A Comparison of Visual-Perceptual and Visual-Motor Skills Between Palestinian and Israeli Children

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PURPOSE. This pioneer study examines the visual-motor and visual-perceptual performance of Israeli and Palestinian children, and makes comparisons among these respective populations according to age, place of residence, and parental education. In addition, the study evaluates the validity of standardized assessment tools for use with Palestinian children, with the view of establishing a sound assessment battery for this underserved population.

METHODS. Participants included 101 Israeli and 125 Palestinian children from kindergarten, first grade, and second grade who underwent visual-motor and visual-perceptual tests.

RESULTS. Significant differences were found between the two cultural groups in all assessments. Results also refer to grade, place of residence, and parents’ education variables.

CONCLUSIONS. Although culture influences children’s performance, children from different societies should be screened and, when necessary, evaluated and treated in order to enable their optimal functioning at school. The validity of the assessment tools used, expressed in the ability to differentiate between Israeli and Palestinian children, should be further studied in order to suggest that these assessments may be considered as part of an evaluation battery for determining the school readiness and ability to advance in grade level among Palestinian children.


Introduction

Motor disabilities may have implications for children’s school readiness and school success (Marr, Cermak, Cohn, & Henderson, 2003). The basic foundations for the development of motor skills are sensorimotor performance components. The important components of motor function that enable a child’s appropriate functioning in the environment are discrete motor skills (Case-Smith, 1991, 1995; Dunn, 1991). Discrete motor skills enable functions such as holding things and manipulating objects with the hand (Law, Baum, & Dunn, 2000). Discrete motor skills are expressed in visual-motor abilities, which enable to coordinate the visual stimulus with the corresponding motor action (Law et al.). Visual-motor abilities also depend on visual perception, which refers to the cognitive skills used for extracting and organizing visual information from the environment and integrating this information with other sensory modalities, previous experiences, and higher cognitive functions (Scheiman, 1997).

All of the above emphasize that visual-motor abilities are associated with functional activities, such as handwriting, and thus are necessary for succeeding in preacademic and academic settings. Studies show that good visual-motor skill development is a precursor to performing well in kindergarten and early primary grades (Dankert, Davies, & Gavin, 2003), especially due to the fact that elementary school children spend up to 50% of the school day engaged in paper-and-pencil tasks (McHale & Cermak, 1992).

Moreover, visual-motor abilities were found to be the best predictor of handwriting legibility for school-age children. Visual-motor abilities and visual processing are critical to improving the performance of slow handwriters (Tseng & Chow,
well as different concepts of the behaviors and skills that are varying attitudes toward and expectations from the child, as own distinctive pattern of child-learning practices, with the same level across cultures.

Extent to which the test measures the same thing at the lence—the amount of familiarity with the content of the translation is equivalent to the original language; (2) functional equivalence in testing: (1) linguistic equivalence—whether the literal translation is not sufficient (Cermak et al., 1995). Moreover, cross-cultural bias may exist even in assessment was standardized (Teresi, Cross, & Golden, 1989). However, studies indicate that standardized assessment tools may not be valid when they are used to assess persons from a cultural group other than the one on which the assessment was standardized (Teresi, Cross, & Golden, 1989). Moreover, cross-cultural bias may exist even in countries that share a common language. When an assessment is standardized for use with a different cultural group, literal translation is not sufficient (Cermak et al., 1995).

Helms (1992) identified four kinds of cultural equivalence in testing: (1) linguistic equivalence—whether the translation is equivalent to the original language; (2) functional equivalence—test scores that have the same functional meaning in different cultures; (3) conceptual equivalence—the amount of familiarity with the content of the test across cultures; and (4) psychometric equivalence—the extent to which the test measures the same thing at the same level across cultures.

Researchers have demonstrated that each culture has its own distinctive pattern of child-learning practices, with varying attitudes toward and expectations from the child, as well as different concepts of the behaviors and skills that are to be encouraged and developed in the child (Katz, Kizony, et al., 2002; Mardell-Czudnowski, Chien-Hou, & Tiem-Main, 1986; Rosenblum, Katz, Hahn-Markowitz, Mazor-Karsenty, & Parush, 2000; Saeki, Clark, & Azen, 1985; Williams & Williams, 1987). These cultural differences may affect all areas of development: cognitive, gross motor, fine motor, personal-social, and language.

