



## Helping mothers adapt to infants of low birth weight may reduce the risk of cognitive impairment

**CITATION:** Rauh, V. A., Achenbach, T. M., Nurcombe, B., Howell, C. T., & Teti, D. M. (1988). Minimizing adverse effects of low birth weight: four-year results of an early intervention program. *Child Development*, 59, 544–553.

**LEVEL OF EVIDENCE:** IA1a

### RESEARCH OBJECTIVE/QUESTION

The study examined the effects of an early intervention program, the Mother-Infant Transaction Program (MITP) which is aimed to assist mothers in their adjustment to the birth and care of a low-birth-weight infant. It was hypothesized that confident, knowledgeable, and effective parenting would reduce the risk of developmental disorder or delay.

### DESIGN

X	RCT		Single Case		Case Control
	Cohort		Before-After		Cross Sectional

### SAMPLING PROCEDURE

	Random	X	Consecutive
	Controlled	X	Convenience

- All infants born between April 1980 and December 1981 at the Medical Center Hospital whose birth weight was below 2,250 grams and gestational age was less than 37 weeks, and who were hospitalized in the intensive care nursery for at least 10 days, were screened for inclusion in the low-birth-weight (LBW) group.
- Infants resulting from multiple births, showing congenital anomalies or severe neurological defects, or born to single mothers were excluded.
- The normal birth-weight (NBW) infants and their mothers were recruited from a normal nursery by selecting the next NBW baby born following the birth of each LBW control infant.

## **SAMPLE**

N=81	M age=34.9 months gestational age	Male=NR	Ethnicity=NR	Female=NR
------	---	---------	--------------	-----------

NR = Not reported

25 LBW dyads were randomly assigned to the experimental group and 28 LBW dyads were assigned to the control group. There was also a comparison group of 28 NBW infants (over 2,800 grams and more than 37 weeks gestation) and their mothers.

## **PARTICIPANT CHARACTERISTICS**

NR

## **MEDICAL DIAGNOSIS/CLINICAL DISORDER**

Low birth weight

## **OT TREATMENT DIAGNOSIS**

Low birth weight

(The LBW control group had a lower mean socioeconomic status (SES) than either of the other two groups)

## **OUTCOMES**

Maternal response to intervention; measures of maternal outcomes, such as confidence and anxiety level, perceptions of infant temperament, and satisfaction with the mothering role; and infant cognitive development.

<b>Measures</b>	<b>Reliability</b>	<b>Validity</b>
3-point scales of Quality of Mothering and Degree of Receptivity to the Program	NR	NR
Seashore Self-Confidence Rating Paired Comparison Questionnaire	NR	NR
Taylor Manifest Anxiety Scale	NR	NR
Carey Infant Temperament Questionnaire	NR	R
Satisfaction Scale-Likert Scale	Satisfaction Scale— interrater reliability $r=.94$	Cronbach's alpha=.80
Bayley Scales of Infant Development, Mental Development Indices (MDI)	Bayley Scales of Infant Development— interrater reliability $r=.89$	NR
McCarthy Scales of Children's Abilities	NR	NR

NR=Not reported

## INTERVENTION

### Description

The in-hospital sessions were devoted to acquainting the mother with qualities of her infant's functioning in different domains. Examples of different domains include demonstrating the infant's potential for self-regulation and interaction, noting behavioral signs of infant distress, recognizing the infant's predominant states, and so on. At the end of the final session, the mother was presented with a logbook of the baby's development.

### Who delivered

Neonatal intensive care nurse

### Setting

Private or semiprivate room (in hospital or at home)

### Frequency/Duration

Eleven 1-hour sessions, seven conducted during the week prior to the infant's discharge from the hospital and four in the home at 3, 14, 30, and 90 days after discharge.

### Follow-up

Four home sessions, 3, 14, 30, and 90 days after discharge

## RESULTS

To control for between-group differences in SES, this variable was included as a covariate in all analyses following.

