Levels of Gross and Fine Motor Development in Young Children with Autism Spectrum Disorder

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ABSTRACT. The purpose of this study was to compare levels of gross motor (GM) and fine motor (FM) development in young children with autism spectrum disorder (ASD), and to compare their levels of GM and FM development with children with developmental delay (DD) without ASD. Thirty-eight children (ASD group: n = 19; DD group: n = 19) between 21 and 41 months of age were assessed using the Peabody Developmental Motor Scales, Second Edition (PDMS-2). Using PDMS-2 classifications as well as differences between standard scores, each child was placed in one of three motor profiles based on the child’s relative levels of GM and FM skills (GM = FM, GM > FM, and GM < FM). The results showed that

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most of the children with ASD had generally similar levels of GM and FM
development. The motor profiles of children with ASD were analogous
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KEYWORDS. Autism, autism spectrum disorder, early childhood,
developmental delay, motor delay, motor development

Autism is the fastest-growing developmental disability (Autism
Society, 2005) and increasing numbers of young children with autism
spectrum disorder (ASD) are being seen in early intervention and early
childhood programs. Federal legislation, including the recent Individu-
als with Disabilities Education Improvement Act of 2004 (Public Law
108-446, 2004), has promoted the work of physical and occupational
therapists in early intervention and early childhood programs, where
therapists are frequently called on to perform evaluation and treatment
of these young children. Therapy services for young children with ASD
may serve several important purposes, including identification of de-
lays or disorders in development, to plan intervention activities, and to
monitor their progress (Quinn & Gordon, 2003).

To provide optimal services, pediatric therapists need to be aware of
the sensory issues and motor differences commonly found in young
children with ASD. Most therapists are aware of the sensory issues in
children with ASD, which have been well-described in the literature,
including differences in their auditory, visual, tactile, movement, and oral
sensory processing (Ayres & Tickle, 1980; Baranek, 2002; Dawson &
Watling, 2000; Dunn, Myles, & Orr, 2002; Kientz & Dunn, 1997;
Watling, Deitz, & White, 2001). Therapists, however, may be less
aware of motor function of children with ASD including implications
for motor control (Mari, Castiello, Marks, Marraffa, & Prior, 2003), be-
havior (Leary & Hill, 1996), diagnosis (Teitelbaum, Teitelbaum, Nye,
Fryman, & Maurer, 1998) and intervention (Baranek, 2002).

Early research found differences in gait in children with autism com-
pared with normal children (Vilensky, Damasio, & Maurer, 1981). More recent studies have provided evidence that children with Asperger’s
Syndrome (AS), which is on the autism spectrum, and high functioning
autism have delays or disorders in gross and fine motor skill development,
including locomotor and object control (Berkeley, Zittel, Pitney, & Nichols, 2001); manual dexterity, ball skills, and balance (Manjiviona & Prior, 1995; Green et al., 2002; Miyahara et al., 1997); and graphomotor skills (Mayes & Calhoun, 2003). Research has also found differences related to motor control and motor planning, such as in reach to grasp tasks that included movement execution and planning (Mari et al., 2003), bimanual load-lifting differences (Schmitz, Martineau, Barthelem, & Assaiante, 2003), and motor imitation (Rogers, Hepburn, Stackhouse, & Wehner, 2003; Stone, Ousley, & Littleford, 1997; Rogers, Bennetto, McEvoy, & Pennington, 1996). In general, the studies showed that 50-73% of children with ASD in various study populations had significant motor delays compared with normative data (Berkeley et al., 2001; Manjiviona & Prior, 1995; Mari et al., 2003; Mayes & Calhoun, 2003). Although most research has involved school-aged children with ASD, a recent study has shown that motor development in young children with ASD is also not typical on standardized testing (Provost, Lopez, & Heimerl, 2006). All of the young children with ASD in the study’s sample showed some degree of motor dysfunction, and, astoundingly, at least 60% of the young children with ASD qualified for early intervention services based on their motor delays alone.

Overall scores on standardized tests of motor functioning for young children with ASD provide important information for therapists about children’s delays and need for services. However, total motor scores alone do not provide information about a child’s proficiency in individual skill areas. Comparison of gross motor (GM; including locomotion and ball-playing abilities) and fine motor (FM; including visual-motor integration and object manipulation) development of children with ASD can provide important information about areas of strength during the childhood years. Research on assessment of developmental discrepancies in various areas of motor skills as well as on motor differences of children with ASD compared with other children with developmental concerns has been inconclusive. For example, Miyahara et al. (1997) assessed subtest performance in older children, and found that school-aged children with AS had better manual dexterity and poorer ball skills than children with learning disabilities. However, Green et al. (2002) compared the motor skills of school-aged children with AS to those of children with motor problems, and reported similar motor incoordination in both groups.