Preacademic performance differences in Israeli and American kindergarten children were investigated in a cross-cultural study by Schneider, Parush, Katz, and Miller (1995). Significant differences were found only on the Foundation Index of the Miller Assessment of Preschoolers (MAP), with Israeli children performing below U.S. norms, as well as on some specific subtests. In another study comparing Ethiopian immigrants, Bedouins, and mainstream Israeli children, Katz, Kizony, and Parush (2002) also found performance differences when assessing visual-motor organi- and thought processes. They found that the Ethiopian and Bedouin groups performed lower than the mainstream Israeli children on most subtests.

Parush, Sharoni, Hahn-Markowitz, and Katz (2000) compared the perceptual, motor, and cognitive performance abilities of Bedouin and mainstream Israeli children according to age group (6–8 and 10–12 years old) and type of residence (rural and town). They found that the mainstream Israeli subjects scored significantly higher than the Bedouins on most variables tested and that older participants performed better than the younger subjects.

Some studies also addressed the relation between chil- dren’s school readiness and parents’ education. Ferguson, Jimerson, and Dalton (2001) examined the effects of family characteristics, school readiness, socialization, and student demographics on academic achievement and behav- ioral adjustment outcomes. Their results demonstrated that academic outcomes are also affected by socioeconomic status and mother’s level of education. Likewise, Ramey-Craig and Landesman (1999) found that educated mothers provide ongoing intellectual stimulation for their children that obviates the need for out-of-home enrichment.

No study comparing the visual-motor and visual-perceptual performance of Israeli and Palestinian children could be found in the literature. This is an important issue because of the fact that due to political and cultural influences, educational programs among Israelis and Palestinians are not equal. Israeli children enter the educational system early, at 3 years of age, whereas Palestinian children enter the system much later, at about 5 or 6. For example, according to the Central Bureau of Statistics in Israel in the year 2000, the number of Israeli kindergarten children was six times higher than the number of Arab kindergarten children.
All of the above elucidate that school entering is a crucial phase for child occupation as a student. Because cultural background may impact academic child’s performance, it is of most importance to evaluate the foundations of learning abilities, in kindergarten years, in order to ensure early intervention and gap closing in specific ethnic groups, especially in those who live in the same geographic area but share different lifestyle, as Israeli and Palestinians.

Although performance varies in children from different cultural backgrounds, little is published in regard to impacts of additional demographic data. Thus, the purpose of this study was to examine differences in the visual-motor and visual-perceptual skills of Palestinian and Israeli children according to age, place of residence, and parents’ education.

It is hypothesized that significant differences in visual-motor and visual-perceptual skills will be found in the following four areas: (1) between the two cultural groups; (2) among the three ages—children in the first grade will perform better than those in kindergarten, and children in the second grade will perform better than those in the first grade; (3) among the different places of residence—no significant differences will be found between children who live in villages and children who live in cities, but children who live in camps will achieve significantly lower scores than those who live in villages or in cities; (4) among children of parents with different educational levels—children of parents with a high school education, including matriculation and above, will achieve significantly higher scores than children of parents with a high school education without matriculation and lower.

Methods

Subjects

Participants were 226 children, including 101 Israeli children from cities and villages and 125 Palestinian children, resident in cities, villages, and camps.

According to available national census data for 1996–1998, refugee camp residents are generally poorer than residents in villages and cities (Central Bureau of Statistics-Israel, 2000). In 1998, although West Bank camp residents constituted about 6% of the total population, 19% lived below the poverty line compared to 16.5% of villagers and 10.4% of urban residents of similar plight. Levels of severe poverty were also higher among camp residents. The census reports that one third of all females (12 years of age and over) in the Jenin camp (33.4%) are illiterate or lack formal schooling, compared to 20.9% of males in the same category. Moreover, illiteracy is prevalent mostly among the older population: only 22% of males and 18.9% of women achieve secondary or higher education (Giacaman & Johnson, 2002). In addition, fertility rates are also higher among refugees when compared to nonrefugee Palestinians, albeit small differences; however they have a significantly higher unemployment rate (Al-Qudsi, 2000).

