The Contribution of Motor Skills and Playfulness to the Play Performance of Preschoolers

Christine Doyle Morrison, Anita C. Bundy, Anne G. Fisher

Key Words: arthritis, juvenile rheumatoid • motor control • motor skills

Consideration of a child's motor proficiency, intrinsic motivation, internal locus of control, and freedom to suspend many of the constraints of objective reality were proposed to provide a more comprehensive assessment of play than would an assessment of play performance alone. For empirical validation of this conceptual model of play, 29 subjects (15 nondisabled children and 14 children with juvenile rheumatoid arthritis) between the ages of 4 years 6 months and 6 years 6 months were given four assessments: (a) the Preschool Play Scale (Bledsoe & Shepherd, 1982; Knox, 1974); (b) the Bruinink–Oseretsky Test of Motor Proficiency (Bruininks, 1978); (c) the Preschool and Primary Internal–External Locus of Control Scale (Novicki & Duke, 1974); and (d) tests of associative fluency (Wallach & Koogan, 1965; Ward, 1968).

Multiple regression procedures revealed that, when considered together, scores on the Bruininks–Oseretsky Test of Motor Proficiency, tests of associative fluency, and the Preschool and Primary Internal–External Locus of Control Scale predicted scores on the Preschool Play Scale, thereby supporting the usefulness of the proposed theoretical model. Further, there was no significant difference in the mean scores of the two groups on the Preschool Play Scale. Although this finding may be an artifact of the small sample size, it also may support the authors' belief that children with motor impairments are able to compensate for their limitations by developing areas of relative strength that allow them to play normally. When this belief was further tested with Pearson product-moment correlations and Fisher's z transformations, it was found that correlations between the test scores of the nondisabled children were not significantly different from those of the children with juvenile rheumatoid arthritis. Clearly, further research is needed.

Play is a complex phenomenon (Reilly, 1974). Occupational therapists (cf. Bundy, 1987, in press; Kielhofner, 1985; Pratt, 1989) consider play to be the primary occupation of children and have suggested that a child's play may be affected by many kinds of dysfunction. Given the importance of play to the development and health of children, however, relatively few occupational therapy researchers or theorists have examined play while simultaneously examining the skills, abilities, and traits thought to underlie play.

Bundy (1987) examined the relationship between motor performance and play skills in pre-school-age boys both with and without sensory integrative dysfunction. Although she found that the scores on a test of motor proficiency explained a statistically significant proportion of the variance associated with scores on the Preschool Play Scale (Bledsoe & Shepherd, 1982; Knox, 1974), the correlation coefficients were reasonably low and explained less than 20% of the variance. Bundy noted, how-

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ever, that although many of the boys with sensory integrative dysfunction scored within normal limits on the Preschool Play Scale, they often appeared to be less playful than the nondysfunctional boys. She suggested that the investigation of playfulness might prove to be a fruitful area for further research.

The purpose of the present study was to examine the relative contributions of playfulness and motor proficiency to the play performance of young children. Playfulness, however, is not a construct that is easily defined. Although Lieberman (1977) defined playfulness as manifest joy and developed an assessment tool to measure it, her instrument has not been shown to be psychometrically sound. Further, Csikszentmihalyi (1965) observed that those characteristics might also be traits of children, which could then be measured and related to play performance. We found the most comprehensive definition of play in the writings of Neumann, an educator:

Play is a transaction between an individual and the environment that is internally controlled, intrinsically motivated and free from many of the constraints of objective reality. Since it is not always possible (or desirable) for individuals (a) to be in complete control of their environments, (b) to fully determine their own reality, or (c) to be in the presence of the objects or playmates that might be the most intrinsically motivating at any given moment in time, play transactions are considered to represent a continuum of behaviors that are more or less playful depending on the degree to which the criteria are present. (as cited by Bundy, in press)

Internal locus of control, the ability to suspend reality, and intrinsic motivation are important criteria for determining whether a specific transaction is play. The feeling of control over the environment, the ability to be creative and imaginative (i.e., to suspend reality), and the intrinsic desire to interact with people and objects in the environment are also traits of children (Kooij & Vrijhof, 1981). An imaginative or creative child who appears to be in control of his or her own actions and who is motivated by the transactions generated through those actions may be more likely to enter into playful episodes. The more playful child, in turn, may be a more capable player, that is, he or she may exhibit more mature play skills.

