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A Pilot Study with the Bayley Infant Scales of Mental and Motor Development- A Turkish Sample

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The Bayley Infant Scales of Mental and Motor Development (Bayley, 1969) were the result of more than fourty years of research, clinical practice and the examination of some 4,500 infants.[1] The current edition of the Scales have been developed from three California Scales: The California First-Year Scale (Bayley, 1933), the California Preschool Mental Scale (Jaffa, 1934), and the California Infant Scale of Motor Development (Bayley, 1936). They Bayley Scales are used extensively in the United States for both clinical and research purposes.[5–8] Comparative studies were done in countries such as Czechoslovakia, England, Greece, India, Israel, and Peru.[9]

The main purpose of this study was to find out if the Bayley Infant Scales had possibilities of application in the effective assessment of the development of Turkish babies. We wanted to find out if the test could differentiate between the developmental performance of babies of various ages and to see how the means compared to the American means. To this end we examined the two socio-economic samples of urban and rural populations, using the age groups of 3, 6, 9 and 12 months. We also looked at the correlation between the Mental and Motor Scales in the age groups mentioned to see if the scales could be used interchangeably.

About the Bayley Test[1, 10]

The Bayley Scales of Infant Development (BSID) is a test designed to measure the overall mental development of infants from birth to 30 months. The BSID consists of three separate parts: Mental Scale, Motor Scale and the Infant Behavior Records.

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The Mental Scale is designed to measure responses to visual and auditory stimuli, discrimination of shapes, the early acquisition of "object constancy", manipulation of objects, simple problem solving, ability to form generalizations and classification; object naming and beginnings of verbal communication.

The Motor Scale consists of items which measure development of gross motor abilities such as turning, sitting, crawling, standing, walking, climbing, as well as finger manipulatory skills of hands and fingers.

There is a positive correlation of .50-.60 between the Mental and Motor Scales in the first twelve months of life.

In administering the BSID, the Mental Scale is regularly given before the Motor Scale. The best results are obtained when the child is wide awake and not distressed by pain or hunger.

The average time for administering both the Mental and Motor Scales is about 45-90 minutes.

The final standardization of the Bayley Scales was carried out on 1,262 children ranging in age from two months to 30 months. The sample was controlled for sex, race and education of the head of household within each age group. The sample was selected to be representative of the U.S. population, regarding major geographic areas and rural-urban populations.

Among the available infant scales today, the BSID is considered to be, by far, the best measure of infant development.[10]

Method

Subjects: The total number of subjects tested were 90 infants in the age groups of 3, 6, 9 and 12 months. Babies were tested within 10 days before or after their monthly birthdays. Fourty-five of these infants came from the urban population and 45 of them came from rural population.

The urban sample was taken among babies who came for a regular check-up to the Well Baby Clinic at the Social Pediatrics Department of Hacettepe University Hospital. All the babies tested in this group were born in Ankara.

The rural sample was comprised of babies tested in ten villages in the center of Yozgat province.

All babies tested were pronounced to be in good physical health by the pediatricians and all lived in their natural home environments. Babies born more than one month prematurely were excluded from the study.

In the Ankara (urban) sample, there were 12 three-month olds, 12 six-month olds, 11 nine-month olds, and 10 twelve-month olds. In the Yozgat (rural) sample there were 13 three-month olds, 16 six-month olds, 12 nine-month olds, and 4 twelve-month olds. The reason for the small number of twelve-month olds in the Yozgat sample was due to shyness on the part of the infants toward the testers who, coming from Ankara, appeared unfamiliar to the babies. Thus, although about 10 twelve-month olds were brought to be tested, only 4 could actually respond far enough to complete the test.

Procedure: The BSID was translated into Turkish by the author. The testing was carried out during the months of October-November 1977, in Ankara and Yozgat. Two regular examination rooms were used at Hacettepe University Hospital to test the babies in Ankara. In Yozgat, the testing was done in the health units or in the elementary school classrooms of the following villages: Kavurgali, Recepli, Bozlar, Gudulu-elmahacili, Buyukincirli, Topcu, Divanli, Gelingullu, Salininoren, Bayatoren, Dayili and Pembecik.

The poor living conditions in the Yozgat villages made it necessary for us to deviate from standard procedures in the administering of the Bayley Scales in that elementary school desk tops were used as both tables and examinaton tables for the babies. Also, since the rooms were not heated well enough, the babies displayed difficulty in extending their hands or moving about freely.

The testing was carried out by two psychologists who had extensive knowledge and experience in standard testing procedures, and a special training in the administering of the Bayley Scales.

For each infant, first the Mental and then the Motor Scales were administered. Information about the baby's sex, ordinal position in the family, education of his mother and father, were taken down prior to testing.