Written parental agreement and approval from the educational authorities were received prior to carrying out the study. Children with known neurological, developmental, or learning disabilities were excluded from the study. The participants constituted a representative sample corresponding to the 1998 Israeli census. Each cultural group included participants from three different ages: kindergarten, first grade, and second grade. Moreover, the sample for each cultural group was drawn from different places of residence, as demonstrated in Table 1.

Instruments

All subjects were tested with the following assessments:

(1) **Motor-Free Visual Perception Test-Revised (MVPT-R)** (Calaruso & Hammill, 1995). This test is designed to provide a quick and simple evaluation of visual perception, while avoiding motor involvement by the subject. The test assesses visual perception with the following five categories: spatial relationships, visual discrimination, figure-ground, visual-closure, and visual memory. The test is a standardized nonwritten multiple-choice test and is designed for children 4 through 11 years of age.

(2) **Developmental Test of Visual-Motor Integration-4th Revision (VMI)** (Beery & Buktenica, 1997). This is a standardized test designed as a classroom screening instrument for early identification of learning difficulties. It consists of a sequence of 24 geometric forms, graded from simple to complex, and the subjects are asked to copy each form shown in the space provided in the test booklet. The test is designed for subjects 2 through 19 years of age.

<table>
<thead>
<tr>
<th>Table 1. Grade, Gender, and Place of Residence Distribution for Each Cultural Group</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Grades</strong></td>
</tr>
<tr>
<td>Kindergarten</td>
</tr>
<tr>
<td>First grade</td>
</tr>
<tr>
<td>Second grade</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td><strong>Place of residence</strong></td>
</tr>
<tr>
<td>City</td>
</tr>
<tr>
<td>Village</td>
</tr>
<tr>
<td>Camp</td>
</tr>
</tbody>
</table>

The American Journal of Occupational Therapy

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March/April 2006, Volume 60, Number 2

A significant difference was also found when $\eta^2 = 0.000$; ES-Mean = 28.98 and 27.11, respectively). The correlation $r = 0.361$. Multiple comparisons with Scheffe post hoc tests were performed to guard against type I errors. Probabilities below .05 were considered significant.

Results

Motor-Free Visual Perception Test-Revised

Table 2 represents MVPT-R raw scores distribution for each cultural group according to grade, place of residence, and parents’ education.

Cultural Group. In the MVPT-R total raw score comparison between the cultural groups, a significant difference was found, $F(1, 219) = 26.198, p = 0.000$; ES-$\eta^2 = 0.107$. The Israeli children achieved significantly higher scores than the Palestinian children ($M = 28.98$ and 27.11, respectively).

Grade. A significant difference was also found when comparing MVPT-R total raw scores according to grade, $F(1, 219) = 61.799, p = 0.000$; ES-$\eta^2 = 0.361$. Multiple comparisons with Scheffe post hoc tests showed that the MVPT-R total raw score was significantly higher in the first grade than in kindergarten (mean difference = 5.2; $p = 0.000$), as well as significantly higher in the second grade.

<table>
<thead>
<tr>
<th>Residence</th>
<th>Mean (SD) 125</th>
<th>Mean (SD) 101</th>
</tr>
</thead>
<tbody>
<tr>
<td>City</td>
<td>27.40 (5.97)</td>
<td>28.89 (4.03)</td>
</tr>
<tr>
<td>Village</td>
<td>27.63 (6.33)</td>
<td>29.09 (5.46)</td>
</tr>
<tr>
<td>Camp</td>
<td>23.69 (7.09)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parents’ education</th>
<th>Mean (SD) 125</th>
<th>Mean (SD) 101</th>
</tr>
</thead>
<tbody>
<tr>
<td>Father</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basic</td>
<td>25.5 (6.69)</td>
<td>28.75 (5.51)</td>
</tr>
<tr>
<td>High school</td>
<td>28.41 (5.55)</td>
<td>29.01 (4.6)</td>
</tr>
<tr>
<td>Mother</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basic</td>
<td>26.88 (6.74)</td>
<td>27.2 (5.16)</td>
</tr>
<tr>
<td>High school</td>
<td>27.27 (6.01)</td>
<td>29.18 (4.62)</td>
</tr>
</tbody>
</table>

Note. MVPT-R = Motor-Free Visual Perception Test; SD = standard deviation.
than in kindergarten (mean difference = 7.84; \( p = 0.000 \)). In addition, the children in the second grade achieved significantly higher scores than the children in the first grade (mean difference = 2.64; \( p = 0.001 \)).