Comparison of levels of GM and FM development in young children with ASD can provide clinically relevant information to therapists and other service providers. If more advanced levels of skills are common in
either the GM or the FM areas for a young child with ASD, then these advanced skills may be especially useful to build on in intervention, including incorporation of social engagement activities with these preferred skills. If particular motor skills tend to be more delayed, then these skills may be especially important to include in program planning to optimize the child’s development. If a child is showing equal levels of development in all motor areas, however, this knowledge may lead to program planning with equivalent emphasis on all of the motor areas. In addition, if a specific motor profile, whether of even development or discrepant skill development, is found to be commonly present in children with ASD, then knowledge of that profile may lead therapists to more effective intervention. The therapist would anticipate that a young child with ASD on their caseload may most likely exhibit that pattern which, if confirmed, could lead to earlier treatment.

The purpose of this study was to compare levels of GM development to levels of FM development in young children with ASD using a standardized assessment, and to assess whether the relative levels of GM versus FM skills were different or similar to those of children with developmental delay (DD). For this study, motor profile is the term used to describe the relative levels between the GM and FM skills or subtests, with three profiles (equal to, greater than, and less than) possible for a child. The questions for this study were:

1. Do young children with ASD show differences in levels of GM and FM development, as measured on the PDMS-2, including differences in levels of development of locomotion, object manipulation (ball-playing) or hand-use skills related to visual-motor integration?

2. How do motor profiles of the relative levels of GM versus FM skills of young children with ASD compare with those of young children with DD when children are matched for chronological age, gender, and mental developmental age?

**METHOD**

**Participants**

Infants and children referred for a comprehensive interdisciplinary assessment at a University Center for Excellence in Developmental Disabilities (UCEDD) were recruited to participate in this study. The
families of these children sought services from the Early Childhood Evaluation Program at the UCEDD because the children were at risk for delay or had an established DD, and many of the children had complex neurodevelopmental problems with unspecified diagnoses. The interdisciplinary team that saw each child was composed of a physical therapist who assessed the GM and FM development and sensory processing abilities, a cognitive specialist (such as a clinical psychologist or an educational specialist) who assessed cognitive, adaptive and social/emotional development, a speech language pathologist who assessed speech and language development, and a pediatrician who conducted a comprehensive medical history and examination. Standardized testing was routinely done to identify developmental levels and assess the quality of the child’s skills across developmental domains. The motor assessment routinely included the administration of the Peabody Developmental Motor Scales, 2nd edition (PDMS-2; Folio & Fewell, 2000).

This exploratory study was part of a larger research project, and was approved by the University’s School of Medicine’s Human Research Review Committee. On the day of the evaluation, each child’s parent or legal guardian was informed about the study and signed the consent to participate form.

A total of thirty-eight children participated in this aspect of the study, and they were divided into two groups: Children with ASD (ASD group, \( n = 19 \)), and children without ASD who had DD including motor delay (DD group, \( n = 19 \)). The children in the ASD group consisted of those children who had undergone team evaluations during the research period and who had received a diagnosis of autism \( (n = 18) \) or PDD-NOS \( (n = 1) \) according to the criteria outlined in the *Diagnostic and Statistical Manual of Mental Disorders—Fourth Edition* (DSM-IV; American Psychiatric Association, 1994) based on the results of the interdisciplinary team evaluations. The children in the DD group consisted of those children who had undergone team evaluations during the research period and who had DD including motor delays, and who met the criteria for matching to the children in the ASD group on gender, chronological age within 3 months, and cognitive abilities based on mental age equivalent within 3 months using the Mental Scale of the Bayley Scales of Infant Development, 2nd edition (BSID II; Bayley, 1993). All of the children in the DD group had a primary condition of mixed developmental disorder, and eleven of the children also had medical conditions such as congenital anomalies/malformations (4 children), unspecified brain anomalies/injuries (2 children), disorder of visual cortex (1 child), diabetes (2 children), and chromosome abnormalities other
than Down Syndrome (2 children). Participant characteristics are presented in Table 1. Thirty boys (15 in the ASD group, 15 in the DD group) and eight girls (4 in the ASD group, 4 in the DD group) participated. The ages of the children ranged from 21 to 41 months ($M = 30.1$ months, $SD = 4.5$). An independent sample $t$-test indicated no significant difference in age between the groups, $t (36) = .47$, $p = .65$ (ASD group $M = 30.4$ months, $SD = 4.6$; DD group $M = 29.7$ months, $SD = 4.4$). In addition to being matched on mental age equivalents, the ASD group and the DD group did not differ on cognitive abilities based on BSID II Mental Development Index (MDI) standard scores (ASD group $M = 54.9$, $SD = 11.1$; DD group $M = 57.4$, $SD = 10.5$), $t (36) = -.69$, $p = .50$.

