

Mental, Motor, and Social Behavior of Infants with Cleft Lip and/or Cleft Palate

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This is a report of analyses of *cross-sectional* and *longitudinal* samples of the *mental*, *motor*, and *social behavior* of children with cleft lip and/or palate as measured by the *Bayley Scales for Infant Development*. Seventy-five patients of the Lancaster Cleft Palate Clinic were the subjects for the sample. The longitudinal sample consisted of 28 of these Ss for whom there were complete data at 6, 12, 18, and 24 months. The results indicated that there were *no significant differences in mental and motor functioning*. In both analyses, the social behavior of patients with oral-facial clefts was more *passive* than the Bayley normative sample. The implications of these findings for future research are discussed.

Problem

Reviews by Ruess (1968), Goodstein (1968), and McWilliams (1970) have suggested the existence of some intellectual impairment of children with clefts; but the evidence is *not* consistent with the data reported by Wirls (1971b). Moreover, these reviews are based upon the results of cross-sectional studies of cleft patients who were three years of age or older. Therefore, there is very little known about the longitudinal nature of the intellectual functioning of these patients or whether there are any early developmental differences. The purpose of this study was to evaluate the longitudinal mental, motor, and social development of infants with cleft lip and/or palate.

Methodology

Concern with the issue of mental, motor, and social development of children with cleft lip and/or palate led the psychologists at the Lancaster Cleft Palate Clinic to begin testing all new patients using the Bayley Scale of Infant Development (1969) in August of 1969. The Bayley Scales were selected because they were the most recent and the best standardized infant scales available at the time (Wirls, 1971a).

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The Scales are composed of three parts: Mental Scale, Motor Scale, and Infant Behavior Record. The Mental and Motor Scales yield two indexes which are, respectively, the Mental Development Index (MDI) and the Psychomotor Development Index (PDI). The Infant Behavior Record (IBR) contains a series of items for rating significant social behaviors on the basis of specific observations.

The data were collected by a staff psychologist with the assistance of two trained graduate student psychology interns. All tests were also scored independently by an observer who was trained in the use of the Bayley Scales. Data collection was not started until 90 per cent intra- and inter-reliability was achieved for the tester and the observer. This level of agreement was based on whether the two scorers passed or failed a child on each item administered during the testing. Differences were resolved by discussion so that consensus for a final score could be reached.

Cross-Sectional Phase

SAMPLE. Eighty-two children with cleft lip and/or palate who were patients at the Lancaster Cleft Palate Clinic comprised the sample for this study. The data were collected at six month intervals from ages six months through two years. The Clinic records were reviewed for all 82 subjects to determine the presence of other anomalies that might contribute to reduced intellectual functioning. As a result, seven cleft palate only patients were excluded from this study. Five of these had Pierre Robin Syndrome, and two had Ellis van Creveld Syndrome with severe mental retardation. These children were excluded because there is some evidence suggesting a positive relationship between the presence of associated anomalies and lower intellectual functioning (Goodstein, 1968).

Table 1 presents the sex and cleft type distribution of the sample ($N = 75$). The size of the sample at each age period changed as some children missed a testing session(s). Although there were more males than females in the sample, the sex distribution is consistent with the male-female ratio for each cleft type (Greene *et al.*, 1964).

RESULTS. The data were analyzed by the Scheffe multiple comparison procedure (1959). Although this technique is generally recommended for pairwise comparisons, it was used here since it is less affected by unequal sample sizes and unequal variances than are other methods. The Scheffe procedure is conservative when compared to some other

	<i>CPO</i>	<i>CLP</i>	<i>CLO</i>	<i>Totals</i>
Male	11	18	15	44
Female	13	13	5	31
Totals	24	31	20	75

TABLE 1. Sex and cleft type distribution for cross-sectional sample.

multiple comparison procedures in that the total probability of making Type I errors is not more than the significance level selected (.05).

Table 2 presents the means, standard deviations, and sample sizes of the MDI of the cleft subjects as compared with the Bayley norms at six, twelve, eighteen and twenty-four months. The results of the analysis indicate that there were no statistically significant differences between groups at six or twelve months. At eighteen months, the cleft palate only (CPO) group and the cleft lip and palate (CLP) group scored significantly lower than did the cleft lip only (CLO) group and than the Bayley norms. At twenty-four months, the CLP group scored significantly lower than did the CLO and CPO groups and than the Bayley norms.

Table 3 presents the sample sizes, means, and standard deviations of the PDI of the subjects as compared with the Bayley norms at six, twelve, eighteen, and twenty-four months. The results of the analysis indicated that there were no statistically significant differences in the PDI between groups at six and twelve months. At eighteen months, the CPO group scored significantly lower than the CLO and CLP groups and than the Bayley norms. At twenty-four months, the CLP group scored significantly lower than the CLO and CPO groups and than the Bayley norms.

The Infant Behavior Record of the Bayley Scales consists of 24 ratings. Chi-square analysis was done for the pooled ratings in order to compare high and low sub-groupings on each of the 24 items. The following items were statistically significant for one or more groups.