**Grade–Cultural Group Effect.** When comparing Israeli and Palestinian children, a significant grade–cultural group interaction effect was found, \( F(2, 219) = 5.85, p = 0.003; ES-\eta^2 = 0.051 \). After Bonferroni correction, statistical significance was set at 0.003, meaning the results were not significant in this case. Israeli children in the first grade performed significantly better than the Palestinian children in kindergarten (mean difference = 9.77; \( p = 0.000 \)). Israeli children in the second grade performed significantly better than the Palestinian kindergarteners (mean difference = 11.65; \( p = 0.000 \)) as well as the Palestinian first graders (mean difference = 4.37; \( p = 0.008 \)). After Bonferroni correction, statistical significance was set at 0.003, meaning the results were not significant in this case. In addition, the Israeli children in kindergarten achieved significantly higher scores than the Palestinian children in kindergarten (mean difference = 5.93; \( p = 0.000 \)). Only Palestinians in the second grade achieved significantly higher scores than Israeli kindergarteners (mean difference = –4.85; \( p = 0.000 \)).

The Israeli children in kindergarten achieved significantly lower scores than those in the first grade (mean difference = –3.83; \( p = 0.022 \)). After Bonferroni correction, statistical significance was set at 0.003, meaning the results were not significant in this case. Children in kindergarten achieved significantly lower scores than those in the second grade (mean difference = –5.71; \( p = 0.000 \)). No significant difference was found between Israeli children in the first grade and those in the second grade.

Among the Palestinians, the children in kindergarten performed significantly lower than those in the first grade (mean difference = –7.27; \( p = 0.000 \)) and the second grade (mean difference = –10.79; \( p = 0.000 \)). In addition, Palestinians in the first grade performed significantly lower than Palestinians in the second grade (mean difference = –3.51; \( p = 0.014 \)). After Bonferroni correction, statistical significance was set at 0.003, meaning the results were not significant in this case.

**Residence.** Regarding the performance according to place of residence, comparison of assessment scores was performed on Israeli and Palestinian children from cities and villages only, as there are no Israelis living in camps. No significant differences were found between the performance of the Palestinian and the Israeli children according to place of residence.

When analyzing the performance of children according to place of residence in the different grades for each culture (camps were included for the Palestinians), a significant difference was found in the performance of second-grade Palestinian children from different residence areas (\( p = 0.013 \)) as presented in Table 2a. After Bonferroni correction, statistical significance was set at 0.005, meaning the results were not significant in this case. According to Scheffe post hoc tests, second-grade Palestinian children from the city performed significantly lower than second-grade Palestinian children from the village (mean difference = –2.62; \( p = 0.048 \)). After Bonferroni correction, statistical significance was set at 0.005, meaning the results were not significant in this case. In addition, second-grade Palestinian children from the camps performed significantly lower than their counterparts from the city (mean difference = 3.56; \( p = 0.01 \)). After Bonferroni correction, statistical significance was set at 0.005, meaning the results were not significant in this case. Second-grade Palestinian children from the camps performed significantly lower than those from the village (mean difference = 6.18; \( p = 0.000 \)).

Among the Israeli children, kindergarteners from the city achieved significantly higher scores than those from the village (mean difference = 4.43; \( p = 0.011 \)). After Bonferroni correction, statistical significance was set at 0.005, meaning the results were not significant in this case. Second-grade children from the village achieved significantly higher scores than second-grade children from the city (mean difference = –4.42; \( p = 0.029 \)). After Bonferroni correction, statistical significance was set at 0.005, meaning the results were not significant in this case.

**Parents’ Education.** No significant interaction was found between cultural group and parents’ education. Among Palestinians in kindergarten, first grade, and second grade, no significant difference was found in the performance of children of mothers with different education levels or in the performance of children of fathers with different education levels.