**Procedures**

One of two experienced physical therapists administered the PDMS-2 to each participating child as part of his/her interdisciplinary developmental evaluation. Both of the pediatric physical therapists involved in this study had over twenty-five years experience in conducting developmental testing of young children. Inter-rater reliability of item scoring was established between the two therapists on six children. Three children were videotaped and then scored from the videotape by both researchers. Three children were tested and scored in the clinic setting by one researcher while being observed and scored at the same time by the other researcher. Inter-rater reliability of the subtest standard scores was excellent using the intra-class correlation coefficient, $ICC (2, 1) = .98$. Because the authors felt it was also important that the items themselves were scored reliability, the percentages of exact item score

<table>
<thead>
<tr>
<th>TABLE 1. Characteristics of Participants</th>
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<tbody>
<tr>
<td><strong>Autism Spectrum Disorder</strong></td>
</tr>
<tr>
<td>Number of participants</td>
</tr>
<tr>
<td>Number of boys</td>
</tr>
<tr>
<td>Number of girls</td>
</tr>
<tr>
<td>Mean age in months ($SD$)</td>
</tr>
<tr>
<td>Mean BSID II MDI * ($SD$)</td>
</tr>
</tbody>
</table>

BSID II MDI = Bayley Scales of Infant Development II Mental Development Index.
agreement were also calculated. Inter-rater agreement for the item scores on the six children averaged 91% for the PDMS-2 (range of 85-98%).

Instruments

*Peabody Developmental Motor Scales-2nd Edition (PDMS-2).* The PDMS was revised to become the PDMS-2 in 2000. The normative sample was 2,003 children (Folio & Fewell, 2000). The PDMS-2 consist of six subtests: Reflexes (for children birth through 11 months), stationary (ability to sustain control of body within its center of gravity), locomotion (ability to move from one place to another), object manipulation (ability to manipulate balls, for children 12 months and older), grasping (ability to use hands), and visual-motor integration (ability to use visual perceptual skills to perform complex eye-hand coordination tasks). Raw scores on the PDMS-2 are converted to age equivalent scores, percentiles, and standard scores for each of the subtests. Scores are also converted to percentile rank and composite standard scores called FM, GM and Total Motor Quotients. The reflexes or object manipulation, stationary and locomotion subtests contribute to the GM Quotient, while the grasping and visual-motor integration subtests contribute to the FM Quotient. The Total Motor Quotient is determined by combining the results of the GM and FM composites. Although the PDMS-2 has a mean motor quotient standard score of 100 and standard deviation of 15, it categorizes GM and FM composite performance primarily based on 10-point increments (rather than the 15-point standard deviation increments), into classifications with descriptions of very superior, superior, above average, average, below average, poor, and very poor. The PDMS-2 has a mean subtest standard score of 10 and SD of 3, and it classifies subtest performance in the same named descriptions, although with 2-5 point increments for each description.

Data Analysis

In order to examine whether the young children showed differences in levels of development of GM versus FM skills as measured on the PDMS-2, each child was placed into one of three profiles related to his/her gross and FM skills: (1) GM skills at equal level to FM skills (GM = FM); (2) GM skills at discrepantly higher level than FM skills (GM > FM); and (3) GM skills at discrepantly lower level than FM skills (GM < FM). Two different methods of GM versus FM comparison
were used: PDMS-2 classifications, and the difference score between the GM Quotient and the FM Quotient.

