FOCUSED QUESTION
In low birthweight infants, what is the effect of early intervention programs on improving behavioral development and cognitive, neuromusculoskeletal, and movement-related functions, compared to lowbirthweight infants who do not receive early intervention treatment in these specified areas?


CLINICAL BOTTOM LINE:
A Cochrane meta-analysis on the effects of early intervention programs post discharge with preterm infants found a positive influence on cognitive and motor outcomes, with cognitive benefits persisting until 5 years of age. It is suggested that early intervention programs that focus on parent–infant relationships along with development have shown to have the greatest positive effect. The Infant Behavior Assessment and Intervention Program (IBAIP) emphasizes environmental, behavioral, and early development factors and aims to reinforce the infant’s self-regulation and multiple developmental functions via infant–parent interactions. Possible implications for occupational therapists is that they can be trained in pediatric IBAIP and other early intervention programs that can assist with motor development, visual motor integration, and play skills. Occupational therapists can coach and involve parents on their child’s development and early intervention. IBAIP lead to improvements on performance IQ, ball skills, and visual motor integration at 5.5 years corrected age. Development of these skills is imperative for activities of daily living for children, like self-care, accessing their education, and participating in play.

RESEARCH OBJECTIVE(S)
List study objectives below.
Evaluate the effect of Infant Behavioral Assessment and Intervention Program (IBAIP) in very low birthweight infants (VLBW, less than 32 weeks gestation and or birthweight of <1500 grams) on cognitive, neuromotor, and behavioral development at 5.5 years corrected age (CA).
**DESIGN TYPE AND LEVEL OF EVIDENCE:**

Level I: Randomized controlled trial. Eighty-six very low birthweight (VLBW) infants received IBAIP intervention until 6 months corrected age and 90 VLBW infants received standard care post discharge.

Limitations (appropriateness of study design):
Was the study design type appropriate for the knowledge level about this topic? *Circle yes or no, and if no, explain.*

YES/NO

**SAMPLE SELECTION**
How were subjects selected to participate? Please describe.

A computer-generated randomization, with stratification for gestational age (less than or equal to 30 weeks gestation) and recruitment placement was used to allocate participants to intervention or control group, with multiplets assigned to the same group.

**Inclusion Criteria**
The inclusion criterion is comprised of infants less than 32 weeks’ gestational age and or birthweight less than 1500 grams. Written informed consent was obtained from parents before the start of the study.

**Exclusion Criteria**
Exclusion criteria were severe congenital abnormalities of the infant, severe mental or physical illness/problems of the mother, non–Dutch-speaking families for whom an interpreter could not be provided, and participation in other intervention(s) on post discharge management.

**SAMPLE CHARACTERISTICS**

<table>
<thead>
<tr>
<th>N= 176 Very Low Birthweight Infants</th>
<th>% Dropouts 23%</th>
</tr>
</thead>
<tbody>
<tr>
<td>#/ (%) Male</td>
<td>66 (49%)</td>
</tr>
<tr>
<td>#/ (%) Female</td>
<td>70 (51%)</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>NR</td>
</tr>
<tr>
<td>Disease/disability diagnosis</td>
<td>Low birthweight infant less than 32 weeks gestation and or birthweight of &lt;1500 grams</td>
</tr>
</tbody>
</table>

Check appropriate group:

<table>
<thead>
<tr>
<th>&lt;20/study group</th>
<th>20–50/study group</th>
<th>51–100/study group</th>
<th>101–149/study group</th>
<th>150–200/study group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>✓</td>
<td></td>
<td></td>
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</tbody>
</table>
### INTERVENTION(S) AND CONTROL GROUPS

**Add groups if necessary**

#### Group 1: IBAIP Group

<table>
<thead>
<tr>
<th>Brief Description</th>
<th>Infant Behavioral Assessment and Intervention Program (IBAIP) is a neurobehavioral intervention program that evaluates the infant’s neurobehavioral organization and self-regulation within the context of the environment. The IBAIP interventionist also informs the parents of facilitation strategies that best support the infant’s neurodevelopmental progression and self-regulation. The strategies include visual and auditory input, handling and positioning, and cue-matched facilitation (e.g. foot bracing, hands to midline). The objective of IBAIP is to provide the infant with multiple opportunities to actively process and explore information while maintaining stable physiological and behavioral functioning. The program reinforces the infant’s growth, infant’s motivation to explore, and provides opportunities to learn novel information.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting</td>
<td>Home</td>
</tr>
<tr>
<td>Who Delivered?</td>
<td>IBAIP-trained pediatric physical therapist. The IBAIP-trained therapist trains the parents to effectively and responsively interact with their child through natural observations of their children.</td>
</tr>
<tr>
<td>Frequency?</td>
<td>6–8 sessions</td>
</tr>
<tr>
<td>Duration?</td>
<td>Up to 6 months’ corrected age</td>
</tr>
</tbody>
</table>