**Developmental Test of Visual-Motor Integration**

Table 3 represents VMI raw scores distribution for each cultural group according to grade, place of residence, and parents’ education.

**Cultural Group.** A significant difference was found in the VMI raw score comparison between the cultural groups \( F(1, 217) = 22.163, p = 0.000; ES-\eta^2 = 0.093 \). The Israeli

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**Table 2a. Motor-Free Visual Perception Test-Revised Raw Scores of Second-Grade Palestinian Children From Different Residence Areas**

<table>
<thead>
<tr>
<th>Residence area</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>City</td>
<td>30.06</td>
<td>3.9</td>
</tr>
<tr>
<td>Village</td>
<td>32.68</td>
<td>3.07</td>
</tr>
<tr>
<td>Camp</td>
<td>26.5</td>
<td>0.71</td>
</tr>
</tbody>
</table>

**Note.** SD = standard deviation.
children achieved significantly higher scores than the Palestinian children ($M = 17.02$ and 15.48, respectively).

**Grade.** A significant difference was also found when comparing VMI raw scores according to grade, $F(2, 217) = 22.892, p = 0.000; \text{ES-} \eta^2 = 0.174$. Multiple comparisons with Scheffe post hoc tests showed that the VMI raw score was significantly higher in the first grade than in kindergarten (mean difference = 2.02; $p = 0.001$), as well as significantly higher in the second grade than in kindergarten (mean difference = 3.06; $p = 0.000$).

**Grade–Cultural Group Effect.** When comparing Israeli and Palestinian children, Scheffe post hoc tests revealed that Israeli children in kindergarten achieved significantly lower scores than Israeli children in the second grade (mean difference = -3.75; $p = 0.002$). Israeli children in the first grade achieved significantly higher scores than the Palestinian children in kindergarten (mean difference = 3.99; $p = 0.001$) as well as significantly higher in the second grade than in kindergarten (mean difference = 5.4; $p = 0.000$).

**Parent's Education.** No significant interaction was found between cultural group and parents' education. Among Palestinians in kindergarten, first grade, and second grade no significant difference was found in the performance of children of mothers with different education levels or in the performance of children of fathers with different education levels.

**Bruininks-Oseretsky**

Table 4 represents Bruininks-Oseretsky item scores distribution for each cultural group according to grade, place of residence, and parents' education.

**Cultural Group.** A significant difference was found in the Bruininks-Oseretsky visual-motor control point score comparison between the cultural groups, $F(1, 219) = 32.421, p = 0.000; \text{ES-} \eta^2 = 0.129$. The Israeli children achieved significantly higher scores than the Palestinian children ($M = 19.69$ and 17.64, respectively).

**Grade.** A significant difference was also found when comparing Bruininks-Oseretsky visual-motor control point scores according to grade, $F(2, 2584.663) = 24.649, p = 0.000; \text{ES-} \eta^2 = 0.184$. Multiple comparisons with Bonferroni post hoc tests showed that the Bruininks-Oseretsky visual-motor control point score was significantly higher in the first grade than in kindergarten (mean difference = -2.66; $p = 0.000$), as well as significantly higher in the second grade than in kindergarten (mean difference = -3.57; $p = 0.000$).
A significant cultural group–grade interaction effect was found, $F(2, 2584.663) = 6.375, p = 0.002; \text{ES-} \eta^2 = 0.055.$ According to multiple comparison Bonferroni post hoc tests, Israeli children in kindergarten, first grade, and second grade achieved significantly higher point scores than the Palestinian kindergarteners (mean difference = 5.04, $p = 0.000$; mean difference = 6.4, $p = 0.000$; mean difference = 7.02, $p = 0.000$, respectively). Among the Palestinians, the kindergarten children achieved significantly lower scores than the children in the first grade (mean difference = $-4.55; p = 0.000$), as well as in the second grade (mean difference = $-5.93; p = 0.000$), Figure 2 represent the means of Bruininks-Oseretsky visual-motor control point scores for each grade in both cultural groups.