On the basis of Neumann's (1971) and Kooij and Vrijhof's (1981) work, we defined playfulness as the combination of a child's feeling of control over the environment, internal motivation, and ability to be creative or imaginative. Further, we found that widely accepted assessment tools, previously found to be valid and reliable, exist to measure children's locus of control and their ability to suspend reality.

The Preschool and Primary Internal-External Locus of Control Scale (Nowicki & Duke, 1974) is a measure of a child's tendency to feel externally controlled. Nowicki and Duke established acceptable test-retest reliability ($r = .79$) and concurrent validity using the Nowicki-Strickland Internal-External Control Scale (Nowicki & Strickland, 1975), a version of the scale for older children ($r = .78$). Further, Rodriguez (1989) found preliminary evidence for a relationship between children's locus of control, as measured by the Nowicki-Strickland Internal-External Control Scale, and scores on the Play History (Behnke & Fetkovich, 1984; Takata, 1974).

When a child's ability to suspend reality is evaluated, measures of associative fluency are used commonly. Associative fluency, which is the ability to rapidly generate words or thoughts with a specific meaning, is thought by many authors to reflect creativity. Wallach and Koogan (1965) established acceptable internal consistency on their associative fluency measures using the split-half method; they obtained correlation coefficients of $r = .75$ and $r = .93$ on the two associative fluency measures used in the present study (Instances and Alternate Uses subtests, respectively). Ward (1968) established that scores on his revised measures of associative fluency did not correlate significantly with verbal receptive language, as measured by the Peabody Picture Vocabulary Test (Dunn & Dunn, 1981). Further, Dantsky and Silverman (1973, 1975) and Lieberman (1977) found that associative fluency is related to the play skills of preschoolers.

Intrinsic motivation, as compared with locus of control and the ability to suspend reality, is more difficult to assess. Smith, Takhar, Gore, and Vollstedt (1985) found the construct of intrinsic motivation to be poorly correlated with actions defined as play, because intrinsic motivation is a trait of many activities of young children, not just of play activities. Further, these authors hypothesized that because young children often play with other children, they may respond more to the social demands placed on them than to their own intrinsic motivations for play.

We therefore defined playfulness as a child's ability to suspend reality and his or her feeling of control over the environment. Intrinsic motivation was not directly measured. Instead, we addressed intrinsic motivation by providing the children with (a) playthings typically thought to be motivating to preschoolers (e.g., blocks, cars, dolls, dishes, puzzles), (b) playmates, and (c) a context thought to support play (i.e., a safe and friendly environment; minimally intrusive adults; freedom to choose what to do; and scheduling that reduced the chances that the children would be tired, hungry, or ill) (Rubin, Fein, & Vandenberg, 1983).

Using this definition of playfulness, we explored the relationship between children's playfulness, motor proficiency, and play performance. Specifically, we examined whether playfulness and motor proficiency would predict the play performance of a group of nondisabled preschoolers and preschoolers with juvenile rheumatoid arthritis. We tested the following regression model:

$$\text{Play performance} = \beta_1(\text{motor performance}) + \beta_2(\text{ability to suspend reality}) + \beta_3(\text{locus of control})$$
We proposed that play performance might be predicted by a regression model, but we also believed that it is not necessary for all children to have exactly the same level of motor proficiency, tendency to be internally controlled, and ability to suspend reality in order to play normally. The results of a study by Clifford and Bundy (1989) formed the basis for our belief.