The results were analyzed by analysis of variance using raw scores.

Results

In the comparison of Ankara and Yozgat samples, the 12-month group, due to its small number was dropped from the analysis of variance. In view of this, the results were analyzed by a 2 x 3 ANOVA design.

Table I presents the summary tables of ANOVA for Mental Scale scores. The analysis of variance revealed no significant difference between Ankara and Yozgat samples in their mental and motor developments. The only significant factor was found to be age ($F=8739.16$ p .01). No interaction effect was found.

TABLE I

TWO-WAY ANOVA OF MENTAL SCORES AT EACH AGE GROUP

Source of Variation	Sums of Squares	Degrees of Freedom	Mean Squares	F	
A (Yozgat vs Ankara)	106.66	1	106.66	3.01	NS
B(3,6, 9 mos)	34,956.63	2	17,478.315	8739.16	p .01
A x B	18.73	2	9.22	–	
Error	1,909.00	54	35.35		
Total	36,990.73	59			

Similar findings were obtained with the Motor Scales scores. Table II provides the results of ANOVA for the motor performance. Here again, there is no significant difference between Ankara and Yozgat samples. Age was found to be significant (F 240.14 p .01). No significance was noted for interaction effect.

TABLE II

TWO-WAY ANOVA OF MOTOR SCORES AT EACH AGE GROUP

Source of Variation	Sums of Squares	Degrees of Freedom	Mean Squares	F	
A (Yozgat vs Ankara	2.81	1	2.8	–	
B (3,6, 9 mos)	5,605.9	2	2,802.95	240.14	p .01
A x B	16.24	2	8.12	–	
Error	630.34	54	11.67		
Total	6,255.25	59			

These results clearly indicate that the mental and motor development of urban and rural babies follow the same pattern and that locality has no bearing on the scores.

The means for age groups are plotted in Figures 1 and 2 for the mental and motor scores respectively.

In both of the figures, there is a linear progression of scores with age. The rate of increase between ages slightly diminishes as the ages advance. Table III presents the means on which Figures 1 and 2 are plotted.

