1-Mile Run Performance and Body Mass Index in Hispanic Youth: Passing Rates for the Fitnessgram

Karen H. Weiller, Allen W. Jackson, and Rhonda D. Meyer

Previous research has reported that Hispanic youth were significantly higher in skinfolds and body mass index (BMI) when contrasted to national reference data or comparison groups of white youth. The present study sought to determine the passing percentage for a sample of Hispanic youth for the BMI and the 1-mile run (OMR) using the Fitnessgram standards. The sample included 722 children, ages 7 to 14 years. The Hispanic youth’s passing percentages for the OMR compare favorably with the National Children and Youth Fitness Studies. The BMI results indicate the passing percentages are lower for the Hispanic, which is in agreement with past reports on body composition in Hispanic youth. Using the Fitnessgram standards, these data indicate the cardiovascular endurance of Hispanic youth may be similar to or better than the general population of children in the U.S. A higher rate of unhealthy body composition may be present, which would warrant targeted interventions for Hispanic children.

It has been argued in recent years that youth fitness levels are declining, although some researchers debate this notion. With the exception of obesity, the relationship between youth fitness levels and adult fitness levels is not totally known. However, while children do not suffer high levels of mortality due to coronary heart disease (CHD), they do have meaningful levels of CHD risk factor development (3). Several studies (5, 15, 17) have reported consistent relationships between measures of physical activity and cardiovascular disease risk factors in adults.

The Hispanic population has been reported to be the second largest minority population in the United States (18). Numerous studies (2, 4, 11, 12, 16, 20) have reported that Mexican Americans are more likely to be hypertensive, to have higher cholesterol and triglyceride levels, to be diabetic, and to develop obesity at an earlier age than the general population. This early onset of obesity has been associated with the onset of diabetes in this population (9, 12).

Commonalities have been reported among the Hispanic population regarding fitness levels. Hispanic youth tend to be shorter and to display an excessive weight for their height (6, 7, 14, 20). A characteristic in Hispanic populations is

Karen H. Weiller, Allen W. Jackson, and Rhonda D. Meyer are with the Department of KHPR at the University of North Texas, P.O. Box 13857, Denton, TX 76203-3857.
that by adolescence they will be shorter, heavier per unit of height, and fatter than children of non-Hispanic European descent. Hispanic youth have also been described as significantly higher in body mass index (BMI) and subscapular skinfolds than comparable youth (6, 20). Both males and females in the Hispanic population have been reported to exhibit escalating levels of obesity as children, with this pattern continuing into adolescence. Although males exhibited curtailed obesity levels as young adults, levels sharply rose in older adults (14). Females displayed similar characteristics, but did not display the decline in obesity levels as young adults. Further, it was suggested that Hispanics tend to exhibit greater amounts of trunk and upper body adiposity than non-Hispanics (14). The nature and distribution of body fatness may represent an increased potential for cardiovascular disease, and Hispanic youth have been identified as leaning toward this typical adult fat distribution profile (20).

Among the three largest major subgroups, Mexican Americans constitute 60% of the total 14.6 million U.S. Hispanics (18). The Hispanic population in Texas increased by 69% from 1980 to 1990 (19). Few data are available in applying recognized health-related standards to the Hispanic population. However, studies that are available on this population suggest that children need to be provided with opportunities for regular exercise, and that activity and fitness levels in children may enhance cardiovascular profiles (15).

Due to the increasing numbers and the reported high risk of cardiovascular disease for this population, this minority group is particularly important to study. Past evaluations of Hispanic youth have focused on normative comparisons. Presently, youth fitness assessment is based upon the use of criterion-referenced standards. This study sought to evaluate BMI and 1-mile run (OMR) performance, using Fitnessgram criterion referenced standards, in Hispanic youth and to compare passing rates with published passing rates based on the National Children and Youth Fitness Studies (NCYFS) (8, 10).