**Residence.** No significant differences were found when comparing the Bruininks-Oseretsky visual-motor control point scores between the Palestinian and the Israeli children according to place of residence. However, when analyzing the performance of the children according to place of residence in the different grades for each culture, only one difference was found, namely between second-grade Israeli children who live in the city and those who live in the village. The children from the city achieved significantly lower visual-motor control point scores than the children from the village ($p = 0.015$). After Bonferroni correction, statistical significance was set at 0.005, meaning the results were not significant in this case.

**Parents’ Education.** No significant interaction was found between cultural group and parents’ education. Among Palestinians in kindergarten, first grade, and second grade, no significant difference was found in the performance of children of mothers with different education levels or in the performance of children of fathers with different education levels.

To summarize the results including the Bonferroni correction, a significant cultural effect was obtained for all three tests employed in the study, with Israeli children performing better than Palestinian children (see Table 5). A grade effect was evident for only the MVPT-R test where child performance was significantly enhanced as a function of age. Performance differences according to grade on the VMI and Bruininks-Oseretsky tests were obtained only between kindergarten and school children. A grade–cultural interaction effect was present only on the MVPT-R and Bruininks-Oseretsky test in regard to kindergarten children, where Israelis performed significantly better than Palestinians. Furthermore, these two tests also showed that among Palestinians, kindergarten children performed significantly more poorly than school children. Residence and parent education did not constitute sensitive parameters for differentiating between and within the groups.

**Discussion**

The present study focuses on two neighboring populations living in close proximity, yet differing on many cultural aspects and measures of lifestyle. These differences lead to the emergence of different points of view regarding the respective importance and contribution of the educational system to child development. This is especially marked at the young kindergarten age, given that most Arab children do not enter the educational system before 5 years of age (Central Bureau of Statistics-Israel, 2000). In addition, higher education is more prevalent among Israelis than among the Palestinians (Central Bureau of Statistics-Israel).
These differences may influence children’s school readiness and may have important practical consequences and far-reaching implications.

This study focused on critical factors in school readiness: visual-perceptual and visual-motor function. The study compared visual-perceptual and visual-motor performance of Israeli and Palestinian children according to three assessments: MVPT-R, which evaluates visual perception; and the VMI and Bruininks-Oseretsky Test of Motor Proficiency, which evaluate visual-motor skills. This study also examined whether performance of children from both populations is influenced by age, place of residence, and parents’ educational background. Finally, the validity of the standardized assessment tools used in the current study may be further considered in the establishment of an assessment battery for Palestinian children.

This study’s results supported both the first and second hypotheses, in terms of statistical significance. In order to further evaluate the practical importance of the obtained effects, in line with Rosnow and Rosenthal’s recommendation (2005), calculations of effect sizes were conducted. Both culture and age respectively constituted significant factors that differentiated between Israeli children and Palestinians.

Significant differences in visual-motor skills were found between the two cultural groups, whereby the Israeli children achieved significantly higher scores than the Palestinian children. The few available studies conducted in Israel regarding the impact of cultural background on children’s performance provide support for our findings. In a study of new-immigrant children from Ethiopia (not of children from societies that have resided contiguously for many years), Rosenblum et al. (2000) obtained a similar impact of culture on children’s performance. The former study compared two groups of children 6–8 and 10–12 years of age, using the Bruininks-Oseretsky and the VMI tests, and revealed that the immigrants scored lower than Israeli-born children of the same age. The authors attribute this finding to the lack of emphasis on visual-motor performance in Ethiopia which precludes the development of skills in fine motor problem solving in most children.