### *Treatment effects on Mothers:*

- There were significant overall differences found on *self-confidence*...  $F(2,66)=4.38$ ,  $p=.02$ . The a priori contrast between the two LBW groups was also significant,  $F(1,66)=4.14$ ,  $p<.05$ , with experimental mothers scoring higher than controls. SES was not associated.
- There was no significant difference found on *role satisfaction*,  $F(2,76)=2.76$ ,  $p=.07$ ; however, the a priori contrast between the two LBW groups did achieve significance,  $F(1,76)=5.22$ ,  $p<.05$ , with the experimental mothers scoring higher. SES was associated.
- Overall group differences on maternal *perception of infant difficulty* were significant,  $F(2,67)=7.38$ ,  $p=.001$ , and the a priori contrast showed that the LBW experimental mothers perceived their infants to be less difficult,  $F(1,67)=14.01$ ,  $p<.01$ . SES was not associated. There was no significant group difference on the measure of maternal *anxiety*.

### *Treatment effects on Children:*

- A priori contrasts revealed no significant differences between the LBW groups on the Bayley MDI at either 6 or 12 months ( $F < 1$ ), and the 6-pt difference at 24 months in favor of the LBW experimental group was still not significant,  $F = 1.81$ ,  $p < .10$ .
- At 36 months, McCarthy GCI scores obtained by the LBW control group were significantly lower than those of the LBW experimental group ( $F = 4.42$ ,  $p < .05$ ), and the difference increased at 48 months ( $F = 8.72$ ,  $p < .01$ ).
- Comparison of experimental and NBW group means (adjusted for SES) shows that the gap between them closed between ages 6 months, when the NBW group was 6.3 points ahead, and 48 months, when the NBW group was only .4 points ahead.
- The difference obtained at 48 months was examined via partial correlations, using all 56 LBW children. Results indicate that although SES clearly made a significant contribution to McCarthy GCI scores among LBW children, the experimental intervention made an independent contribution of smaller magnitude.

## CONCLUSIONS

- The intervention program had a beneficial effect on mothers' initial adjustment to their LBW infants, and a longer-term positive effect on child cognitive development.
- Because the mean-adjusted 48-month McCarthy score for the LBW experimental group was almost identical to that of the NBW group, the intervention appears to have reduced the risk of impaired cognitive development in the LBW sample.
- Regarding the delayed emergence of cognitive effects, studies involving children at risk for impaired development on the basis of environmental rather than biologic disadvantage provide evidence of developmental plasticity.

## LIMITATIONS

### Biases

	Attention	x	Masking/blinding		Drop outs
	Contamination		Co-intervention		

- Cohort is from 1980–1981; subjects from one hospital.
  - There was a between-group difference for SES.
  - Unclear what the control group received, not discussed in article.
  - At 36 and 48 months, the outcome measure switched to the McCarthy Scale score.
  - Intervention only accounted for 9.8% of the variance on the 48-month McCarthy Scale score.
  - For all three analyzed groups, the Bayley scores and the McCarthy scores were all within 1 standard deviation of mean (clinical significance questioned).
  - One NICU nurse did treatment and maternal assessment; no blindness or inter-rater reliability were established.
- Terminology used in this document is based on two systems of classification current at the time the evidence-based literature reviews were completed: *Uniform Terminology for Occupational Therapy Practice—Third Edition* (AOTA, 1994) and

*International Classification of Functioning, Disability and Health (ICIDH-2)* (World Health Organization [WHO], 1999). More recently, the *Uniform Terminology* document was replaced by *Occupational Therapy Practice Framework: Domain and Process* (AOTA, 2002), and modifications to *ICIDH-2* were finalized in the *International Classification of Functioning, Disability and Health* (WHO, 2001).

This work is based on the evidence-based literature review completed by L. Diane Parham, PhD, OTR, FAOTA, and Nancy Bagatell, MA, OTR, with contributions from Christine R. Berg, PhD, OTR/L, and Patricia D. LaVesser, PhD, OTR/L.

For more information about the Evidence-Based Literature Review Project, contact the Practice Department at the American Occupational Therapy Association, 301-652-6611, x 2040.

Copyright 2004 American Occupational Therapy Association, Inc. All rights reserved. This material may be reproduced and distributed without prior written consent.