

# Some Maternal and Child Developmental Characteristics Associated with Breast Feeding: A Report from the Dunedin Multidisciplinary Child Development Study

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**Silva, P. A., Buckfield, Patricia, and Spears, G. F. (1978). *Aust. Paediatr. J.*, 14, 265-268. Some maternal and child developmental characteristics associated with breast feeding: A report from the Dunedin Multidisciplinary Child Development Study.** A study of some maternal, experiential, and developmental characteristics of 1037 three-year-old children who were breast fed for varying lengths of time was described. The results indicated that those children who breast fed longest had advantaged mothers and more developmental experiences. When these differences were controlled by matching breast fed with non breast fed children, there were no significant advantages in developmental status found consistently to characterise the breast fed children. It was concluded that alleged "probable" developmental benefits to children from breast feeding should be more properly considered "possible".

In a recent review article on breast feeding, Taylor (1977) drew attention to some alleged "probable benefits" to the infant thought due to this form of feeding. Included in the list were more rapid early motor development, enhanced learning ability, higher IQ's, and less psychological problems. Others have suggested that breast feeding results in clearer speech and better early reading progress in boys (Broad, 1972) and faster "brain growth" as assessed by head circumference measures (Anderson *et al.*, 1977).

In his concluding statements, Taylor (1977) properly drew attention to the difficulties of interpreting reported associations between breast feeding characteristics in children and warned that these may not reflect cause and effect. He pointed out that reported differences may be due to other controlled co-variables.

This study was designed to examine whether 3-year-old children who had been breast fed show any significant developmental advantages compared with non-breast fed children, when the effect of some of the maternal and experiential co-variables of breast feeding was controlled through matching. Control of the co-variables was necessary because it had already been shown that length of breast feeding was significantly correlated with maternal general mental ability, maternal education levels,

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socio-economic level, and child experiences (Silva, 1976) which, in turn, were known to be correlated with child intelligence (Silva and Fergusson, 1976).

## METHODS

### Subjects

The sample consisted of 1037 three-year-old children studied in the Dunedin Multidisciplinary Child Development Study. The sample has been fully described elsewhere (Silva, 1976; Silva *et al.*, 1978), as have the patterns of breast feeding and reasons for weaning the baby (Hood *et al.*, 1978).

### Methods of Data Collection

The mothers were interviewed and their children assessed when they were within a month of their third birthday. The following data were collected:

#### Length of Breast Feeding in Weeks

This was assessed as less than a week (N = 463), 1-4 weeks (N = 98), 5-12 weeks (N = 205), 13-24 weeks (N = 116), 25-36 weeks (N = 84), 37-51 weeks (N = 41), and more than 51 weeks (N = 30).

#### Maternal Factors

1. General mental ability (Thurstone and Thurstone, 1973). Raw scores were converted to IQ's using the method described by Silva (1976).
2. Maternal education levels — a 5 point scale (Silva and Fergusson, 1976).
3. Socio-economic level — a 6 point scale (Elley and Irving, 1972).

#### Child Experiences

Score on a 30 point checklist of developmental experiences (Silva, 1976).

#### Child Developmental Characteristics

1. Age of attainment of the milestones of smiling, sitting unaided, walking unaided, talking in single words, and talking in sentences.
2. Gross motor co-ordination (Bayley, 1961).
3. Fine motor co-ordination (Silva, 1976).
4. Verbal comprehension and verbal expression (Reynell, 1969; McKerracher *et al.*, 1977).
5. Intelligence (Dunn, 1965).
6. Child behaviour problems — separation problems, short concentration and hyperactivity. These were observed by the psychometrist and were defined as follows:
  - (a) separation problems: child very upset, cries, clings to mother, may have tantrum or withdraw, refusing to look at examiner or talk to him. Stays clinging to mother throughout interview.
  - (b) short concentration: attends to tasks very briefly, highly distractable, fleeting and sporadic

attention, lack of concentration interferes significantly with test performance.

(c) hyperactivity: extreme overactivity and restlessness, can't sit still, constantly in motion, activities not in response to specific external stimulation.

7. Height, weight, and head circumference were measured as described by Clarkson *et al.* (1975).

#### Analysis of Data

For data that were normally distributed, means were computed for each of the seven breast feeding groups and differences were tested for significance using analysis of variance, Scheffe's (1959) method for testing simultaneous comparisons, or the Student's t test as appropriate. For ordinally scaled variables, differences were tested for significance using the Wilcoxon Matched Pairs Signed Rank Test and for categorical data the Fisher's Exact Probability Test or Chi Squared Test was applied, depending on the distribution of numbers in each cell (Siegel, 1956).

For the comparison of maternal and experiential characteristics, each breast fed group was compared with the total group that had not breast fed for more than a week. For comparison of data on early milestones, co-ordination, verbal ability, intelligence, child behaviour problems, and anthropometric status, each breast fed group was compared with a matched comparison group selected from among the non-breast fed group. Matching was based on mother's general mental ability, educational level, socio-economic status, and the child's score on the Experiences Scale. This was done to control for the effect of differences in the maternal and experiential characteristics of breast fed and non-breast fed groups.

