A effect (3.47) results in a value of about 32.2, indicating a much higher estimated rate of parallel functional play in Center A compared to the three centers on average. There also was a significant effect of the statistical interaction 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 (b = 1.42, p < .05). Exponentiating this parameter estimate (2.72 raised to the power of 1.42) results in an estimate of parallel functional play being about 4.1 times as likely to occur among older children outdoors than among younger children indoors.

In the interactive dramatic play model, the significant main effect was for setting. Children were more likely to be engaged in interactive dramatic play outdoors than indoors (b = 1.01, p < .05). The exponentiated result is an estimate that interactive dramatic play is about 2.75 times as likely to occur outdoors compared to indoors. There was also a significant two-way statistical interaction of setting with child care center, and a significant three-way statistical interaction of setting with age group and child care center. Children in Center B were more likely to be engaged in interactive dramatic play on the playground than the average across all three centers (b = 1.66, p < .05). Through exponentiating this estimated parameter value, this means that children in Center B were about 5.3 times as likely as children in other centers to engage in interactive dramatic play. The three-way statistical interaction effect demonstrates that the 2- and 3-year-old age group in Center B was significantly less likely to be engaged in interactive dramatic play outdoors than in the classroom (b = -1.93, p < .05). The

Table 4
Logistic Regression Predicting the Parten-Smilansky Scale

	Solitary Functional Play		Parallel Functional Play		Interactive Dramatic Play	
	ß	Wald[a]	ß	Wald[a]	ß	Wald[a]
Setting	.45	1.58	1.81	21.35****	1.01	4.79*
Child care		.14		6.32		.43
Childcare (A)	15.47	.14	3.47	5.94*	-2.25	.43
Childcare (B)	-11.63	.11	-2.37	.08	1.22	.35
Age	6.53	.03	1.64	.35	-1.76	1.63
Child		38.55		39.93		25.85
Setting X Age	1.35	4.67*	1.42	4.20*	-1.15	3.59
Setting X Childcare		.28		1.25		5.34
Setting X Childcare (A)	.18	.11	.12	.05	-1.01	2.35
Setting X Childcare (B)	-.27	.28	-.59	1.15	1.66	5.34*
Setting X Age X Childcare		4.23		.31		4.69
Setting X Age X Childcare (A)	-1.64	4.14*	-.46	.24	1.15	1.89
Setting X Age X Childcare (B)	.76	.37	.36	.16	-1.93	4.62*
Constant	-5.66	.07	-2.43	6.46	-1.22	.48
-2 Log Likelihood	438.77		454.26		371.07	
-2 Log Likelihood	327.07		314.06		303.48	
Model Chi-Square	111.70****		140.20****		67/70*	

[a]Wald Chi-Square has the square of the ratio of the coefficient (ß) to its standard error (se):(t = b/se)^2.

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

estimated coefficient of -1.93 for the statistical interaction of setting, age group, and Center B indicates that the logarithm of the odds ratio of interactive dramatic play occurring decreases by the value of 1.93 in child care center B (compared to the average for all three centers) for the indoors setting among 2- and 3-year-old children.

Discussion

The discussion is presented in two parts. First, the quality of the classroom and playground environment is discussed, presenting the contextual features of the child care programs. Second, the findings of the logistic regression analyses are discussed as they relate to the differences of children's play behaviors with peers, indoors and outdoors.

The results of the classroom assessment showed that overall quality of the three child care centers was mediocre for both age groups in all six classrooms. This finding is consistent with other studies where the average quality of child care programs was only minimally adequate (e.g., Dunn, 1993; Peisner-Feinberg et al., 1996). Child care classrooms of lesser quality may interfere with the development of peer interactions, especially social pretend play (Howes & Matheson, 1992). The videotapes support previous findings showing that children who did not have a rich learning environment were more likely to engage in less complex peer play. For example, the children were more likely to be involved in stacking blocks and making a tower, moving from place to place in the classroom, running around the outdoor playspace, or swinging alone. Dunn (1993) argued that children need an environment that allows them to explore actively and interact with materials and peers.