The same two groups of boys involved in Bundy's (1987, 1989) studies comprised the population for Clifford and Bundy's (1989) study. In addition to motor proficiency and play skill, the play preferences of all of the boys were evaluated. Although toys that support sensorimotor play were most often selected as the subjects' first choice, many of the boys with sensory integrative dysfunction had adapted their play preferences to reflect their skills, that is, approximately 35% of the boys with sensory integrative dysfunction did not prefer toys that support sensorimotor play over other types of toys, as did 80% of their nondysfunctional peers. Instead, these boys expressed a preference for toys that support imaginative (symbolic) or constructional play. The results of the study suggested that the content of a child's play may be strongly influenced by his or her unique combination of strengths and weaknesses.

Children may compensate for areas of relative weakness by developing skills that reflect their relative strengths. Thus, when these children engage in play transactions, the scale is tilted sufficiently for their transactions with the environment to be playful. We examined this belief in two ways. First, we tested whether the mean scores of the two groups of children differed on the Preschool Play Scale. Second, we compared correlation coefficients obtained between the scores of the two groups on the Preschool Play Scale, the Preschool and Primary Internal–External Locus of Control Scale, tests of associative fluency (Wallach & Koogan, 1965; Ward, 1968), and the Bruininks–Oseretsky Test of Motor Proficiency (Bruininks, 1978).

Children both with and without juvenile rheumatoid arthritis were chosen as subjects for this exploratory study. Children with juvenile rheumatoid arthritis have known motor deficits (i.e., decreased cognition, perception, or sensation) without also having complications that result from central nervous system damage or dysfunction. We assumed that their inclusion in a study of children who are of a fairly homogeneous age would provide us with the needed variability in our motor data to demonstrate a relationship between motor proficiency and play performance, if such a relationship existed.

Further, the activities of children with juvenile rheumatoid arthritis are often monitored closely by parents and physicians and may even be performed cautiously by the children themselves because of the pain associated with movement. Thus, many children with juvenile rheumatoid arthritis may feel more externally controlled than do their nondisabled peers.

Because children with juvenile rheumatoid arthritis usually have normal intellectual skills, they may be able to compensate for their decreased ability to play motorically by developing their imaginative abilities. Thus, they may have an above-average ability to suspend reality (associative fluency) and might engage in more imaginative play than do their nondisabled peers.

We believed that the relative contributions of the elements of playfulness and motor skills to play performance would differ between the two groups of subjects and that the play performance scores of both groups might well be within normal limits. Specifically, we tested the following hypotheses:

1. When considered together, scores on the Bruininks–Oseretsky Test of Motor Proficiency, tests of associative fluency (ability to suspend reality), and the Preschool and Primary Internal–External Locus of Control Scale would predict the overall play performance of a group of preschoolers both with and without juvenile rheumatoid arthritis.
2. The mean scores of the two groups would not differ significantly on the Preschool Play Scale.
3. The relationships among play performance and scores on the Bruininks–Oseretsky Test of Motor Proficiency, tests of associative fluency, and the Preschool and Primary Internal–External Locus of Control Scale for the children with juvenile rheumatoid arthritis would differ significantly from those for the nondisabled children.

Method

Subjects

The subjects for this investigation were 15 nondisabled children and 14 children with juvenile rheumatoid arthritis; the subjects ranged in age from 4 years 6 months to 6 years 6 months. The mean age of the children with juvenile rheumatoid arthritis was 5 years 9 months (SD = 8 months; range = 4 years 9 months to 6 years 4 months). The mean age of the nondisabled children was 5 years 7 months (SD = 6 months; range = 4 years 10 months to 6 years). Of the 14 children with juvenile rheumatoid arthritis, 2 had upper extremity involvement only; 6 had lower extremity involvement only; and 6 had both upper and lower extremity involvement. All of the children were free from neurological impairment and gross visual or hearing impairments, and all volunteered to participate in the study. Further, all of the subjects were of middle socioeconomic status. The groups also were equivalent for receptive vocabulary, based on the scores of the Peabody Picture Vocabulary Test (range for nondisabled children = 79 to 134; for children with juvenile rheumatoid arthritis, 82 to 138); the mean score on this test is 100 (SD = 15).
The children with juvenile rheumatoid arthritis were tested during clinic or therapy visits at one of three midwest rheumatology clinics. The nondisabled children were tested while attending one of two Chicago-area preschools.