**Methods**

**Subjects**

Subjects for this study were 722 Hispanic youth (375 males and 347 females), ages 7 to 14 years. Subjects were identified from elementary schools’ computer ethnicity listings in a Dallas, Texas, suburban school district with a significant Hispanic population. The Carrollton-Farmers Branch Independent School District is located approximately 25 miles from downtown Dallas. As of the 1992–1993 academic year, the student enrollment for the district was 18,344, with the Hispanic population comprising 3,792 (20.67%) of the total population. This particular district has experienced an increase in the Hispanic population of over 24% since 1980. At the elementary school level, the Hispanic population comprises 18% of the total enrollment (1). Subjects were selected from four schools that had some of the highest Hispanic populations and that were willing to participate in this study.

**Procedures**

Children of this school district, as part of their typical education program, receive a physical fitness test on a yearly basis during the months of March and April.
The Fitnessgram physical fitness test program (8) is used to measure health-related fitness components. The test includes assessments of cardiovascular endurance OMR, body composition (skinfolds for percent body fat estimation and BMI), upper body strength and endurance (pull-ups), abdominal strength and endurance (sit-ups), and flexibility (sit-and-reach test). Height and weight are measured during the testing. BMI was determined by using the following formula: 

\[ \text{BMI} = \frac{\text{weight (kg)}}{\text{height}^2 \text{ (m)}} \]

The test is administered by elementary school physical educators who are trained in appropriate test administration procedures by individuals from the Institute of Aerobics Research. Scores were recorded by physical education teachers and aides.

**Data Analysis**

The means and standard deviations for the OMR and BMI were calculated and provided for each age and gender. A 2 × 8 (Gender × Age [7–14]) analysis of variance (ANOVA) was used to examine gender differences and age differences in the variables OMR and BMI. An alpha level of .025 (.05/2) was established. The values of OMR and BMI for each child are compared to the Fitnessgram criterion-referenced standard for the child’s age and gender. The pass-fail status was established based on that comparison. The percentages passing the criterion-referenced standards were determined and provided for the total sample and for each age and gender.

**Results**

Table 1 provides the means and standard deviations for the OMR and BMI. A 2 × 8 (Gender × Age) ANOVA revealed significant gender, \( F(1, 693) = 29.76, p < .001 \), and age, \( F(7, 693) = 15.73, p < .001 \), effects for the OMR. There was no significant Gender × Age interaction. The descriptive statistics in Table 1 indicate that males ran faster than females and that run times were generally lower with advancing age, with the exception of females ages 12–14. A trend analysis of the age factor indicated a significant linear trend, \( F(1, 693) = 94.58, p < .001 \). A 2 × 8 (Gender × Age) ANOVA indicated a significant age, \( F(1, 693) = 11.2, p < .001 \), effect for BMI. There were no significant gender or Gender × Age interaction effects. A trend analysis indicated a significant, \( F(1, 693) = 6.85, p < .009 \), quadratic effect. Inspection of the means for BMI indicate a nonlinear increase in BMI with advancing age and a sharp increase for females between 12 and 14 years.

Table 2 provides the Fitnessgram criterion-referenced standards used in this study (8). Figures 1 and 2 present the percentages of Hispanic youth passing the criterion-referenced standards across gender and age. In the OMR the females’ passing rates ranged from 67% to 94% and were generally higher than the males’, which ranged from 58% to 85%. In BMI the males’ passing rates ranged from 64% to 96% and were generally higher than the females’, with a range of 60% to 88%.