The first dimension was *responsiveness to mother*. At six and eighteen months, there was no statistically significant differences. At twelve and

TABLE 2. Cross-sectional sample sizes, means, and standard deviations of the mental development index of cleft subjects compared with Bayley norms.

<i>Six Months</i>					
	<i>All Clefts</i>	<i>CPO</i>	<i>CLP</i>	<i>CLO</i>	<i>Bayley Norms</i>
N	62	21	24	17	94
\bar{X}	102.71	103.52	100.00	105.29	100.20
σ	20.47	22.48	18.91	20.59	16.90
<i>Twelve Months</i>					
N	69	22	28	19	94
\bar{X}	99.88	98.36	96.82	106.16	100.10
σ	19.92	20.13	23.12	12.88	15.90
<i>Eighteen Months</i>					
N	58	19	23	16	89
\bar{X}	95.55	85.00	88.78	98.44	100.00
σ	16.95	14.27	22.06	15.41	16.00
<i>Twenty-four Months</i>					
N	43	12	17	14	90
\bar{X}	88.93	90.00	84.00	93.93	99.90
σ	16.19	12.12	17.96	16.35	16.30

twenty-four months, all three cleft groups scored significantly lower than the Bayley norms.

The second dimension was *object orientation*. At six months, the CPO and CLP groups scored significantly lower than the CLO group and Bayley norms. At twelve months, only the CPO group scored significantly lower. There were no statistically significant differences at eighteen months. At twenty-four months, the CLO group scored significantly lower than the CPO, CLP groups and Bayley norms.

The third dimension was *imaginative play*. At six and twelve months, there were no statistically significant differences among the three cleft type groups and the Bayley norms. At eighteen months, the CLO and CLP groups were scored as less imaginative in their play as compared with the Bayley norms. At twenty-four months, the CPO and the CLP groups were rated as less imaginative in their play.

The fourth dimension was *activity level*. At six, twelve, and eighteen months, the CPO group was significantly lower on activity level than the Bayley norms. The only other significant difference was for the CLP group at six months, also in the direction of less activity.

The final dimension was *reactivity level*. At six, twelve, and eighteen months, the CLP group was rated as significantly lower than the Bayley norms. At twelve months, the CPO group was rated significantly lower than the Bayley norms.

The findings here suggest that there might be fluctuations in the mental and motor development of the CPO and CLP groups. These fluctuations appear to occur after twelve months of age and are most marked in the CLP group. These findings are interpreted with caution

TABLE 3. Cross-sectional sample sizes, means, and standard deviation of the psychomotor development index of cleft subjects compared with Bayley norms.

<i>Six Months</i>					
	<i>All Clefts</i>	<i>CPO</i>	<i>CLP</i>	<i>CLO</i>	<i>Bayley Norms</i>
N	62	21	24	17	94
\bar{X}	98.18	98.14	96.42	100.71	99.70
σ	12.50	11.87	12.41	13.67	16.50
<i>Twelve Months</i>					
N	69	22	27	20	94
\bar{X}	93.54	92.50	92.41	96.15	100.00
σ	15.67	15.10	17.66	13.87	16.00
<i>Eighteen Months</i>					
N	58	19	23	16	89
\bar{X}	95.91	89.58	89.91	93.63	100.10
σ	14.86	10.49	15.97	18.17	15.90
<i>Twenty-four Months</i>					
N	42	12	17	13	90
\bar{X}	91.50	96.58	87.65	97.92	100.10
σ	16.53	12.23	16.45	19.24	16.20

because of the nature of the sample. It is for this reason that we undertook the second analysis.

Longitudinal Sample

SAMPLE. The twenty-eight children with cleft lip and/or palate were subjects for whom there were complete Bayley data at each age period (six, twelve, eighteen, and twenty-four months). Table 4 presents the sex and cleft type distribution of the sample.

RESULTS. The design for this longitudinal analysis had to take into account initial differences in the patients and how they change over time. The repeated measure analysis of variance employed took both of these problems into consideration. In a sense, each patient served as his own control. Hence, the existence of differences in mental and motor functioning because of cleft type, age, and/or cleft type-age interaction could be determined.

Table 5 presents the means, standard deviations, and sample sizes of the MDI of the cleft subjects as compared with the Bayley norms at six, twelve, eighteen, and twenty-four months. The results of the analysis

	<i>CPO</i>	<i>CLP</i>	<i>CLO</i>	<i>Totals</i>
Male	4	9	7	20
Female	4	3	1	8
Totals	8	12	8	28

TABLE 4. Sex and cleft type distribution for longitudinal sample.

TABLE 5. Longitudinal sample sizes, means, and standard deviations of the mental development index of cleft subjects compared with Bayley norms.