Each of the child care programs in this study used only one playground for all children enrolled in the center. At one center, the playground was shared by all three age groups simultaneously (i.e., by toddlers, and by the younger and older age groups), while the playgrounds of two centers were used by both the younger and older age groups (no toddlers were enrolled). The outdoor play environment lacked a variety of equipment (e.g., rockers, climbing units, single props) and had a low ratio of play spaces per child (e.g., 1.06, 0.71).

The teachers rarely altered or added to the complexity and variety of equipment and materials available either before or during outdoor play time. These findings indicate that the teachers did not actively provide, or plan for, an enriched or responsive outdoor play environment for their preschoolers through the selection and addition of items, arrangements, or substances (e.g., water and paint brushes, tricycles, wagons, blankets, appliance boxes, sidewalk chalk, buckets). Their observed practice is more similar to recess time in elementary schools (Ladd et al., 1988; Pellegrini, 1995), rather than making a higher quality outdoor play time as an extension of the preschool classroom by adding challenging and movable play accessories. In addition, the ratio of play spaces per child at these centers was insufficient. The current finding is consistent with the work of Getz and Berndt (1982), who examined the number of play spaces in a gymnasium and found low ratios (0.8 and 1.2).

Taken together, these identified contextual features describe the quality of the environmental influences for children's play behaviors with peers in this study. These assessments suggest that teachers of young children should consider how they can increase the quality of the classroom and playground environments to influence children's experiences in group settings.

Differences in Play Behaviors With Peers

Differences were found with regard to age. The older preschoolers were more likely to show social interest and attention toward peers than were the younger children. This finding is consistent with previous research showing that older children engage in more peer interactions (Hartup, 1983; Pellegrini, 1992). In the outdoor playground, older preschoolers could find particular types of play experiences more readily than in the classroom. The older age group was more

likely to be engaged in functional play (e.g., bouncing, shooting, or throwing a basketball) and dramatic play (e.g., pretending to be an animal or a cloud) 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) also reported that the outdoor environment seemed to facilitate functional play. These findings support the importance of the outdoor environment in providing children more opportunities for interacting with peers, rather than with adults.

It is noteworthy that the children were more likely to engage in the most complex forms of peer play (i.e., interactive dramatic play) outdoors than indoors. The videotapes revealed that the preschoolers engaged in more self-oriented social pretend play outdoors, although the classrooms tended to offer more teacher-provided dramatic play materials and equipment. The playground tended to have play items that imposed less structure on the children's play, such as a play house, trees, and a jungle gym, while the classrooms tended to have equipment that was more suggestive of specific play activities, such as trucks, dolls, and a housekeeping area. The less structured equipment may encourage children to engage in more social interaction with peers in social pretend play (e.g., Berk & Winsler, 1995; Hartle, 1996; Petrakos & Howe, 1996). Shin (1994) indicated that on the outdoor playground children felt freer to explore the world around them and to transform the real world into a fantasy world.

The analyses of the child care centers showed that the children in one center were more likely to be involved in interactive dramatic play outdoors than in the classroom, whereas the children at another center were more likely to be engaged in parallel functional play. This may be attributed to the classroom environment. For example, the children who did not have dramatic play materials or equipment in the classroom were more likely to engage in dramatic play on the outdoor playground. Also, the children at another center restricted by reduced space and increased noise level in the classroom may feel free to act physically (e.g., jumping, wrestling, rolling over) on the playground. These results support previous findings showing that the overall quality of the child care environment influences children's social competence and adjustment (e.g., Holloway & Reichart-Erickson, 1988; Phillips, McCartney, & Scarr, 1987). It is inferred that the differences in peer play between the child care programs are related to the quality of the classroom environment.

Caution needs to be taken regarding the transferability of the findings. The child care programs in this study used only one playground for all children enrolled, without partitioned areas. While this is a typical occurrence in many child care centers, it may have confounded the effects of child, age group, and environmental setting. For example, children's play behaviors in the classroom were observed in same-age settings, whereas on the outdoor playground they were in mixed-age settings. Also, the teachers had only one age group in the classroom, whereas on the playground there might have been other age groups present. Despite the mixed-age outdoor settings, however, the videotapes revealed that the preschoolers tended to mingle with their classmates. Future research is needed to examine children's peer interactions in same-age and mixed-age outdoor settings.

