The Pediatric Low Vision Chart: A Critical Appraisal

Senior Research Project

April, 1983

William J Hooker,B.S.

Faculty Advisor, Jack E.Richman,O.D.

INTRODUCTION

In search for new and better ways of measuring visual acuity in the pediatric population, several acuity tests have recently been developed. One such test is the PEDIATRIC LOW VISION TEST CHART designed by Edwin L. Novak, O.D. for Designs for Vision, Inc.

It is important that visual acuity measurements with new tests be comparable to those of accepted clinical acuity tests. Snellen is the most frequently used clinical visual acuity test. With the low vision population the most frequently used test is the DISTANCE TEST CHART FOR THE PARTIALLY SIGHTED arranged by William Feinbloom, O.D. for Designs for Vision, Inc..

Although Snellen is the most frequently used visual acuity test and an acceptable equivalent to Landolt rings (1), it is not the standard of visual acuity tests. However the purpose of this study was to look at the Pediatric Low Vision Chart in relation to two clinically relevant tests, namely Snellen and the Distance Chart for Partially Sighted.

METHOD

The total population consisted of 60 subjects ranging in age 21 to 35. All were corrected for any ametropia to 20/20 or better.

Each subject was blurred with plus lenses of varying amount. Six different powers were used, from +1.50D to +4.00D.

Three acuities were measured for each subject; one from each chart. The Snellen chart, calibrated for 20 feet, was projected on a screen at 13 feet. The Low Vision charts were tested at 10 feet in the same room. Since there are no directions with the Low Vision tests, the testing distance was confirmed by personal communication with the designer of the Pediatric Low Vision Chart.

The Pediatric chart consists of 17 different figures. Some of these figures are shown in figure 1. There is one figure at the 10/700 level and increasing in number up to 7 for the 10/10 level.

The Distance Test Chart consists of numbers from 0 to 9 (figure 2) and corresponds to the pediatric chart with one number at the 10/700 level and 7 at the 10/20 level which is the smallest acuity level for this chart.

The minimum criterion level for acuity was established to be more than 50% correct on any one line. After two lines in a row were missed, the last correct line was considered the acuity level. This criterion is lower than that suggested by Hofstetter.(1,2) The recommended 7 out of 10 correct was not possible because there were not 10 optotypes for any one acuity level.

RESULTS

The mean values for the 60 subjects are shown in figure 3. The visual acuity values were analyzed for their relationship with a Pearson Product-Moment correlation(r). This correlation was then tested for significance. The coefficient of determination (r^2) was also calculated. The results of these tests are shown in tables 1 and 2. Further analysis for

significant difference between the means was tested with Students t-test.

There was a significant relationship (r=.85) between Snellen and the Pediatric Low Vision Test Chart. However there was a significant difference between the scores in each test (t=9.0435, df 59, p<.01). Critical t=2.660.

When Snellen was compared to the Distance Test Chart for the Partially Sighted a strong relationship (r=.88) was found with no significant difference between the scores (t=1.4557, df 59, p<.01). Critical t=2.660.

The coefficient of determination (r^2) as shown in tables 1 and 2 indicated that the Snellen and the other 2 tests commonly shared and accounted for a significant percentage of the performance variance. This means that clinically the score from one will vary as the other one varies a significant percent of the time.

DISCUSSION

Snellen acuities were taken through various plus lenses and compared with acuities measured with the Pediatric Low Vision Test Chart and the Distance Test Chart for the Partially Sighted through the same lenses.

The acuity levels with Snellen and the Distance test chart were not significantly different. The acuities measured with the Pediatric Low Vision chart were significantly different from Snellen acuities. The Pediatric chart measured significantly worse acuities than did Snellen or the Distance Low Vision chart. Furthermore it was very difficult to determine the level of acuity with the Pediatric chart because certain figures were invariably

missed independent of the amount of blur.