The authors of the PDMS-2 have developed the following ordinal-level classifications: Very superior (motor quotient of ≥130), superior (motor quotient of 120-129), above average (motor quotient of 110-119), average (motor quotient of 90-109), below average (motor quotient of 80-89), poor (motor quotient of 70-79), and very poor (motor quotient of ≤69). In this study, children’s classifications ranged from average to very poor, and a child was placed in the GM = FM profile if he or she had the same classifications for GM and FM quotients. In addition, the PDMS-2 manual states that a difference of 8 points between the GM Quotient and the FM Quotient is considered a significant difference score. In this study, therefore, a child was placed in the GM = FM profile if he or she had a difference of less than 8 points between the GM Quotient and the FM Quotient, and a child with a difference of 8 points or more between the quotients was placed in the appropriate discrepant profile.

Each child was also placed in one of three profiles related to the PDMS-2 subtests of locomotion (Loc), object manipulation (Obj), and visual-motor integration (VMI): (1) each of the three subtest skills at equal level to the other subtest skills (Loc = VMI; Loc = Obj; Obj = VMI), (2) each of the three subtest skills at discrepantly higher level than the other subtest skills (Loc > VMI; Loc > Obj; Obj > VMI), and (3) each of the three subtest skills at discrepantly lower level than the other subtest skills (Loc < VMI; Loc < Obj; Obj < VMI). Two different measures were also used to assess the relative skills in the subtest areas: PDMS-2 classifications (the range in this study included average, below average, poor, and very poor), and difference scores, differences between subtest standard scores. In the PDMS-2 manual, a difference of 2 points is considered a significant difference between these particular subtests standard scores. A child was placed in the Loc = VMI, Loc = Obj, or Obj = VMI profile if he or she had a difference of less than 2 points between the relevant subtest standard scores, while a child with a difference of 2 points or more between the standard scores was placed in the appropriate discrepant profile. The PDMS-2 subtests of stationary and grasping were not individually analyzed because of the small number of items in these subtests for the sample age group in this study. The Stationary subtest had only 2 items in the 14 to 41-month age range, and the grasping subtest had only 1 item in the 17 to 41-month age range.
In order to examine whether the relative levels of GM versus FM skills of young children with ASD differed from those of young children with DD, the numbers of children with ASD in each of the above profiles were compared with the numbers of children with DD in each of the profiles. To determine differences in the motor profiles by the two groups of children, a Chi-Square analysis ($\chi^2$) was performed in each of the areas: GM versus FM Skills, Loc versus VMI, Loc versus Obj, and Obj versus VMI. The effect size index ($w$) was calculated post hoc for each analysis (Portney & Watkins, 2000) to assess the strength of the association irrespective of sample size.

RESULTS

The distribution of children with ASD and children with DD among the three motor profiles are presented in Tables 2-5. When profiles were based on classifications (average, below average, poor, and very poor), more children (from >1 child to >7 children in either group on the various comparisons) had a discrepant profile than when difference scores were used as the comparison method. The scores of the children with ASD on the PDMS-2 are reported elsewhere (Provost et al., 2006).

Chi-Square analysis indicated that the profiles of PDMS-2 GM and FM Quotients did not differ between the children with ASD and children with DD based on classification [$\chi^2 (2, 38) = 2.66, p = .27$] or difference score [$\chi^2 (2, 38) = 2.15, p = .34$]. The profiles for the PDMS-2 subtests also did not differ between the two groups: Loc and VMI [classification: $\chi^2 (2, 38) = .69, p = .71$; difference score: $\chi^2 (2, 38) = .19, p = .91$]; Loc and Obj [classification: $\chi^2 (2, 38) = 4.54, p = .10$; difference scores not reported].

**TABLE 2.** Comparison of Peabody GM and FM Quotient Classification (Average, Below Average, Poor, and Very Poor) and Difference Scores (8 Points) Between Children with Autism Spectrum Disorder (ASD) and Developmental Delay (DD)

<table>
<thead>
<tr>
<th>Classifications</th>
<th>GM = FM</th>
<th>GM &gt; FM</th>
<th>GM &lt; FM</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASD</td>
<td>12</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>DD</td>
<td>7</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>Difference Scores</td>
<td>ASD</td>
<td>13</td>
<td>2</td>
</tr>
<tr>
<td>DD</td>
<td>14</td>
<td>0</td>
<td>5</td>
</tr>
</tbody>
</table>
TABLE 3. Comparison of Peabody Locomotion (Loc) and Visual-Motor Integration (VMI) Subtest Classification (Average, Below Average, Poor, and Very Poor) and Difference Scores (2 Points) of Children with Autism Spectrum Disorder (ASD) and Developmental Delay (DD)

