The Standing Long Jump Performances of Preschool Children With Speech Impairments and Children With Normal Speech

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This study was undertaken to investigate quantitative and qualitative differences in the standing long jump as performed by preschool children with speech impairments and those with normal speech. The subjects were 15 children with speech impairments and 15 children with normal speech, 3 to 5 years of age. The qualitative movement components of the standing long jump were measured with the Developmental Sequence of the Standing Long Jump (Van Sant, 1983). Subjects were videotaped while performing the standing long jump, and each jump was rated according to the Developmental Sequence. The quantitative variable of distance jumped was also measured. The analysis of data revealed no significant differences between the mean distance scores of the speech-impaired and normal-speech groups. However, data analysis did reveal a significant difference between the mean movement component rating scores of the two groups.

Over the last decade, federal legislation has been enacted that requires states to implement an early intervention system for children from birth to age 5 with disabilities. The Preschool Program (Section 619 of Part B) of the Individuals with Disabilities Education Act (IDEA) requires states to provide educational services for all eligible preschoolers (ages 3 to 5) with disabilities (Public Law 101-476, 1990).

IDEA has abandoned categorical labeling (e.g., learning disabled, emotionally disturbed) of preschoolers so eligible children can be identified noncategorically. However, within the total population of children with disabilities, many will have speech or language disorders (Ysseldyke & Algozzine, 1990).

Fein (1983), in a review of prevalence studies, concluded that speech impairments serious enough to warrant special attention are present in approximately 4.2% of school-age children, or between 2 and 3 million children. During

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the 1987–88 school year, a total of 946,904 children received special education services due to speech/language disorders (Ysseldyke & Algozzine, 1990). This equaled 23% of the total number of children with disabilities receiving special education services.

This study focused on preschool children with speech impairments. A widely used definition states that ‘‘speech is abnormal when it deviates so far from the speech of other people that it calls attention to itself, interferes with communication or causes the speaker or his listeners to be distressed’’ (Van Riper & Emerick, 1984, p. 34). The three classifications of speech disorders are articulation, voice, and fluency.

Speech disorders are often manifested in conjunction with other disabilities. Because speech is dependent on neurological and motor development, any neurological or motor problem might impair the ability to speak and also might impair social development, which is highly related to the emergence of language (Hallahan & Kauffman, 1991). This speculation can be further explored through the dynamical systems (Thelen, Kelso, & Fogel, 1987) or Bernsteinian (Berstein, 1967) framework currently employed in motor development. This approach sees movement as the ‘‘final common pathway’’ for the accomplishment of goals or tasks including speech and social behaviors (Thelen, 1989). Movement is seen as ‘‘emerging from the confluence and interaction of many developing components (perceptual, affective, attentional, motivational, postural, and anatomic) within a particular context’’ (Thelen, 1986, p. 1498). Lack of development in any component would limit the rate of development of the emergent movement. This rate limitation might then appear within all tasks (speech, social behaviors, the performance of motor skills) that make use of the common pathway of movement. This would lead to the prediction that children with speech disorders might also display difficulties in the performance of motor skills.

Several studies (Bilto, 1941; Cermak, Ward, & Ward, 1986; Jenkins & Lohr, 1964; McLoughlin & Gullo, 1982; Prins, 1962) have found that children with speech/language disorders do not perform as well on motor coordination tests when compared to children with normal speech. Results of other studies (Bishop, 1992; Carroll, Fuller, & Lindley, 1989) have indicated that children with articulation problems do not perform as well on visual–motor skills. Neuro-anatomical research has started to address cerebral control of speech and limb movements and the association between spoken language and manual dexterity (Hammond, 1990). Levine (1985) has suggested that articulation deficits are more clearly related to fine-motor planning than gross-motor planning.

This study was undertaken to further investigate the influence of speech impairments on a gross motor skill. In keeping with current trends in the study of motor development (Rarick, 1982), a process-oriented approach that included observation of individual body segments and their contributions to the overall movement was used. Specifically, preschool children with speech impairments and those with normal speech were compared on performances of the standing long jump. This skill was selected for its early age of acquisition, generally by 3 years of age (Bayley, 1935), and because of the availability of an accepted developmental sequence (Roberton & Halverson, 1984; Thomas, 1984; Van Sant, 1983). It was hoped that the investigation and observation of differences within the actual organization of the jump might provide a more in-depth understanding of how children differ in their performances of this skill.
Methods

Subjects

For this study, 30 preschool children, 15 who were children with speech impairments (12 boys and 3 girls) and 15 who had normal speech (10 boys and 5 girls), were selected from the same private school. Parents of all preschool children in the school were sent letters requesting permission for their children to participate in the study. The first 30 children (15 with speech impairments, 15 with normal speech) for whom permission was received became subjects in the study. Subjects for this study were designated as speech impaired and eligible for speech therapy by the Committee on Preschool Special Education of the school district where they resided at the time of this study. Subjects were not reported to have other disabilities. Five subjects at each of three age levels were selected for both groups. Means and standard deviations for each age level are presented in Table 1. An independent t test indicated no significant difference in mean age for the two groups.

Instrument

The arm, leg, and trunk actions in the standing long jump were evaluated by use of the Developmental Sequence of the Standing Long Jump as developed by Van Sant (1983). Several nationally recognized experts in motor development have recommended Van Sant’s Developmental Sequence for study of the standing long jump (Roberton & Halverson, 1984; Thomas, 1984). This instrument examines six components of the standing long jump grouped according to arm, leg, and trunk actions on the takeoff, and a flight and landing portion of the movement. Investigators evaluate each component by determining at which level a child performs the specific component of the skill. Two components have four levels, and one component has five levels. Possible scores range from 6 (all six components performed at the lowest developmental level) to 23 (all six components performed at the highest developmental level).