**Instrumentation**

All of the children were assessed with the Preschool Play Scale, the Bruininks–Oseretsky Test of Motor Proficiency, the Preschool and Primary Internal–External Locus of Control Scale, and tests of associative fluency. All tests, except for portions of the Bruininks–Oseretsky Test of Motor Proficiency for 6 children, were administered by the first author.

The Preschool Play Scale involved the first author's naturalistic observation of the children's free play. The Preschool Play Scale was administered to only one child at a time; although more than one child was present in the play environment. While recording the behavior of the child, the observer was silent. The Preschool Play Scale yields an overall play-age score (in months) derived from an averaging of the child's scores from four dimensions of play (Space Management, Material Management, Imitation, and Participation).

The Bruininks–Oseretsky Test of Motor Proficiency was used to assess the children's motor proficiency. From this test, a total score representing overall motor proficiency as well as composite scores of the Gross Motor and Fine Motor subtests were obtained. The test was administered in accordance with the standardized testing procedures specified in the manual.

The Preschool and Primary Internal–External Locus of Control Scale yielded a score of the total number of responses reflecting external control. The assessment entailed the subjects' looking at cartoons of two children talking and answering yes or no to the statements made by one child in the cartoon. The test was administered with the use of the recommended materials and instructions in a quiet, distraction-free environment. Because norms are not available for this test, the scores of the children with juvenile rheumatoid arthritis were compared with those of the nondisabled children.

Associative fluency was measured with two assessments developed by Wallach and Koogan (1965) and revised by Ward (1968). One test, Alternate Uses, required that the children provide as many uses as possible for common objects (e.g., string). The second test, Instances, required that the children name as many objects as they could that possessed a characteristic named by the examiner (e.g., round, moves on wheels). The two assessments were combined and together yielded a fluency score. Because norms were not available for this test, the scores of the children with juvenile rheumatoid arthritis were compared with those of the nondisabled children.

**Procedure**

Once parental consent was obtained, the Bruininks–Oseretsky Test of Motor Proficiency, the tests of associative fluency, the Preschool and Primary Internal–External Locus of Control Scale, and the Preschool Play Scale were administered in one to four sessions, depending on each child's availability; no more than 14 days lapsed between the first and last sessions. During the sessions, the children were given choices among gross motor, fine motor, and verbal items to increase their motivation, cooperation, and attention levels and to vary the order of tests. Total testing time was approximately 2 hr per child.

The Preschool Play Scale was administered in two 15-min observations. One observation was done in an indoor play area equipped with standard preschool toys that encouraged various types of play (i.e., pretend, construction). The other observation occurred either in an outdoor playground or an indoor gym equipped with a slide, a trapeze, a fire pole, stairs, and monkey bars.

**Results**

Because this was an exploratory study with a small sample size, we set the significance level at $p \leq .10$ to reduce the risk of a Type II error (Stevens, 1986). To test the hypothesis that, when considered together, the scores on the Bruininks–Oseretsky Test of Motor Proficiency, tests of associative fluency, and the Preschool and Primary Internal–External Locus of Control Scale would predict the play performance of the total group of children, we first tested the scores from the three tests for both groups using Pearson product-moment correlations for possible multicollinearity problems. Because no correlation coefficient exceeded $r = .25$, scores from the three measures were forced into a multiple regression (Stevens, 1986). The results were statistically significant ($R = .48, p = .079$). Thus, the hypothesis and the theoretical model were supported. For the tests of associative fluency, $\beta = .18$; Preschool and Primary Internal–External Locus of Control Scale, $\beta = .24$; and Bruininks–Oseretsky Test of Motor Proficiency, $\beta = .42$.