<table>
<thead>
<tr>
<th>Classifications</th>
<th>Loc = VMI</th>
<th>Loc &gt; VMI</th>
<th>Loc &lt; VMI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASD</td>
<td>7</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>DD</td>
<td>7</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Difference Scores</td>
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</tr>
<tr>
<td>ASD</td>
<td>11</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>DD</td>
<td>12</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

TABLE 4. Comparison of Peabody Locomotion (Loc) and Object Manipulation (Obj) Subtest Classification (Average, Below Average, Poor, and Very Poor) and Difference Scores (2 Points) of Children with Autism Spectrum Disorder (ASD) and Developmental Delay (DD)

<table>
<thead>
<tr>
<th>Classifications</th>
<th>Loc = Obj</th>
<th>Loc &gt; Obj</th>
<th>Loc &lt; Obj</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASD</td>
<td>7</td>
<td>6</td>
<td>6</td>
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<tr>
<td>DD</td>
<td>11</td>
<td>1</td>
<td>7</td>
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<td>Difference Scores</td>
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<td>DD</td>
<td>13</td>
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</table>

TABLE 5. Comparison of Peabody Object Manipulation (Obj) and Visual-Motor Integration (VMI) Subtest Classification (Average, Below Average, Poor, and Very Poor) and Difference Scores (2 Points) of Children with Autism Spectrum Disorder (ASD) and Developmental Delay (DD)

<table>
<thead>
<tr>
<th>Classifications</th>
<th>Obj = VMI</th>
<th>Obj &gt; VMI</th>
<th>Obj &lt; VMI</th>
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<tbody>
<tr>
<td>ASD</td>
<td>11</td>
<td>4</td>
<td>4</td>
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<tr>
<td>DD</td>
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<td>Difference Scores</td>
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<td>DD</td>
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<td>1</td>
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</table>
score: $\chi^2 (2, 38) = 1.15, p = .56$, or Obj and VMI [classification: $\chi^2 (2, 38) = .59, p = .74$; difference score $\chi^2 (2, 38) = 1.50, p = .47$]. Most of the effect sizes were small, ranging from .07 to .35, with all but one less than .27. A medium effect size of .35 and a power of approximately 49% were found for the Loc versus Obj classification.

**DISCUSSION**

The results of this exploratory study showed that the relative levels of development of gross and FM skills varied in the children with ASD, with the children falling into all three motor profiles (GM = FM, GM > FM, and GM < FM). However, for about two-thirds of the sample (12-13 children) with ASD, the levels of GM and FM development did not differ. Although this equal skill profile was predominant, it is important to also recognize that approximately a third of the children had discrepant levels of development in motor skills. About a quarter of the sample (4-5 children) had FM skills that were more advanced than GM skills, and approximately 10% of the sample (2 children) with ASD showed GM skills more advanced than FM skills.

Assessment of the subtest relationships also showed that the relative levels of development of particular motor skills such as locomotion (ability to move around the environment), object manipulation (ball-playing skills), and visual-motor integration (eye-hand coordination) varied in the children with ASD. However, similar to the GM and FM skill comparisons, the profile that showed an equal level of development between the subtest skills had the highest number of children of any of the three profiles. The difference scores showed most children with ASD in the sample developing at similar levels in their locomotion versus visual-motor integration skills (57.9%), in their locomotion skills versus object manipulation skills (63.2%), and in their object manipulation versus visual-motor integration skills (68.4%). On the other hand, at least three children (15.8% of the sample) with ASD fit into each of the three different profiles portraying the relative development of the various subtests measured.

Clinically it is important for therapists to note that somewhat different profiles were obtained for the children when using the two diverse methods of classifications versus difference scores, especially in the subtest comparisons. When the method compared the PDMS-2 classification levels of the skills or subtests, more children (by at least 1 child and up to 5 children with ASD) had discrepant profiles than when difference scores
were used as the comparison method. Therefore, physical and occupational therapists, those who clinically use a child’s PDMS-2 classifications in particular motor subtests, may see discrepant levels of motor development in a greater number of young children with ASD. However, if therapists choose to compare levels of GM and FM development to emphasize areas of strengths and weaknesses for a child, the authors strongly encourage therapists to use difference scores, which have a sounder measurement foundation. Therapists need to be aware that specific differences (e.g., difference scores of ≥2 points) between the subtest standard scores may be more indicative of a truly significant discrepancy in subtest skills than are classification comparisons, since classification cut-offs can be based on only a 1 point difference.