Likewise, the delayed entry to kindergarten of many Palestinian children may result in similar impairments in their fine motor problem-solving development. An additional study by Sharoni (1996) compared Jewish Israeli children and Bedouin children from different cultural backgrounds, resident in Israel. Using the same assessment tools, Sharoni found that Bedouin children scored significantly lower than Jewish children on perceptual and cognitive tasks. A study by Parush et al. (2000) augments the above findings. They compared cognitive abilities of children from different cultural contexts: new immigrant children from Ethiopia, Bedouin children (a minority group in Israel), and mainstream Israeli children. Two subtests of the Lowenstein Occupational Therapy Cognitive Assessment (LOTCA) were employed: visuo-motor organization and thinking operations of children. Subjects were children 6–8 and 10–12 years of age, as in the Rosenblum study. Ethiopian and Bedouin children performed significantly more poorly than mainstream Israeli children in both age groups on the visuo-motor organization subtest. A large effect size was obtained (ES-$\eta^2 = 0.46$ for the 6–8-year-old group; ES-$\eta^2 = 0.6$ for the 10–12-year-old group), whereas similar results were obtained for the older group on the thinking operations subtest (ES-$\eta^2 = 0.24$ for the 6–8 year old group; ES-$\eta^2 = 0.37$ for the 10–12-year-old group). The effect size in our study and in the Parush study is in the same line, although different assessment tools were used. No significant differences were evident for 6–8-year-old mainstream Israeli children and Ethiopian children, however their performance was superior to that of the Bedouin group. The overall decreased performance of Ethiopian and Bedouin children may be attributable to environmental variables, such as rural residence and large multigenerational families in which children usually forego preschool kindergarten. The absence of a stimulating environment, coupled with an idiosyncratic lifestyle and deficient schooling may thus impede perceptual, motor, and cognitive development.

Similar cultural characteristics may likewise be applicable to the Palestinian population, thus possibly accounting for our present study results. The centrality of culture as a

<table>
<thead>
<tr>
<th>Cultural group</th>
<th>MVPT-R</th>
<th>VMI</th>
<th>Bruininks-Oseretsky</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade</td>
<td>Israeli &gt; Palestinian</td>
<td>Israeli &gt; Palestinian</td>
<td>Israeli &gt; Palestinian</td>
</tr>
<tr>
<td>Culture * Grade</td>
<td>Second &gt; first &gt; kindergarten</td>
<td>School &gt; kindergarten</td>
<td>School &gt; kindergarten</td>
</tr>
<tr>
<td>Residence</td>
<td>Israeli kindergarten &gt; Palestinian kindergarten</td>
<td>Palestinian school &gt; Palestinian kindergarten</td>
<td>Palestinian school &gt; Palestinian kindergarten</td>
</tr>
<tr>
<td>Parents' education</td>
<td>Palestinian village &gt; Palestinian camp</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5. Summary of Main Results

Note. MVPT-R = Motor-Free Visual Perception Test-Revised; VMI = Developmental Test of Visual-Motor Integration.
The emphasis of our study was on a comprehensive battery assessment of visual-perceptual and visual-motor skills with younger children attending kindergarten. The importance of this focus may be in its potential for assessing and pinpointing kindergarten children with underdeveloped abilities, and subsequently providing an early intervention to address these developmental gaps prior to school entry.

An interesting finding of note embedded in the Parush et al. (2000) study is the absence of significant visuo-motor organization differences between Ethiopian children—residing in Israeli for more than 6 years—and mainstream Israeli children. The authors suggest, after Kaniel (1990), that these results underline the influence of the educational school environment and the exposure to the larger mainstream culture. This serves to emphasize the need for conducting early screening and intervention programs, starting off with developing and exposing the therapeutic staff assigned to work with Palestinian children, as a means for enhancing child development.

Parush et al. (2000) recommend furthermore that subsequent to a first-step screening based on standardized tests, dynamic assessment methods and instruments should be used to explore the learning potential of children raised in a culture different to their current one. The foundations for dynamic assessment were first established by Vygotsky (1978) and later elaborated by Feuerstein (1979). This additional clinical implication underlying their recommendation may be of relevance to both Palestinian children, as well as children from other cultures.

In regard to age differences in performance, maturational differences among children in the first years of elementary school are indeed cited in the literature (Christopher et al., 2003). In this study, performance differences were found among the grades, but only when comparing school-age children and kindergarten children. Specifically, MVPT-R was found to be the most sensitive to performance improvement with age, whereas the VMI and the Bruininks-Oseretsky Test of Motor Proficiency could only distinguish between kindergarten and school-age performance.