Univariate $F$ tests revealed that the mean scores of the two groups were not significantly different on the Preschool Play Scale ($F = 2.6, p = .12$). Thus, Hypothesis 2 was also supported. However, although the mean scores of the two groups did not differ significantly on the Preschool Play Scale, the difference between the means approached statistical significance. Thus, with a larger sample size, the mean scores of the two groups might differ. Further, contrary to our expectations, the mean scores of the two groups did not differ significantly on the Preschool and Primary Internal–External Locus of Control Scale ($F = 1.39; p = .25$), the tests of associative fluency ($F = .00; p = .98$), the Fine Motor subtest of the Bruininks–Oseretsky Test of Motor Proficiency ($F = .07; p = .80$), and the Composite score of the Bruininks–Oseretsky Test of Motor Proficiency ($F = 1.39; p = .25$).
.80), or the total score on the Bruininks–Oseretsky Test of Motor Proficiency ($F = 2.19; p = .15$). The two groups' mean scores were significantly different on the Gross Motor subtest of the Bruininks–Oseretsky Test of Motor Proficiency ($F = 4.45; p = .04$) (see Table 1). As with the Preschool Play Scale, the difference between the mean scores of the two groups approached statistical significance for the Preschool and Primary Internal–External Locus of Control Scale and the total score on the Bruininks–Oseretsky Test of Motor Proficiency. Thus, the failure to find differences between the two groups on these measures is likely to be a result of the small sample size.

To test the hypothesis that the relationship between play performance and scores on the Bruininks–Oseretsky Test of Motor Proficiency, the tests of associative fluency, and the Preschool and Primary Internal–External Locus of Control Scale would be significantly different for the children with juvenile rheumatoid arthritis than for the non-disabled children, we calculated several Pearson product-moment correlations and performed Fisher's $Z$ transformations. The results indicated that there was no significant difference between the two groups, which did not support Hypothesis 3.

To investigate any relationships between specific aspects of play and of motor performance, locus of control, and creativity, we calculated several partial correlations between scores of the four dimensions of the Preschool Play Scale (Space Management, Material Management, Imitation, and Participation) and the Bruininks–Oseretsky Test of Motor Proficiency, the Preschool and Primary Internal–External Locus of Control Scale, and the tests of associative fluency. Correlations were performed separately for the children with juvenile rheumatoid arthritis and the non-disabled children. Several correlations were significant ($p < .10$). For associative fluency, the non-disabled group showed a correlation of .59 on the Material Management dimension. For the Fine Motor subtest of the Bruininks–Oseretsky Test of Motor Proficiency, the nondisabled group showed a correlation of .91 on the Material Management dimension. For the Gross Motor subtest of the Bruininks–Oseretsky Test of Motor Proficiency, the nondisabled group showed a correlation of .54 on the Participation dimension and the group with juvenile rheumatoid arthritis showed a correlation of .45 on the Preschool Play Scale. For the Gross Motor subtest of the Bruininks–Oseretsky Test of Motor Proficiency, the non-disabled group showed a correlation of .53 on the Participation dimension and the group with juvenile rheumatoid arthritis showed a correlation of .49 on the Space Management dimension.

**Discussion**

Our first hypothesis, that the combination of scores on measures of locus of control, motor proficiency, and the ability to think creatively would predict play performance, was supported. This suggests that our conceptual framework for defining playfulness and for combining playfulness with motor proficiency to describe play in young children warrants further study. It should be noted, however, that although the results were statistically significant, 75% of the variance in play remained unexplained by our model. Because so much of the variance in play performance could not be explained by our model, both the model and the assessments that we employed to examine it may require revision.

Further, because we tested this model with such a small sample, the weights of the regression coefficients obtained may change when this model is tested on a larger sample. Thus, although locus of control, associative fluency, and motor proficiency all contribute to the prediction of play performance, further research is needed to address the stability of the strength of their contributions.