#### Group 2: Control Group

<table>
<thead>
<tr>
<th>Brief Description</th>
<th>Standard post discharge medical care. The control group received standard medical care and was referred to a non-IBAIP trained physical therapist if deemed necessary by the physician.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting</td>
<td>NR</td>
</tr>
<tr>
<td>Who Delivered?</td>
<td>Non-IBAIP trained physical therapist and pediatrician</td>
</tr>
<tr>
<td>Frequency?</td>
<td>As deemed necessary by the pediatrician</td>
</tr>
<tr>
<td>Duration?</td>
<td>NR</td>
</tr>
</tbody>
</table>

**Intervention Biases:** Circle *yes* or *no* and explain, if needed.

- **Contamination:**
  - YES/NO

- **Co-intervention:**
  - YES/NO

- **Timing:**
  - YES/NO
Site

| YES/NO | IBAIP-trained pediatric physical therapist. Also, the IBAIP-trained therapist trains the parents to effectively and responsively interact with their child through natural observations of their children. |

Use of different therapists to provide intervention

| YES/NO | IBAIP-trained pediatric physical therapist. Also, the IBAIP-trained therapist trains the parents to effectively and responsively interact with their child through natural observations of their children. |

MEASURES AND OUTCOMES

Cognitive and motor development and visual motor integration was assessed using the Wechsler Preschool and Primary Scale of Intelligence (WPPSI-III_NL), 3rd Dutch edition. The WPPSI-III_NL was used to calculate full-scale IQ scores, performance IQ, verbal IQ, and processing speed quotient.

Validity and reliability NR.

The Movement Assessment Battery for Children, 2nd Edition (MABC-2) was utilized to identify motor dysfunction and impairments. Motor outcomes were calculated using the age range of 3 to 6 years. Within this age range, 8 items were grouped under 3 components: manual dexterity, aiming and catching, and balance.

Validity and reliability NR.

Developmental Test of Visual Motor Integration (VMI). The VMI is composed of 24 geometric forms that must be copied using a pencil and paper, which increase in difficulty. This test assesses the integration of visual processing and fine motor skills. Supplementary, the visual perception test and the motor coordination test were used as means to compare visual motor integration results with relatively pure visual and motor performance.

Validity and reliability NR.

Neurologic conditions were assessed with the neurologic examination according to Touwen. Touwen was utilized to focus on minor neurological dysfunction (MND). It addresses 8 functional clusters; however, those clusters were NR. Neurological development was classified as normal when no deviant cluster was present, simple MND was indicated if one or two deviant clusters were present, and abnormal MND was defined as 3 or more clusters or cerebral
palsy being present.
Validity and reliability NR.

Name of measure, what outcome was measured, whether the measure is reliable and valid (as reported in article – yes/no/NR [not reported]), and how frequently the measure was used.

Behavior was assessed with Strengths and Difficulties Questionnaire (SDQ). The SDQ is a parental behaviors screening questionnaire that has a summed difficulty score, and 5 subscales consisting of 5 items each. These items include hyperactivity or inattention, conduct and peer problems, emotional symptoms, and prosocial behavior.
Validity and reliability NR.

Measurement Biases
Were the evaluators blind to treatment status? Circle yes or no, and if no, explain.

YES/NO

Recall or memory bias. Circle yes or no, and if yes, explain.

YES/NO

Others (list and explain):
NR

RESULTS
List results of outcomes relevant to answering the focused question
Include statistical significance where appropriate (p < 0.05)
Include effect size if reported

The study found that 5 years after completion of the intervention program, the IBAIP improved the children’s IQ, motor skills with respect to handling a ball, and visual motor integration. The effect sizes of the intervention group were small; on aiming and catching 0.44, on block design 0.40, on vocabulary 0.41, and on the VMI 0.37. Impairment in verbal IQ and performance IQ occurred significantly less often in the intervention group. However, after adjustment for risk factors, the effect size for performance IQ was .24 and remained significant. There were no significant differences between the groups with respect to behavioral outcomes.

Was this study adequately powered (large enough to show a difference)? Circle yes or no, and if no, explain.

YES/NO
Were appropriate analytic methods used? Circle yes or no, and if no, explain.

**YES**/NO

Were statistics appropriately reported (in written or table format)? Circle yes or no, and if no, explain.

**YES**/NO

**CONCLUSIONS**
State the authors’ conclusions that are applicable to answering the evidence-based question.

<table>
<thead>
<tr>
<th>After the intervention group completed their IBAIP intervention program, improvements on performance IQ, ball skills, and visual motor integration were found at 5.5 years’ corrected age. These skills involve visual–spatial abilities and motor responses, and functionally overlap. The authors hypothesize that the outcomes may be a result of early positive scaffolding neurobehavioral support from the parents trained in IBAIP, which was offered to their children at a sensitive period of the involved brain areas, concerning the development of motor control and self-regulation. By improving self-regulation capabilities and delivering environmental and task activities that the infant expects and can handle, the IBAIP enriches the infant’s processing and abilities to explore.</th>
</tr>
</thead>
</table>

This work is based on the evidence-based literature review completed by Justine David, OTS, University of Southern California.


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