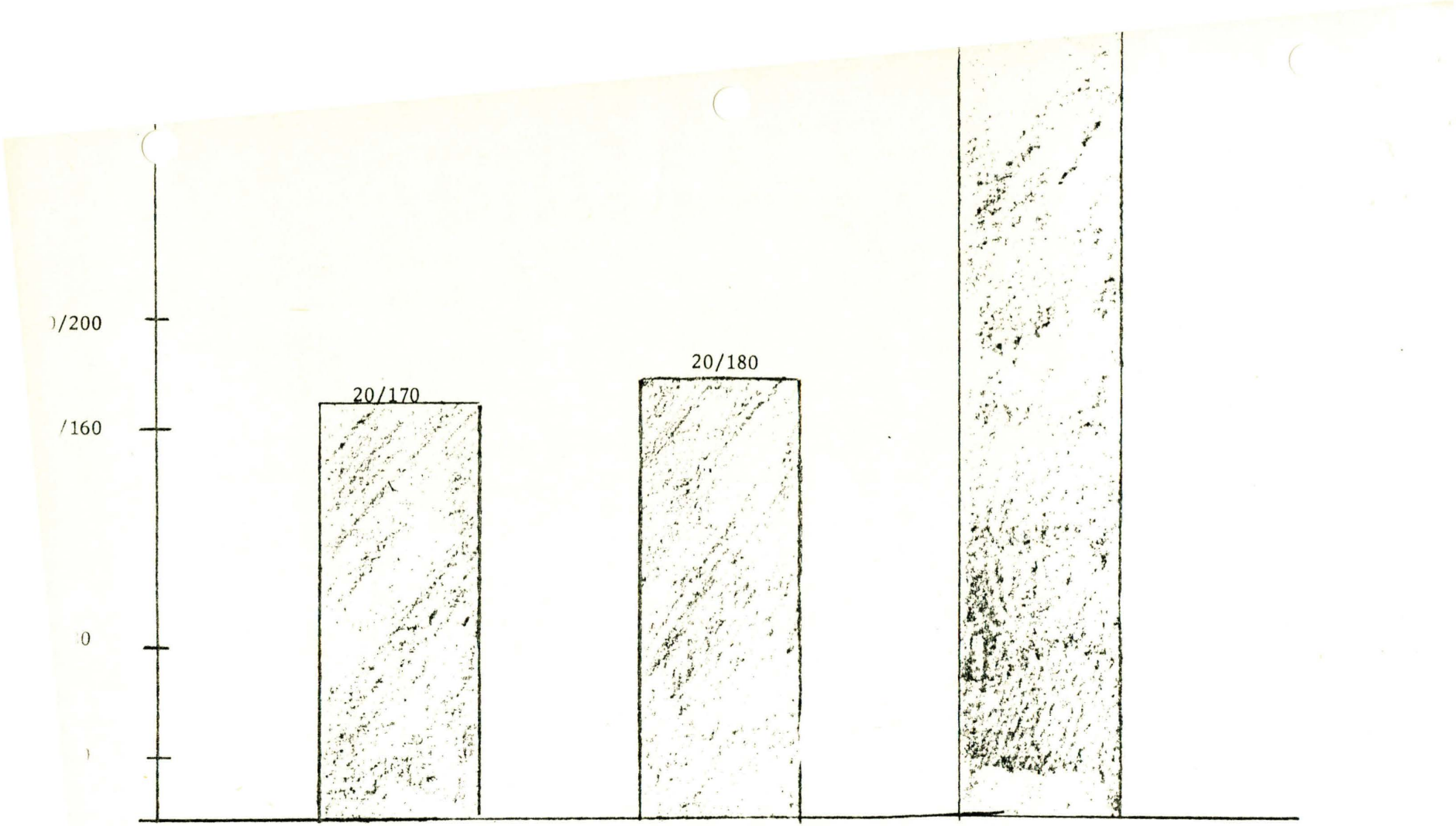
As a result of this investigation the clinician should be cautious when using the Pediatric Low Vision Test Chart. Especially when the results are used by teachers to determine functional vision levels and when used by authorities concerning legal definitions of blindness of visual impairment.

Further investigation into the validity of the Pediatric Low Vision Test Chart is warranted. It would be usedful to compare it to Landolt rings and also to compare the two Low Vision charts in a low vision population.

It may also prove to be useful to plot the measurements from the Pediatric Low Vision chart as a psychometric function to determine level of acuity.

CONCLUSIONS

The Pediatric Low Vision Test Chart as measured in this investigation is not equivalent to Snellen nor the Distance Test Chart for the Partially Sighted. The clinician must be cautious when reporting acuities from this chart. This study indicated that visual acuity can significantly be underestimated by the use of the Pediatric Low Vision Chart.


/200
/160
0
20/170
20/180
Snellen
Distance Test Chart
for the Partially
Sighted
Pediatric Low
Vision Test Chart

Figure

Table 1

Means and standard deviations, correlation (r), coeficient of determination (r^2), and significance level (p) for Snellen acuity and Pediatric Low Vision Test Chart.

Test	mean	SD	r	r^2	p
Snellen	170	109	.847	.718	.01
Pediatric Low Vision Chart	326	214			

Table 2

Means and standard deviations, correlation (r), coeficient of determination (r^2), and significance level (p) for Snellen acuity and Distance Test Chart for the Partically Sighted.

Test	mean	SD	r	r^2	p
Snellen	170	109	.879	.773	.01
Distance Test Chart for the Partically Sighted	181	121			

REFERENCES

1. Hoffstetter HW. New standards procedures for measuring visual acuity. J Am Optom Assoc 1981; 52:32-7.

2. Richman JE and Garzia RP. The Bead Test: A Critical Appraisal. American Journal of Optometry and Physiological Optics 1983; Vol. 60, No. 3, pp. 199-203.