We suggested in our model that to obtain a more comprehensive assessment of play in young children than could be provided by the assessment of play performance alone, one could combine a measure of motor proficiency

<table>
<thead>
<tr>
<th>Table 1</th>
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<tr>
<td><strong>Comparative Test Scores for the Control and Juvenile Rheumatoid Arthritis (JRA) Groups</strong></td>
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<tr>
<th>Test</th>
<th>Group</th>
<th>M</th>
<th>SD</th>
<th>Range</th>
<th>F</th>
<th>p</th>
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<tr>
<td>Preschool Play Scale (Bledsoe &amp; Shepherd, 1982, Knox, 1974)</td>
<td>Control</td>
<td>62.1</td>
<td>5.8</td>
<td>52 to 71</td>
<td>2.60</td>
<td>.12</td>
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<td>JRA</td>
<td>58.1</td>
<td>7.4</td>
<td>46 to 72</td>
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<td>Bruininks–Oseretsky Test of Motor Proficiency (Bruininkes, 1978)</td>
<td>Control</td>
<td>55.7</td>
<td>14.2</td>
<td>30 to 74</td>
<td>2.19</td>
<td>.15</td>
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<tr>
<td>JRA</td>
<td>48.1</td>
<td>13.4</td>
<td>21 to 63</td>
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<td>Bruininks–Oseretsky Test of Motor Proficiency (Gross Motor)</td>
<td>Control</td>
<td>60.3</td>
<td>15.9</td>
<td>33 to 80</td>
<td>4.45</td>
<td>.04</td>
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<tr>
<td>JRA</td>
<td>49.2</td>
<td>14.5</td>
<td>23 to 71</td>
<td></td>
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<tr>
<td>Bruininks–Oseretsky Test of Motor Proficiency (Fine Motor)</td>
<td>Control</td>
<td>48.1</td>
<td>11.4</td>
<td>31 to 66</td>
<td>0.07</td>
<td>.80</td>
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<tr>
<td>JRA</td>
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<td>9.3</td>
<td>34 to 67</td>
<td></td>
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<tr>
<td>Preschool and Primary Internal–External Locus of Control Scale (Nowicki &amp; Duke, 1974)</td>
<td>Control</td>
<td>12.3</td>
<td>2.4</td>
<td>9 to 17</td>
<td>1.39</td>
<td>.25</td>
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<tr>
<td>JRA</td>
<td>13.5</td>
<td>2.2</td>
<td>8 to 17</td>
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<tr>
<td>Associative fluency</td>
<td>Control</td>
<td>35.5</td>
<td>15.3</td>
<td>20 to 70</td>
<td>0.00</td>
<td>.98</td>
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<tr>
<td>JRA</td>
<td>35.6</td>
<td>10.1</td>
<td>20 to 60</td>
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*Note: Control group, $n = 15$; JRA group, $n = 14$.*
with measures reflecting playfulness. Although motor proficiency explained only a small percentage of the variance in play, it was the greatest single contributor to play age in both the present study and Bundy's (1987) study. Thus, motor proficiency is an important contributor to preschoolers' play and should be included as a variable in further explorations of play.

We operationally defined playfulness as the performance on tests of associative fluency and locus of control. Intrinsic motivation, the third criteria of play in Bundy's (in press) definition, was not measured directly. In retrospect, we believe that we might have measured an aspect of intrinsic motivation by measuring the children's play preferences. A tool such as the Preschool Play Materials Preference Inventory (Wolfgang & Phelps, 1983), which was used in the Clifford and Bundy (1989) study, might have provided us with further insights into this aspect of play. The operational definition of playfulness would then have included all three criteria. By broadening this definition in future studies, we anticipate that a greater percentage of the variance in play will be explained. Thus, the following adapted model is suggested for further study:

$$\text{Play} = \beta_1[\text{relevant underlying skills (cognition, perception, motor skills)]} + \beta_2[\text{locus of control}] + \beta_3[\text{associative fluency}] + \beta_4[\text{play preference}]$$

Clearly, additional variables may have to be added to our theoretical model to explain a greater percentage of the variance associated with the play performance of preschoolers. Smith et al. (1985) tested a conceptual model in which they were able to discriminate successfully between play and non-play transactions by observing for (a) positive affect, (b) non-linearity, (c) means rather than ends-centered activity, and (d) flexibility. Adding one or more of these variables to our theoretical model might enable researchers to explain a higher percentage of the variance associated with play performance.