Figure 3 presents a comparison of the overall percentage passing between the Hispanic youth in this study and the NCYFS passing rates provided by Looney and Plowman (10). In the OMR the Hispanic males’ percentage was only 5% less than the NCYFS rate. The Hispanic females’ rate was 16% higher...
Table 1  Descriptive Statistics for OMR and BMI

<table>
<thead>
<tr>
<th>Age</th>
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<th>Females</th>
<th>Males</th>
<th>Females</th>
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<tbody>
<tr>
<td></td>
<td>1-mile run (s)</td>
<td>Body mass index</td>
<td>1-mile run (s)</td>
<td>Body mass index</td>
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<td></td>
<td>M</td>
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<td>SD</td>
</tr>
<tr>
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<td>16.85</td>
<td>1.80</td>
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<tr>
<td>8</td>
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<td>159.49</td>
<td>17.04</td>
<td>3.17</td>
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<td>152.19</td>
<td>18.00</td>
<td>2.41</td>
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<td>124.66</td>
<td>19.23</td>
<td>4.44</td>
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<td>159.98</td>
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<td>100.71</td>
<td>19.19</td>
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<td>491.52</td>
<td>76.38</td>
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Table 2  Fitnessgram Criterion-Referenced Standards

<table>
<thead>
<tr>
<th>Age</th>
<th>1-mile run</th>
<th>Body mass index</th>
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Note. These standards were used in the present study and in the study of Looney and Plowman (10). A 1993 revision of Fitnessgram has standards based on a health-related fitness zone.
Figure 1 — Percentages of Hispanic youth across gender and age passing Fitnessgram criterion-referenced standards for the 1-mile run.

than the NCYFS rate. For the BMI both Hispanic males’ (8%) and females’ (12%) rates were lower than the NCYFS rates.

**Discussion**

This study examined the cardiovascular endurance and BMI of Hispanic youth by comparing their results to the health-related criterion-referenced standards of the Fitnessgram (8). The passing rates of Hispanic youth for the OMR compared favorably to the passing rates of the children in the NCYFS (10). However, the Hispanic youth passing rates were lower on BMI when compared to the NCYFS results. This finding is in agreement with other researchers who have analyzed the BMI of Hispanic youth on the basis of comparisons to national reference data or to groups of children of other races (6, 20). Thus, whether one uses a norm-referenced or a criterion-referenced approach to evaluate BMI, Hispanic youth have a higher risk for unhealthy body composition.

The analysis of the gender differences and age trends did not reveal any unexpected results. Males tended to perform better on the OMR and had lower BMI during the ages 13 to 14 years. It should be noted that the results of this study indicate that evaluations using norm-referenced standards will not correspond to evaluations using criterion-referenced standards. For example, in the OMR the males had significantly lower mean run times than the females,
but the females had higher passing rates. An examination of Table 2 demonstrates that the females’ standard is 1 min slower for ages 7 to 11 and 2 min slower for ages 12 to 14. This accounts for the slower mean running times for females producing higher passing rates for the health-related criterion-referenced standards.

Another point to consider is the observation that the Hispanic females had generally higher passing rates for the OMR but lower passing rates for BMI. This finding would be confusing since BMI is positively related to OMR, with higher BMI associated with slower OMR times. As Table 2 demonstrates, the differences in criterion-referenced standards explain this observation. As mentioned above, the male OMR standards are 1 to 2 min lower than the female standards. The BMI standards are the same for both males and females. Thus, higher female values of BMI produce lower passing rates for females compared to males. However, the higher average OMR times of the females produced higher, not lower, passing rates, as previously explained.

The increased risk of obesity for this population begins in childhood and continues into adolescence and adulthood (12). The Hispanic adult population has been particularly susceptible to higher levels of obesity, which may lead to an increased potential for diabetes and CHD (3, 4, 20).

It is critical to continue to examine the Hispanic population as to adiposity and activity levels, as Hispanics tend to be overweight and to have lower activity
Although the relationship between CHD risk factors and physical activity is not yet understood in youth, it appears that low intensity, prolonged bouts of aerobic exercise may reduce levels of body fat in moderately obese youth (3).

To appropriately address these issues in a manner that will provide changes for the Hispanic population, future research projects might address development of effective programs that include fitness testing, physical activity, nutrition, and family intervention programs. These projects could be followed by longitudinal studies to investigate long-term effects. Public schools alone cannot alleviate the problems of obesity and sedentary lifestyle in the Hispanic population. Education and community programs must combine to intervene in producing long-term, positive effects.

References


