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ABSTRACT

This paper describes a study which examined the performance of 48 pairs of 18-month-old twins on the Mental Development Scale of the Bayley Scales of Infant Development to determine whether score differences would be found for the three subgroups of identical, fraternal same-sexed, and fraternal opposite-sexed twins. Of the 96 subjects, 46 (23 pairs) were identical twins; 22 subjects (11 pairs) were same-sexed fraternal; and 28 (14 pairs) opposite-sexed fraternal twins. The twins were tested in their homes, generally, within two weeks of their 18-month birthday. For the entire group, the overall Mental Development Index was 95.5; for identical twins, the average Index was 94.0; for same-sexed fraternal twins, the average Index was 90.4; and for opposite-sexed twins, the average Index was 102.2. These results are discussed, and it is suggested that the typical differential treatment given to boys and girls may lead to a greater differentiation of treatment and/or more individual attention for the opposite-sexed twins than for same-sexed twins. In addition, twin-pair interaction may differ for same-sexed and opposite-sexed twins, influencing each twin's intellectual development in different ways. (CS)

DIFFERENTIAL MENTAL DEVELOPMENT OF 18 MONTH-OLD SAME-SEXED AND OPPOSITE-SEXED TWINS

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DIFFERENTIAL MENTAL DEVELOPMENT OF 18 MONTH-OLD SAME-SEXED AND OPPOSITE-SEXED TWINS

It is generally agreed that as a group, young twins score below-average on ability tests, especially on measures of verbal ability. However, findings by Koch in her book "Twins and Twin Relations," suggest that this generalization may not be true for all twin-type subgroups. Koch analyzed the intellectual performance of 96 pairs of 5- to 7-year old twins separately for the subgroups of monozygotic twins, dizygotic same-sexed twins, and dizygotic opposite-sexed twins. She found that on the verbal subtest of the Thurstone Primary Mental Abilities Test both same-sexed twin groups had scores significantly lower than matched singletons. This was not true for opposite-sexed fraternals. However, Myrianthopolcus, Nichols, Broman and Anderson have reported that at 8 months, 4 years, and 7 years, twin test scores are significantly below those of singletons, but that this degression was not differential for the twin types.

The present study examined the performance of 18 month-old twins given the Mental Development Scale of the Bayley Scales of Infant Development in order to determine whether this differences of scores would be found for the 3 subgroups of identical, fraternal same-sexed and fraternal opposite-sexed twins.

Method

Subjects

Potential subjects were identified from records of twin births at five hospitals in Indianapolis and Lafayette, Indiana. Indianapolis

subjects were obtained with the cooperation of the Department of Medical Genetics of the Indiana University School of Medicine. Of the 50 twin families who were located and contacted for this study, only 2 refused to participate.

Birthweight and other perinatal information was obtained from hospital records. Blood serology and dermatoglyphics were used to determine zygosity. Forty-sex (23 pairs) of the subjects were identical (MZ) twins; of these, six (3 pairs) were males. Twenty-two subjects (11 pairs) were same-sexed fraternal (DZS) twins with eight (4 pairs) of these males. There were 28 (14 pairs) opposite-sexed fraternal (DZO) twins. Subjects' families were from a wide variety of socioeconomic backgrounds and ranged from Class 1 through Class 7 on the occupational scale of the Hollingshead Two Factor Index of Social Position. The mean rating was 4.7 for all subjects, indicating that the population studied was typically lower-middle class. Of the 96 subjects in this study, 62 were white and 24 non-white. Twenty of the non-white subjects were Black; two twins (1 pair) were bi-racial Caucasion-Chinese mixture with a white mother, and two twins (1 pair) were a bi-racial black-white mixture with a white adoptive mother.

Procedure

Twins and their families were seen in their homes in order to encourage cooperation on the part of both the mother and the children. Twins were usually tested within two weeks of their 18-month birthday. However, two pairs were tested at 19-months of age following the Christmas holidays. Twins were tested by one of four female examiners. The twins were usually, but not always, tested by different examiners. The examiners were in most instances aware of the twins zygosity. Twins were most frequently

tested at the kitchen table seated in their own high chairs. The Mental Development Scale of the Bayley Scales of Infant Development was administered following a brief period in which the child became familiar with the examiner. Information obtained from an interview with the primary caretaker included the occupation or source of income for the head of the household and the number of other children in the home. The primary caretaker was judged to be the mother in 45 families, the father in 2 families, and a hired caretaker in one family.