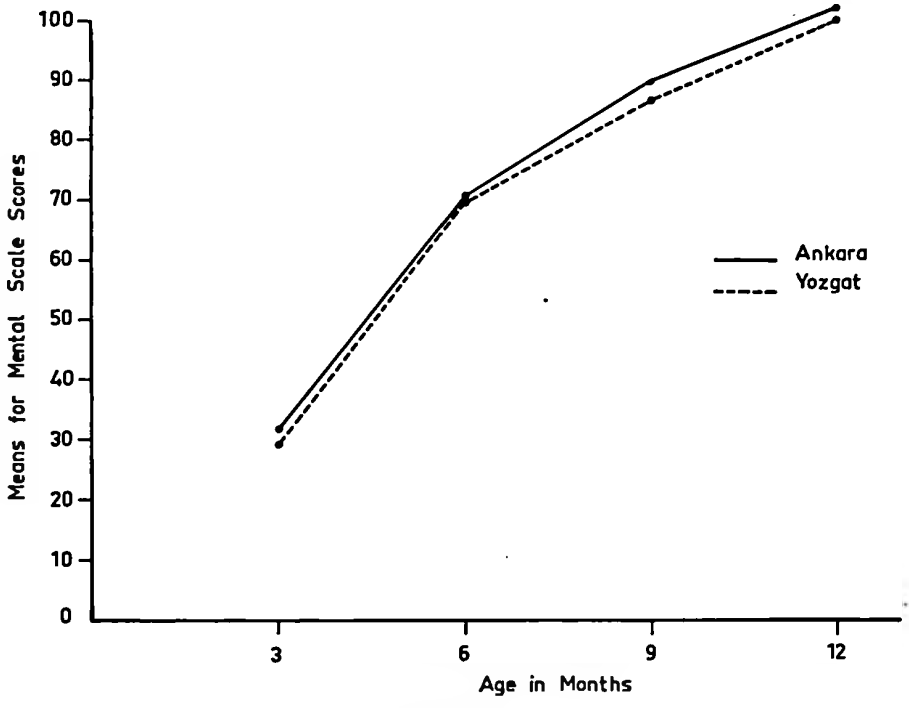

Figure 1

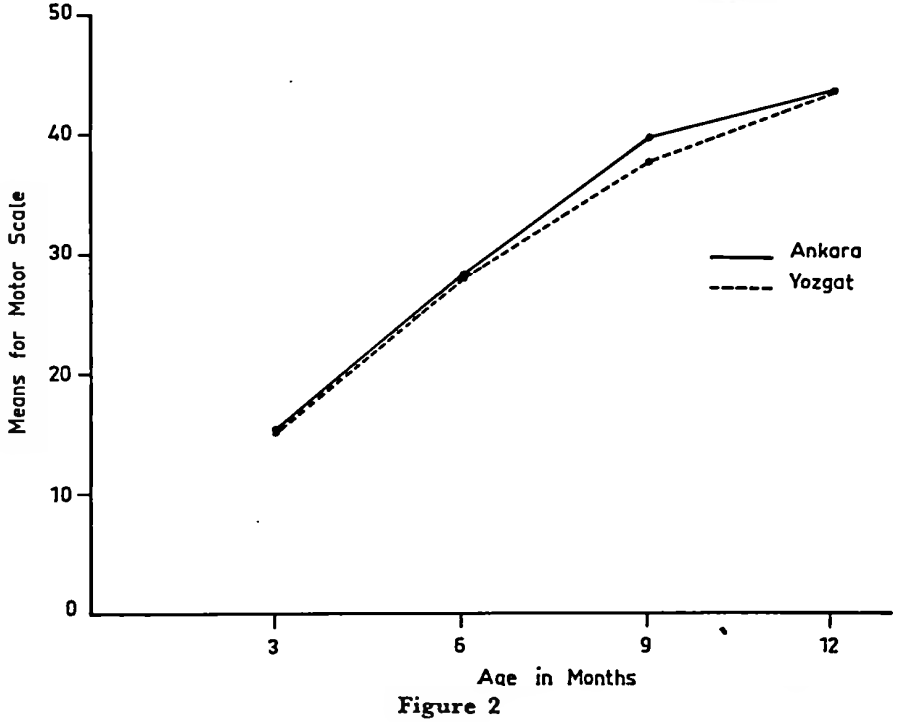

Figure 2

TABLE III

THE MEAN SCORES OF MENTAL AND MOTOR SCALES AT EACH AGE GROUP

	3 Months		6 Months		9 Months			
	Mental	Motor	Mental	Motor	Mental	Motor	Mental	Motor
Yozgat	29.2	15.7	70.2	28.6	86.9	38.3	100.75	44.00
Ankara	32.6	15.5	71.3	28.2	90.4	40.2	103.1	44.04
Ankara Yozgat Combined	30.9	15.6	70.7	28.4	88.6	39.2	101.9	44.02

On the basis of these findings we can conclude that the Mental and Motor Scales of the Bayley test clearly differentiate the development performance of Turkish babies between the ages 3, 6, 9 and 12 months and that there is no difference in the mental and motor performance of urban and rural infants.

Table IV presents the descriptive data and correlation of seven variables with the mental and motor scores.

TABLE IV

CORRELATION OF BAYLEY SCORES WITH NINE VARIABLES

Variable Name	Mean	Variance	r With Mental Sc.	r With Motor Sc.
Yozgat vs. Ankara	1.54	0.25	+.20	+.205
Age Code*	2.3	1.12	+.94	+.93
Age in Days	207.51	9,327.52	+.94	+.94
Sex	1.45	.25	+.04	+.04
Ordinal Position	2.45	4.06	+.04	- .01
Mother's Education	7.25	134.08	+.04	- .04
Father's Education	9.24	129.46	+.07	- .02
Mental Score	68.43	779.26	-	+.96
Motor Score	29.51	139.03	+.96	-

* The ages of 3,6,9,12 mos. were given the codes of 1,2,3,4, respectively.

Inspection of Table IV shows that the variables of Yozgat versus Ankara, sex of the subjects, ordinal position of the babies within the family, mother's education and fathers' education have no effect on the mental and motor scores. The age in code and the more differentiated measure of age in days both correlate very highly with both the mental and the motor scores. (r = 94). Intercorrelation of mental and motor scores is also very high (r = 96).