The result that similar levels of development in GM and FM skills were present in the majority of children with ASD in this sample is consistent with the clinical observation of increasing complexity in both GM and FM skills during the preschool years. Many items on standardized testing for young children in both GM and FM areas require aspects of motor planning (e.g., throwing and kicking a ball, stringing beads) and motor imitation (imitating walking on a line, standing on one foot, imitating crayon strokes, and block designs). The comparable level motor profile is consistent with the idea that a common underlying difficulty with motor planning and imitation, often present in children with ASD (Rogers et al., 2003; Stone et al., 1997; Rogers et al., 1996), may be affecting both fine and GM skills.

**Comparison of the Motor Profiles of Children with ASD and Children with DD**

The motor profiles of the young children with ASD were similar to the motor profiles of the young children with DD when the children were matched for chronological age, gender, and mental developmental age. This study supports the work of Green et al. (2002), who felt that motor impairments were not distinctive in their group of older children with ASD. Although older children with ASD (Miyahara et al., 1997) had poorer ball skills and better manual dexterity than children with learning disabilities, these differences were not noted in the younger children with ASD in our study. The majority of children in both groups in our study showed comparable development in the related areas of object manipulation and visual-motor integration, and children in both groups showed discrepancies in either direction between the two areas.
An important aspect of this research may be the matching of the two groups of children not just on chronological age and gender but also on mental developmental age. Mental developmental age is related to many aspects of development, including motor development. Although the children with ASD have additional difficulties in their social interaction and social communication abilities, young children with ASD and young children with DDs may have similar issues in other biopsychosocial factors that affect their mental, and also motor, development.

**Limitations of This Study**

The PDMS-2 reports evidence of a high degree of reliability (Folio & Fewell, 2000) for all ages within their normative sample, including the ages of the children in this study. However, there is little published research on the reliability of PDMS-2 motor testing with young children with autism, and children with ASD are often difficult to test because they may not comply with directives. In spite of possible difficulty, clinical testing of motor performance is still mandated for young children who are in early intervention services, including those children with ASD, and any variations in performance for the children in this sample most likely also represent variances in performance of many young children with ASD who are seen clinically. Because the UCEDD Early Childhood Evaluation Program serves all populations of the state, including urban as well as rural families (interdisciplinary teams travel throughout the state) and families from all socioeconomic levels (families are not billed for the services), it is likely that the sample of children in this study is a representative sample of young children with ASD in the state. However, the sample of 19 children with ASD in this study is relatively small, and the unique characteristics of the children in the sample may have a marked influence on the distribution across the three motor profiles. Furthermore, although no significant differences were found between the groups for the motor profiles, the medium effect size and a power of approximately 49% that was observed for the loc versus Obj classifications suggest that a larger sample size would be required to confirm the lack of differences between these groups. To achieve 80% power (a reasonable protection against Type II error) with alpha = .05, a sample of approximately 84 subjects would be needed. Therefore, because of these issues, the results of this study should be considered exploratory, and further research needs to be done with larger samples of children.
Clinical Implications

The general implications of this exploratory research for pediatric physical and occupational therapists are that the majority of young children with ASD in this sample demonstrated comparable developmental levels, including similar delays, in not only their overall GM and FM skills, but also in specific areas of locomotion, object manipulation, and visual-motor integration skills. If this sample is representative, therapists might consider planning interventions earlier and more effectively for young children with ASD by encompassing aspects of both GM and FM areas into their service plans. A common misconception that most children with ASD have relative strengths in their GM skills is not supported by this study. However, since this study also showed that a variety of motor profiles existed among the children with ASD in the sample, the authors also emphasize that pediatric therapists continue to individualize treatment to a particular child’s strengths and challenges.

CONCLUSION

All three motor profiles pertaining to relative levels of development of the various areas of GM and FM skill development were seen in the young children with ASD in this sample. This research, however, showed that the majority of the young children with ASD had generally similar levels of their GM and FM development during the preschool years. In addition, the motor profiles of the young children with ASD were analogous to those of the young children in this sample with DD who did not have ASD.

REFERENCES


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