Care needs to be exercised in interpreting the results of those statistical interactions that were significant in these models, particularly regarding the role of centers. When such center-related significant statistical interactions occur, it may be problematic to interpret the main effect that occurred previous to the statistical interaction. For example, the solitary functional setting x age effect might have been accounted for by the setting x age x child care (A) effect. Such a situation would suggest that there may be an idiosyncratic set of events occurring in the center that caused the difference to appear. This may create

difficulties with interpreting model results for solitary functional play and interactive dramatic play.

This study investigated only three child care programs—six classrooms and their related playgrounds; the settings were of low quality. Research including more child care centers representing a broader range of child care quality is needed to examine the extent of differences between classroom and playground settings for facilitating children's peer interactions. In addition, the present study had a large number of center effects due to age differences; for example, the youngest age group in center A was younger than in the two other centers. Future research also should include a larger number of centers with comparable age groups to illuminate this confounding factor. Finally, future studies need to examine how teachers' preparation is associated with children's peer interactions and program quality.

It should be noted that a multimethod, multisource, and multisetting information assessment approach was used in the present study to obtain a more comprehensive understanding of young children's peer interactions (e.g., Achenbach et al., 1987; Brown et al., 1996). The advantage of a multisetting assessment of young children's interactions with peers is the breadth of information and the multiple perspectives available for analysis. Detailed examination of peer interactions allows researchers to understand better the variables that explain any obtained similarities and differences in children's responses (e.g., different play behaviors, or different peer interactions in various settings, or with different people) (see Brown et al., 1996). Second, the present study used a wireless transmission and an observational coding system to apply analytic strategies for observational data collected in the classroom and playground settings. Small microphones and lightweight transmitters provided rich verbal records of preschoolers' play and peer interactions. These technical advances eased the use of videotaping to obtain behavioral samples, especially in these naturalistic classroom and playground settings (Asher & Gabriel, 1993). Finally, this study considered the contextual features of each setting (indoor and outdoor) by measuring the independent quality of the indoor and outdoor play environments for children. It would be prudent for further investigators to avoid potential confounds by considering the contextual features of the environment in which their data is collected.

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Appendix

Children's Play Behavior Across Setting, Age Group, and Child Care Center

	Setting		Age Group		Child Care Center		
Play Behavior	Indoor	Outdoor	2/3 years	4/5 years	Center A	Center B	Center C
Solitary-functional Play	55 (40.4%)	81 (59.6%)	87 (64.0%)	49 (36.0%)	51 (37.5%)	53 (39.0%)	32 (23.5%)
Parallel-functional Play	49 (29.0%)	120 (71.0%)	99 (58.6%)	70 (41.4%)	63 (37.3%)	57 (33.7%)	49 (29.0%)
Interactive-functional Play	151 (47.8%)	165 (52.2%)	163 (51.6%)	153 (48.4%)	110 (34.8%)	110 (34.8%)	96 (30.4%)
Solitary-constructive Play	42 (95.5%)	2 (4.5%)	25 (56.8%)	9 (43.2%)	16 (36.4%)	20 (45.5%)	8 (18.2%)
Parallel-constructive Play	84 (87.5%)	12 (12.5%)	39 (40.6%)	57 (59.4%)	32 (33.3%)	32 (33.3%)	32 (33.3%)
Interactive-constructive Play	71 (78.9%)	19 (21.1%)	33 (36.7%)	57 (63.3%)	23 (25.6%)	31 (34.4%)	36 (40.0%)
Solitary-dramatic Play	3 (18.8%)	13 (81.3%)	11 (68.8%)	5 (31.3%)	4 (25.0%)	6 (37.5%)	6 (37.5%)
Parallel-dramatic Play	5 (50.0%)	5 (50.0%)	6 (60.0%)	4 (40.0%)	1 (10.0%)	4 (40.0%)	5 (50.0%)
Interactive-dramatic Play	39 (43.8%)	50 (56.2%)	39 (43.8%)	50 (56.2%)	28 (31.5%)	30 (33.7%)	31 (34.8%)