It should be noted that these latter matched comparisons involved 16 separate variables, each of which was compared for six breast fed groups and its matched control group. This means that 96 separate comparisons were made altogether. On the basis of binomial distribution theory (e.g., see Guilford, 1965), it would be expected that approximately five comparisons would be significant at the .05 level and one would be significant at the .01 level on the basis of chance alone.

## RESULTS

### Maternal and Environmental Characteristics

The results of these analyses are summarised in Table 1.

The table shows that there were significant differences in maternal characteristics. The three longest breast feeding groups (25-36 weeks; 37-51 weeks;

TABLE I  
Means of Maternal Characteristics and Experiences Measures

Breast Feeding Groups	less than 1 week	1-4 weeks	5-12 weeks	13-24 weeks	25-36 weeks	37-51 weeks	more than 51 weeks	Error root Mean Square
Numbers	463	98	205	116	84	41	30	—
General Mental Ability	96.15	98.54	100.04	103.26*	106.01*	108.37*	113.43*	14.15
Level of Education	1.24	1.33	1.50	1.54	1.88*	2.29*	2.47*	.88
Socio-economic Level	4.40	4.10	3.81*	3.71*	3.33*	2.83*	3.40*	1.92
Experiences Scale	17.65	18.13	18.04	18.54*	19.29*	19.95*	21.33*	3.46

\*Indicates a mean significantly different from the non-breast fed (< 1 week) group ( $p < .05$ ). (Analysis of variance followed by Scheffe's method of simultaneous comparisons).

and more than 51 weeks) were all significantly advantaged in maternal general mental ability, level of education, and socio-economic level in comparison with the non-breast fed group. In addition, the 5-12 weeks and 13-24 weeks groups were from higher socio-economic levels than the non-breast fed group and the 13-24 week group was also of significantly higher maternal general mental ability.

The table shows a trend towards increasing advantage with increased length of breast feeding. This is most clearly shown with regard to maternal general mental ability where the non-breast fed group had a mean IQ score of 96.15 as against 113.43 for the group breast fed for a year or more.

Table I also shows that the groups who breast fed for more than 13 weeks gained significantly higher scores on the Experiences Scale than the non-breast fed groups.

The findings that the longer breast feeding groups were characterised by more intelligent, better educated, more socially advantaged mothers and that these children had more experiences indicated the need to control for these variables in an analysis of child developmental characteristics associated with breast feeding. Had these variables not been controlled, the breast fed children may have shown abilities and attributes that were an outcome of the generally advantaged maternal and experiential characteristics rather than breast feeding *per se*.

#### Results of Matched Comparisons

Comparison of the breast feeding groups with the matched comparison groups resulted in only one significant difference among 96\* comparisons made. There were no differences that were significant at the .05 level or less in age of attainment of the milestones, gross or fine motor ability scores, verbal comprehension or expression, ability, intelligence, the incidence of separation problems, hyperactivity, height, weight and head circumference.

With one exception, there were no significant differences in concentration. The one exception was the comparison between the group breast fed for 13-24 weeks and its matched control group. (Fisher's Exact Probability Test  $p < .005$ ). However, this must be considered an isolated finding as it was the only significant difference found in 96 separate comparisons and could well have resulted from chance.

#### DISCUSSION

The most interesting finding to emerge from this study was that children who were breast fed came

\*Detailed tables of results are available from the author on request. Because only one difference was statistically significant ( $p < .05$ ), it was not considered informative to publish the detailed results.

from more advantaged environments and had more intelligent mothers than those who were not breast fed. This advantage increased with length of time the infants were breast fed.

The first implication, already referred to, is the need to control for these factors in an analysis of the characteristics of breast fed children compared with their non-breast fed peers. A second implication is that if it is assumed that breast feeding conveys advantages to the baby and/or the mother (e.g., see Fergusson *et al.*, 1978), then education programmes should focus on encouraging the less advantaged mothers to breast feed. Among the present sample, 36 mothers had received guidance on breast feeding from the local La Leche League and the mean IQ of these mothers was 113.3, standard deviation 12.18, compared with a mean of 99.80, standard deviation 14.76 for the remainder. This suggests that the La Leche League may well be an elite group who might look to ways of providing guidance to the less advantaged mothers in the community.

An analysis of 16 aspects of child development where breast fed children were compared with matched non-breast fed children, resulted in only one statistically significant difference that could have resulted by chance. This finding indicates that claims for "probable" long term benefits to the child must be accepted with considerable caution. This finding does not, however, imply that breast feeding is not beneficial or not to be encouraged. Benefits conveyed at the time of breast feeding may well be important in their own right and do result in additional health benefits to the child not considered in this study (e.g., see Fergusson *et al.*, 1978). Further, it may be that breast feeding in the first months of life has subtle psychological benefits for the mother and/or child that were not detected or long term effects that cannot yet be ascertained. Ongoing study of the possible long term effects of breast feeding, if any, are planned. In the meantime, benefits of the kind reported in this study should be considered "possible" rather than "probable".

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