<i>Six Months</i>					
	<i>All Clefts</i>	<i>CPO</i>	<i>CLP</i>	<i>CLO</i>	<i>Bayley Norms</i>
N	28	8	12	8	94
\bar{X}	95.89	92.38	96.25	98.88	100.20
σ	18.11	13.51	22.73	17.14	16.90
<i>Twelve Months</i>					
N	28	8	12	8	94
\bar{X}	99.96	107.38	89.80	107.75	100.10
σ	17.87	12.44	21.17	10.55	15.90
<i>Eighteen Months</i>					
N	28	8	12	8	89
\bar{X}	90.82	87.50	88.50	97.63	100.00
σ	16.92	10.78	21.37	15.38	16.00
<i>Twenty-four Months</i>					
N	28	8	12	8	90
\bar{X}	89.64	94.50	83.67	93.75	99.90
σ	15.86	10.17	18.24	16.54	16.30

F ratio for cleft type = 1.05

F ratio for age \times cleft type = 2.11

F ratio for age = 6.24, $P = .01$

indicated that there were no statistically significant differences among groups by cleft type. The cleft type and age interaction was also not statistically significant. The results for age were statistically significant.

Because of the significant *F* ratio for age, *t* tests were run between age groups. This could be done only for the sample of children with clefts as the Bayley manual does not include any raw scores.

The results of the *t* tests were not statistically significant for the age group comparisons at six and twelve months, twelve and eighteen months, and eighteen and twenty-four months. However, the comparison between twelve and eighteen months approached statistical significance ($t = 1.93$).

Table 6 presents the means, standard deviations, and sample sizes of the PDI of the cleft subjects as compared with the Bayley norms at six, twelve, eighteen, and twenty-four months. The results of the analysis indicate that there were no statistically significant differences between groups by cleft type, age, or cleft type and age interaction.

The results for the Infant Behavior Record of the patients in the longitudinal sample were similar to those patients in the cross-sectional sample. Therefore, they will not be presented.

The findings in this analysis for the longitudinal sample do not suggest that there are any significant differences in the mental and motor functioning of children with oral-facial clefts from six months to two years of age as compared with the Bayley norms.

TABLE 6. Longitudinal sample sizes, means, and standard deviation of the psychomotor development index of cleft subjects compared with Bayley norms.

<i>Six Months</i>					
	<i>All Clefts</i>	<i>CPO</i>	<i>CLP</i>	<i>CLO</i>	<i>Bayley Norms</i>
N	28	8	12	8	94
\bar{X}	96.35	93.12	95.00	101.63	99.70
σ	12.59	9.26	13.71	13.56	16.50
<i>Twelve Months</i>					
N	28	8	12	8	94
\bar{X}	91.46	84.88	88.25	102.88	100.00
σ	16.10	10.44	18.04	12.79	16.00
<i>Eighteen Months</i>					
N	28	8	12	8	89
\bar{X}	88.96	91.75	86.75	89.50	100.10
σ	13.53	10.31	16.66	12.09	15.90
<i>Twenty-four Months</i>					
N	28	8	12	8	90
\bar{X}	95.25	96.88	91.67	100.25	100.10
σ	16.09	14.72	12.36	13.85	16.20

F ratio for cleft type = 1.63

F ratio for age = 2.42

F ratio for cleft type \times age = 1.31

Discussion

The small sample size is a limitation of this study. It suggests that caution has to be exercised in extrapolating our findings to all patients with oral-facial clefts.

The authors also recognize that it would have been preferable to have a group of noncleft children to serve as a control group. Two attempts were made to secure and maintain such a comparison group, and both were unsuccessful. Use of normative data was considered to be a less desirable but an acceptable alternative.

The results of this study suggest that there are no significant differences in the mental and motor functioning of children with oral-facial clefts from six months to two years of age as measured by the Bayley Scales. These findings support those of Plotkin *et al.*, (1970) who reported that the developmental functioning of infants with cleft lip and/or palate, as measured by the Cattell Infant Intelligence Scale, was normal for their age levels.

Results of this study also suggest that the cleft population is not a homogeneous one in mental and motor functioning (Ruess, 1968). As measured by the Bayley Scales of Infant Development, in both the cross-sectional and longitudinal samples, the CLO group did not differ from the Bayley norms on the MDI or PDI. In fact, the higher scores of the CLO group on these scales illustrates the danger of pooling all cleft subjects as the CLO group contributed disproportionately to the higher scores for all clefts. This suggests the need to consider the heterogeneity of the cleft sample in all studies of this nature.

The analysis of the Infant Behavior Record was not suggestive of a trend for any particular cleft type. Together, the significant findings for the five dimensions (*responsiveness to mother, object orientation, imaginative play, activity, and reactivity levels*) are suggestive of the fact that our subjects tended to be more passive or to show a greater tendency to avoid sensorimotor stimuli than did noncleft children.

Summary

This has been a report of two analyses of the mental, motor, and social behavior of children with cleft lip and/or palate as measured by the Bayley Scales for Infant Development. The findings support the premise that the cleft population is not homogeneous and that there are no significant differences in the mental and motor functioning in these cleft subjects from the ages of six months to two years.

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