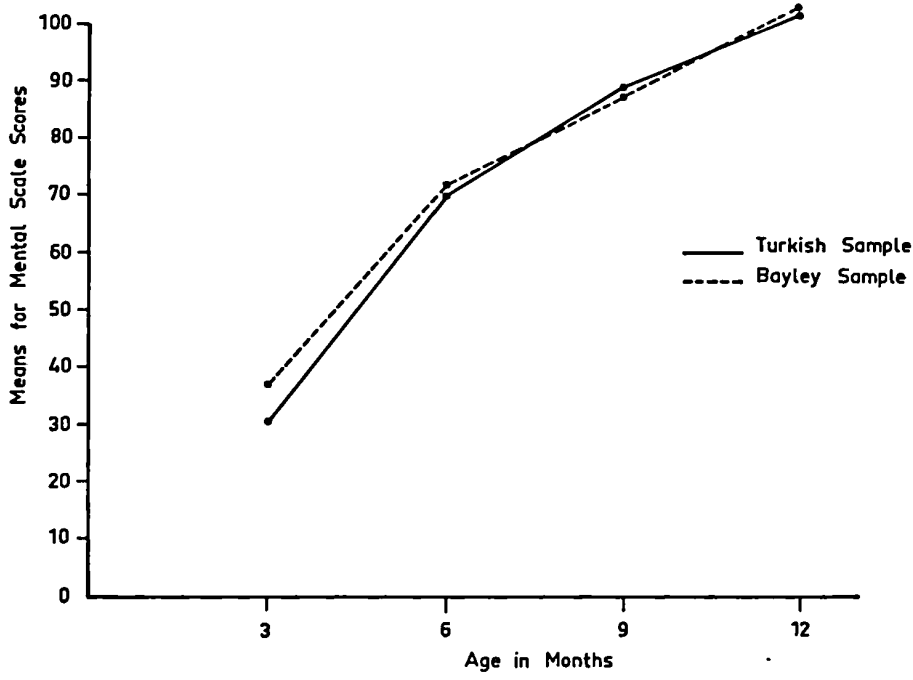

Figure 3

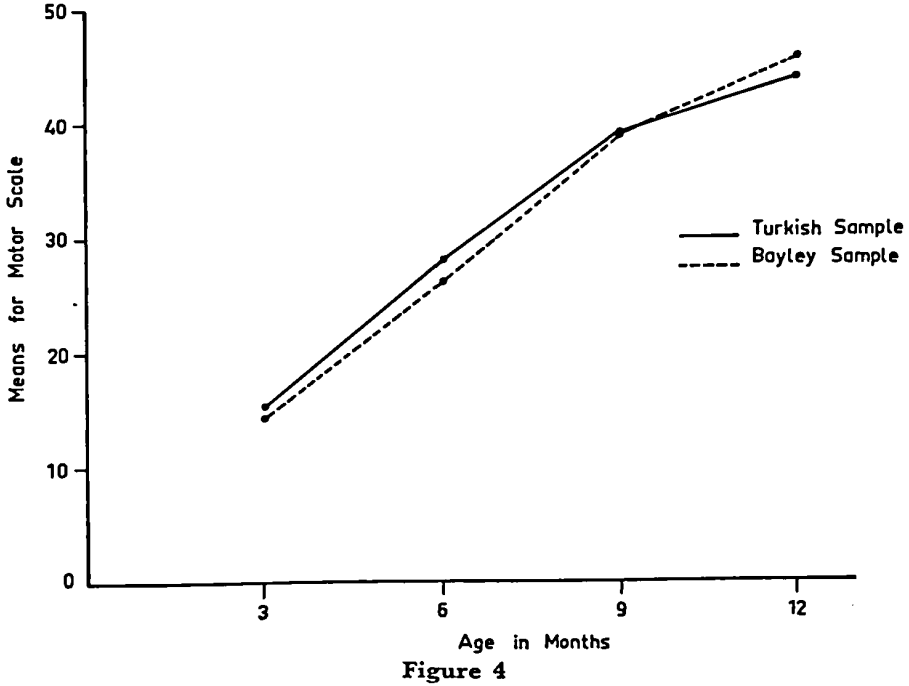

Figure 4

In order to compare the Turkish means with the American means, we averaged the mean mental and motor scores for Ankara and Yozgat and compared the results with the Bayley means (1, p.20), for the age groups of 3,6,9, and 12 months. The results are presented in Figures 3 and 4, where the raw scores from the Bayley manual were plotted against the scores from the present study.

Inspection of Figures 3 and 4 reveal that the mental and motor performance of Turkish babies are very close to the performance of American babies.

Discussion

All the evidence supports that this was an appropriate translation of the BSID, There is no evidence of a bias, and the BSID can be used in the effective assessment of the mental and motor development of Turkish babies.

The final comparison of Tables III and IV show a tremendous similarity between American and Turkish babies in the raw scores, thus it yields a direct comparability with the American norms. The intercorrelation of mental and motor scores is so high as to render them to be used interchangeably. Therefore, we can use the Motor Scale, which is simpler to administer, by itself and get an estimate of the mental development of babies aged 3-12 months.

On the basis of these findings the logical suggestion would be to test into the second year of mental development using the urban and rural samples. It is predicted that the trends started here will show a greater divergence between the rate of development of urban and rural samples in the second year of life.

Summary

A sample of 90 infants equally divided between urban and rural populations in Turkey, in the age groups of 3,6,9 and 12 months were administered the Bayley Infant Scales of Motor and Mental Development. The results were found to indicate no significant difference between the rural and urban samples. The only significant effect was in the ages. The mean Turkish raw scores of the Mental and Motor scales were comparable to the mean American raw scores. The Mental and Motor scales were found to be very highly correlated with each other.

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