Age effect was found in additional studies. Parush et al. (2000), who found significant differences for all perceptual and motor tests and for most cognitive tests between younger and older subjects, claimed that regardless of lifestyle and education, younger children have lower performance levels in these areas. Katz, Kizony, et al. (2002) assessed visual-motor organization and thought processes among Ethiopian immigrants, Bedouins, and mainstream Israeli children, and found that all groups showed significant improvement with age, but not at the same rate. The authors claimed that age differences were expected within each group due to the maturation processes as well as to schooling influences. In the current study, age intervals were not as vast as in the Katz, Kizony, et al. (2002) study. This might explain why the performance differences were significant only when comparing kindergarten children to school-age children using the VMI and Bruininks-Oseretsky assessments. The reference of this study to children from kindergarten to second grade has an important practical impact, because performing a screening process in kindergarten enables an earlier intervention when needed. Further research must be conducted in order to determine whether the reason for not finding differences in performance between first-grade and second-grade children is due to lower assessment sensitivity or to objective similarities in the visual-motor performance at these ages.

When examining the effect of cultural group and grade, Israeli children in each grade achieved significantly better scores than Palestinians from lower grades. No differences were found when comparing the performance of Israeli children to that of the Palestinian children in the same age group according to the different assessments. The only exception was with the MVPT-R, according to which the Israeli kindergarten children achieved significantly higher scores than the Palestinian kindergarten children. Thus, it may be assumed that visual perception is one of the parameters best suited for distinguishing between these two cultures at such young ages.

The third hypothesis regarding place of residence was partially confirmed. Palestinian children who live in camps were found to achieve significantly lower scores than their counterparts from villages, but this was true only for second-grade children in their performance on the MVPT-R. Studies emphasize the connection between school readiness and socioeconomic level (Ferguson et al., 2001; Spell, 1998). The socioeconomic status of Palestinian citizens living in camps is much lower than for those who live in villages. This may provide a possible explanation for the academic differences between these children from different areas, but further research is needed to provide additional support.

The other assessment results did not differ significantly between Palestinians from all residence types in the different grades. Parush et al. (2000) did not find any differences between the performance of Bedouin children from nomadic communities and that of Bedouin children from urban communities. The authors suggest that the lack of differences between the two Bedouin groups may indicate...
that the transition from nomadic to urban communities is mainly external and has not caused a significant change in perception, perceptual-motor, and cognitive performance abilities.

Contradictory to the fourth hypothesis, no significant differences were found between children in accordance with the educational backgrounds of their parents. This might be explained by Piaget theory, which holds that the child is active in investigating the world and that any environment may encourage development (Piaget, 1970). Although other studies have emphasized the connection between school readiness and mother’s education (Ferguson et al., 2001; Ramey-Craig & Landesman, 1999), this connection could not be found in this study.

The assessments used in the current study demonstrate discriminant validity and succeeded in differentiating between Israeli and Palestinian children. Nevertheless, additional studies should be performed in order to better understand whether these standardized tools are valid for Palestinian children as well as for Israeli children, or whether the results represent an outcome of less rich educational opportunities for Palestinian children. Further examination of this point may enhance the establishment of an assessment battery to use with Palestinian children, for whom no standard assessment currently exists for determining school readiness and the ability to advance in grade level. Moreover, children who are found to have difficulties and low scores in these assessments may be referred for further evaluation and intervention in occupational therapy, for example, in order to improve their school functioning.

In summary, school readiness follows guidelines that can inform parents and preschool teachers on developmental progress. Culture will probably still continue to influence children’s performance; therefore, as Katz et al. recommended (Katz, Kizony, et al., 2002), further studies should be conducted to explore the variables that may explain cultural differences. Given that such functions as visual-motor and visual-perceptual abilities are so critical to school readiness and success, children from different societies should be screened and, when necessary, evaluated and treated in order to enable their optimal functioning at school. Routine screening procedures in kindergarten as well as in the early grades may enable children with a developmental lag to improve their achievements and their adaptive behavior in the educational system.

**Acknowledgments**

This research was supported by the Netherlands–Israel Development Research Program (NIRP) (98-3.1). We also thank all the assessors for data collection, Mrs. Rachel Nadler for her help in coordination of the project, and all the children for their participation.

**Endnote**

1 The camps incorporate Palestinian refugees displaced by war events and constitute a high-density residential area with poor infrastructure and underdeveloped educational facilities.

**References**