As we predicted in our conceptual model, the mean scores of the nondisabled children and of the children with juvenile rheumatoid arthritis in this study did not differ on the Preschool Play Scale. Although this finding may have been an artifact of the small sample size, it is similar to Bundy's (1987, 1989) findings. Although Bundy found that the boys with sensory integrative dysfunction had significantly lower mean scores on the Preschool Play Scale than did the nondysfunctional boys, many of the subjects with sensory integrative dysfunction did not demonstrate deficits in play performance. The results of both this study and Bundy's (1987, 1989) studies, when considered together, suggest that minor dysfunction does not always result in play deficits. Clearly, some children with disabilities can compensate for areas of dysfunction and play normally.

Our related hypothesis, that the patterns of statistically significant correlations for the nondisabled children would differ from those of the children with juvenile rheumatoid arthritis, originated from the results of Clifford and Bundy's (1989) study in which they found that many children with sensory integrative dysfunction adapt their play preferences to reflect their own strengths and weaknesses. Although we were unable to demonstrate that particular traits associated with playfulness make a differential contribution to play performance, we believe that play is a complex phenomenon. Thus, we examined the relationships between the dimension scores of the Preschool Play Scale and the measures of locus of control, motor proficiency, and associative fluency. We found that the pattern of statistically significant correlations differed for the two groups. These differences, however, are not easily interpretable. For the nondisabled children, motor play and also Interest, Purpose, Attention, Management, and Consistency (which are measured by the Material Management subtest of the Preschool Play Scale) were significantly related to associative fluency and to an external locus of control. Social play was also related to motor skill. For the children with juvenile rheumatoid arthritis, however, the strongest associations were between play and motor skill.

We believe that limitations with our measurement tools and methods affected our results negatively. Our conceptual model may describe play better than our statistical analyses demonstrate. In anticipation of additional research in this area, we will describe our concerns with the measures and our methodological difficulties in some detail. Thus, future researchers may be able to contribute to the development of better measures and may avoid some of the pitfalls we faced.

Although the Preschool Play Scale was an adequate assessment of play and has been found to be sensitive to minor motor dysfunction (Bundy, 1987, 1989; Clifford & Bundy, 1989), the environments in which we administered it to the children with juvenile rheumatoid arthritis may have affected our results negatively. We had difficulty recruiting children with juvenile rheumatoid arthritis between the ages of 4 years 6 months and 6 years 6 months and had to gather subjects from a wide geographic area. We were therefore unable to observe these children in their usual play environments. Although we attempted to provide the children with an environment that would encourage their play, the clinical environment in which many were tested was unfamiliar to them.

Because children typically explore unfamiliar environments before engaging in play, the subjects with juvenile rheumatoid arthritis may have been exploring the toys rather than actually playing with them in the short time allowed for the observations (Ceci, Gray, Thornburg, & Ipsa, 1985). We also question whether their level of social play (as measured by the Participation dimension) during the observations was indicative of their true abilities, because they were not observed playing with children they knew. Despite all of these limitations, however, the two groups of children did not differ in their mean Preschool Play Scale scores, thus supporting the
concept that children may compensate for areas of relative weakness by developing play in other areas and maintaining play skills within normal limits.

Besides difficulties encountered with the Preschool Play Scale, we encountered difficulties with other measures. By incorporating the following changes into the assessments of locus of control and associative fluency, we expect that further delineation of these aspects of playfulness will be possible.