Results

Results will be reported here for the Mental Development Index (MDI) which is obtained from the Bayley norms. For the entire group of 96 twins the overall average Mental Development Index was 95.5. However, there were significant differences between the twin subgroups. For the identicals, the average Index was 94.0. For the same-sexed fraternals the average Index was 90.4. For the opposite-sexed twins the average Index was 102.2. For both variables on overall analysis of variance was significant at the .05 level. (Raw score: $F = 3.86$, $p < .05$; MDI: $F = 3.47$, $p < .05$). Individual t-tests revealed that the scores for the opposite-sexed fraternals were significantly higher than those of either same-sexed group but that the same-sexed fraternals and the identicals did not differ from one another.

The test items were examined and separated into two categories of verbal and nonverbal items and the separate raw scores calculated and examined to see if one or the other class of behaviors was primarily involved in the twin type difference. The pattern of differences reported above for the overall scores held true for both the verbal and nonverbal items examined separately.

The data were also examined for possible sex differences. For none of the groups were there differences between the scores of males and females; that is, the pattern of twin subgroup differences held for both boys and girls.

In order to eliminate some possible explanations for these differences, the groups were compared on the variables of socioeconomic status, racial composition, number of children in the family, mother's age, and birthweight. Our subjects, like Koch's, were classified into one of three weight categories: over 5-1/2 pounds, from 4-1/2 to 5-1/2 pounds, and under 4-1/2 pounds. There were no socioeconomic or racial composition differences among the groups nor did the mother's age and average number of children in the family differ significantly for the groups. It was the case that the groups differed significantly in weight classification with the identicals more often in the lower weight categories, not an unusual finding in the twin literature.

If differential birthweight was responsible for the depressed functioning of identical twins, one would expect that the average Bayley score for the three weight groups would differ. This was not true for either the overall group of twins or for the identical twin subgroup. The data reporting the relationship between Bayley scores and the other variables on which the groups did not differ have been analyzed and are to be reported elsewhere.

Although both prenatal and postnatal deprivation have been suggested as responsible for the decrement in the intellectual functioning of twins, we believe that the most likely explanation is an environmental one. The environment of twins as compared to singleton would seem to be less optimal for mental development. Although there are no systematic

observations to document this, casual observation and parental report suggest that twins receive less individual attention from their parents and have extensive social interaction with one another.

Again, although there is presently no systematic data it seems likely that those two factors may operate differentially for the twin subgroups. On the basis of what little direct evidence is available, one may conclude that young boys and girls are treated differently. Difference in terms of such variables as amount of physical contact and verbal interactions is reported by Moss (1967); that parents have different expectations for the two sexes was reported by Aberle and Naegele (1952); Fagot (1973) reported that parents see certain traits as masculine and others as feminine. The data reported at this session today further supports this view. In addition, casual observation suggests that the toys made available for the sexes differ from an early age: possibly opposite-sexed twins have available to them a greater variety of toys than do same-sexed pairs. We suspect that the typical differential treatment given to boys and girls leads to a greater differentiation of treatment and/or more individual attention for the opposite-sexed twins than for same-sexed twins.

Additionally, it seems that the nature of the twin-pair interaction may differ for same-sexed and opposite-sexed twins and that these interactions may influence the twin's intellectual development. For example, a study by Ikeda (1970) reported that same-sexed twins seemed to differentiate themselves from their twins at a later time than did opposite-sexed twins. Interestingly, Koch reported that opposite-sexed twins had the least attachment to one another. Further, she found that identical twins displayed even greater closeness than fraternal same-sexed twins and that they were lower in verbal ability scores. We are not suggesting that closeness

or attachment per se will interfere with optimal development. Rather there is likely to be some mediating mechanism: for example, twins who are close may prefer to interact socially with one another and may spend less time with adults and less time exploring objects and their environment.

Our ongoing research suggests that there may well be a developmental factor involved. Additional data from 18-month c confirm the pattern reported here. However, our work being done with 3 to 5 year olds suggests that there is no longer a difference between the two fraternal subgroups while the identical twins are below the fraternals in a number of aspects of verbal functioning.

Further research is needed that would observe the interaction patterns in the environment of the various twin subgroups at a variety of ages. The findings from such a study might yield information that, given to the parents of twins, would enable the elimination of the depressed development presently found, on the average, for twin pairs.

Finally, we suggest that our findings and those of the others in this paper session have methodological implications for persons who are obtaining behavioral measurements from twins in order to make generalizations about the relative effects of heredity and environment. One of the basic assumptions of the twin method is that the environmental contribution to the within-pair variance of a characteristic is the same for identical and fraternal twins.

If boys and girls are receiving differential treatment from their environment then it may be most appropriate to use only data from fraternal same-sex twins in the determination of heritability coefficients.

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