Distance covered by the jump was also measured. A 60-in. (152.4-cm) tape measure was used to measure (to the nearest 1/2 in., or 1.27 cm) the distance

Table 1

Means and Standard Deviations for Ages Across Groups

<table>
<thead>
<tr>
<th>Age group</th>
<th>Speech impaired M</th>
<th>Speech impaired SD</th>
<th>Normal speech M</th>
<th>Normal speech SD</th>
<th>Overall M</th>
<th>Overall SD</th>
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<td>5</td>
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<td>.33</td>
<td>5.40</td>
<td>.24</td>
<td>5.27</td>
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<tr>
<td>Overall</td>
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<td>.78</td>
<td>4.41</td>
<td>.89</td>
<td>4.41</td>
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</table>
from the starting line to that part of the body that was closest to the line at the
termination of the jump.

Procedure

Each subject was tested individually. A physical demonstration of the standing
long jump was provided by the examiner prior to testing, which was conducted
indoors on a mat. Subjects were instructed to place their toes on the starting line
and jump as far forward as possible. Each subject performed three trials of the
jump. An 8-mm video camcorder was used to record the side view of the subject
during each of the three trials. Distance jumped was measured at the termination
of each trial. All 30 subjects were tested over a period of 3 days.

Four physical therapists, each with at least 10 years of experience working
with preschool children, volunteered to participate as raters for this study. Prior
to testing for this study, all raters attended a 2-hr training session in the use of
the Developmental Sequence of the Standing Long Jump. After training, each
rater viewed the performance videos and individually rated the three trials for
each subject. A mean across the three trials was calculated, resulting in four
scores (a mean from each rater) for each child.

Results

Fifteen children with speech impairments and fifteen children with normal speech
were evaluated by four raters on the developmental level of their standing long
jump. Correlations between raters’ scores are presented in Table 2.

A 2 x 3 x 4 (Speech Group x Age x Rater) repeated-measures ANOVA
was used to analyze the raters’ scores. Significant main effects were found for
the group factor, \( F(1, 24) = 7.95, p<.05 \), with the normal-speech group receiving
significantly higher scores (\( M = 15.5, SD = 3.8 \)) than the speech-impaired group
(\( M = 11.6, SD = 3.8 \)). No significant differences were found for age or raters
nor were any of the interactions significant.

A second analysis that used a 2 x 3 (Speech Group x Age) ANOVA
evaluated distance covered by the jump. Although no significant differences were
found between the speech groups, significant main effects were noted for the

| Table 2 |
|---|---|---|---|
| Inter-rater Reliability Coefficients |

<table>
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<th>Rater</th>
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</table>
Figure 1 — Mean distances jumped for 3-, 4-, and 5-year-old children with speech impairments and children with normal speech.

age factor, $F(2, 24) = 6.44, p<.05$. Post hoc analysis with the Scheffe test and $p<.05$ found no significant differences between any pairings of the three age means (Figure 1).

**Discussion**

This study was undertaken to investigate quantitative and qualitative differences in the standing long jump performed by preschool children with speech impairments and those with normal speech. Analysis of the quantitative measure of distance jumped indicated no significant difference between means for the two groups. These results tend to negate any concern that the groups differed in their interpretation of the directions to jump forward as far as possible. Additionally, the results of this study dispute the findings of McLoughlin and Gullo’s (1982) study, in which a significant relationship was found between quantitative measures of verbal and motor performance of 3- and 4-year-old children. However, the disparity between the results of the present study and McLoughlin and Gullo’s (1982) study might be explained by Levine’s (1985) suggestion that speech deficits are more closely related to fine-motor planning rather than gross-motor planning. The finding of significant main effects for age supports age-related improvement in quantitative measures of skill performance (Thomas, 1990).

However, lack of significant age differences in qualitative measures of performance indicates that quantitative improvement is not due to increasingly more mature performances of the jump across the three age groups. Combined, these results support the importance of analyzing both qualitative and quantitative
measures in order to better understand the process by which a particular skill performance is accomplished rather than focusing on the quantitative product of the performance.

Results of the present study also indicated that the mean qualitative score for the normal-speech group was significantly higher than the speech-impaired group. Overall, the normal-speech group demonstrated more developmentally mature movement patterns for the standing long jump. A review of the literature on motor performance in children with speech impairments did not reveal any examinations of the qualitative aspects of their motor skills. Current investigation in the motor development literature has shifted away from product or outcome measures and has focused on process or patterns that emerge during the performance of a motor skill.

For example, Clark, Phillips, and Peterson (1989) and Jensen and Phillips (1991), through qualitative analysis, have attempted to identify stability and variation in the organization of children’s and adults’ jumping behaviors across changes in task demands. The qualitative, rather than quantitative, approach allows inferences concerning the nature of control processes involved in the production of movements. Application of this process approach to the study of movement organization by children with normal speech and with speech impairments may yield insights into the relationship between speech and movement control processes. The results of the present study clearly indicate differences in the rate of development of the mature form for the standing long jump.

The results of this study support the need for further investigation of qualitative differences in gross motor skills as performed by children with speech impairments. Early instructional intervention will be facilitated by more detailed information concerning differences and similarities between the motor performances of children with speech impairments and children with normal speech. Additionally, initiation of more process-oriented analysis of motor performance may provide additional direction for the planning of instruction in motor skills for children with speech impairments.

References