The Preschool and Primary Internal–External Locus of Control Scale provided a measure of the child's tendency toward an external locus of control. Given the tendency for all preschoolers to be relatively externally controlled and our small sample size, subtle differences between the groups may not have been measured by the Preschool and Primary Internal–External Locus of Control Scale; that is, it is likely that the power to find statistical differences between the mean score of the two groups was too low to find any existing differences. Other difficulties were observed as well. Although the test was written for preschoolers, many of the questions were difficult for the children to understand (e.g., "When another child wants to be your enemy, is there anything you can do to make him or her like you?" "When you do something wrong, is there little you can do to make it right again?"). Additionally, the cartoons intended to increase the children's interest are the same throughout the test and maintained most children's interest for only three or four questions.

Finally, the Preschool and Primary Internal–External Locus of Control Scale contains no questions specific to play. We therefore recommend that a new locus of control assessment be developed that contains questions more readily understood by this age group and that includes questions specific to play.

Concerns with the tests of associative fluency also require discussion. Dansky and Silverman (1973) found that children who played just before taking the tests of associative fluency had significantly higher scores than did children who had not played immediately before testing. In the present study, the nondisabled children were tested while attending preschool, often after free play. In contrast, the children with juvenile rheumatoid arthritis were tested during visits to rheumatology clinics, when they had not been playing. The possibility of an interaction between the prior play opportunities and scores on the tests of associative fluency, therefore, cannot be discounted. The nondisabled children in this study may have been in a situation that heightened their performance on the tests of associative fluency, whereas the children with juvenile rheumatoid arthritis may have been in a situation that diminished their performance.

That the two groups of children had equivalent mean scores on the measures of associative fluency raises a question as to whether their imaginative ability is equivalent. Perhaps if the children with juvenile rheumatoid arthritis had been measured following play, they might have been found to be more creative than the nondisabled children. Further, the tests of associative fluency were administered in various environments (i.e., playroom, physician's examining room, gym, teachers' lounge). Wallach and Koogan (1965) observed that the more creative child uses cues from the environment when involved in associative fluency tasks. Children in the present study also tended to name items present in the room. We therefore suggest that, in future investigations, researchers control the environment in which the associative fluency tests are administered.

Despite our questions and speculations, it is important to note that our results indicate that there was virtually no difference between the two groups on the associative fluency measures ($F = 0.00; p = .98$). Thus, if differences in the ability to suspend reality do exist between the two groups, it may be necessary to measure this trait in another way.

Although the Gross Motor subtest of the Bruininks-Oseretsky Test of Motor Proficiency differentiated between children with juvenile rheumatoid arthritis and their nondisabled peers, the Fine Motor subtest did not do so. Qualitative differences were noted, however, between the performance of the two groups of children. Although the subtle fine motor deficits observed in the children in this study did not appear to affect their overall play skills, one cannot assume that accurate assessment of fine motor skills is unimportant in play. The gross motor nature of preschoolers' play may mean that overall play performance is not affected much by fine motor performance. However, the same deficits may lead to dysfunction in older children when manipulative abilities become a more prominent part of play. We therefore recommend that a test of in-hand manipulation, or a comparable test, be used to assess the more qualitative components of fine motor function, particularly with older children.

**Summary and Conclusion**

This exploratory study provided much useful information for further study in the area of play and pediatric occupational therapy. The proposed model, which combined measures of motor proficiency with suggested measures of playfulness, was supported. We recommend that the model be expanded and that the assessments used to measure the constructs be adapted. In this way, we anticipate that a battery of tools to assess play skills in children with disabilities will become available for clinicians.

The results of this exploratory study suggest that measures of motor proficiency, locus of control, and associative fluency may provide therapists with important information about a child's playfulness and relative play performance. Given the small sample size and the exploratory nature of this study, however, we make this
suggestion somewhat cautiously. Replication of this study with a larger sample size and a broader population of children with disabilities is necessary before any definitive statements can be made. The development of valid, reliable, and sensitive tools that would more accurately assess locus of control and fine motor performance in preschoolers is important before this study is replicated. Finally, we suggest that measures of play preference and of other important variables (e.g., flexibility) be incorporated into future studies that use our conceptual model.

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