



# THE HOMEOSTASIS-ENRICHMENT-PLASTICITY (HEP®) APPROACH AS AN EARLY INTERVENTION FOR INFANTS AT RISK: A FEASIBILITY STUDY

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## Overview

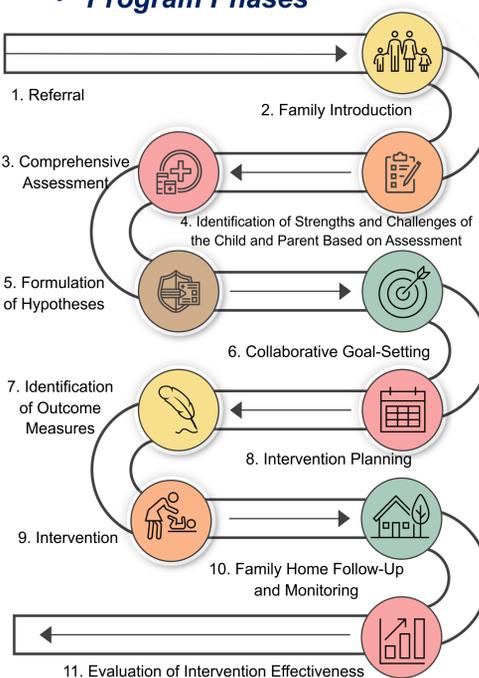
- The study evaluated the feasibility, safety, caregiver acceptance, and satisfaction of implementing the **HEP® Approach intervention**, a novel EI model based on the environmental enrichment (EE) framework.
- The study examined **18 premature infants** and used outcomes measures such as motor development, individual functional goals, sensory functions, caregiver-provided environmental affordances, and motivation for movement.
- Most parents found the intervention feasible, safe, acceptable, and satisfactory.
- Results showed significant improvements** in motor development, individualized parental goals, sensory functions, caregivers' use of environmental opportunities, and movement motivation in premature at-risk infants.

## Introduction

- The environmental enrichment (EE)** framework has inspired several early intervention (EI) approaches<sup>1-3</sup>.
- This study evaluated the feasibility, safety, caregiver acceptance, and satisfaction of implementing the **HEP® Approach intervention**<sup>4,5</sup>, a novel EI model based on the EE paradigm.
- Outcome measures** for motor development, individual functional goals, sensory functions, caregiver-provided environmental affordances, and motivation for movement were examined.

## Methods

### Program Phases



### Study Design

- ✓ Pre-post feasibility study

### Participants

- ✓ 18 premature infants (<33 weeks six days gestation) with a corrected age of 4–10 months

### Duration of intervention

- ✓ 3 months (12 one-hour sessions)

### Feasibility Measure

- ✓ A 21-item Likert scale survey

### Outcome Measures

- ✓ The Goal Attainment Scale (GAS)
- ✓ The Peabody Developmental Motor Scales-2 (PDMS-2)
- ✓ Test of Sensory Functions in Infants (TSFI)
- ✓ Affordances in the Home Environment for Motor Development (AHEMD)
- ✓ Infant Movement Motivation Questionnaire (IMMQ)

## Results

- Most participating parents found the HEP® Approach intervention **feasible, safe, acceptable, and satisfactory**.
- GAS scores** demonstrated **significant gains** with a mean t-score of 67.75 (SD = 2.00).
- Results found **significant improvement** ( $p \leq 0.05$ ) in all outcome measures.

Variables	Mean (SD)
Enrollment corrected age (weeks)	26.06 (7.13)
Birth weight (kg)	1.48 (3.41)
Gestational age (weeks)	30.67 (2.74)
Maternal age	30.44 (2.47)
Variables	N (%)
Gender	
Male	10 (55)
Female	8 (45)
Family income	
1-2 minimum wage	3 (16.7)
3-4 minimum wage	8 (44.4)
5+ minimum wage	7 (38.9)
Mother's Educational Level	
High school	4 (22.2)
Bachelor's degree	11 (61.1)
MSc, PhD	3 (16.7)
Father's Educational Level	
High school	3 (16.7)
Bachelor's degree	15 (83.3)
MSc, PhD	0

	Before Intervention M (SD)	After Intervention M (SD)	p
<b>PDMS-2 Scores</b>			
Reflexes	8.17 (1.32)	10.39 (0.97)	$\leq 0.001$
Stationary	8.33 (1.32)	10.61 (1.57)	$\leq 0.001$
Locomotion	7.17 (2.25)	9.61 (1.42)	0.001
Grasping	7.72 (0.89)	10.72 (2.05)	$\leq 0.001$
Visual-Motor Integration	9.56 (1.09)	10.44 (1.33)	0.011
Gross Motor Quotient	23.78 (3.31)	30.50 (3.65)	$\leq 0.001$
Fine Motor Quotient	17.17 (1.85)	21.00 (2.72)	$\leq 0.001$
Total Motor Quotient	40.94 (4.54)	50.89 (5.21)	$\leq 0.001$
<b>TSFI Scores</b>			
Reactivity to Tactile Deep Pressure	8.78 (1.55)	9.94 (0.23)	0.005
Adaptive Motor Function	5.44 (2.09)	12.78 (2.15)	$\leq 0.001$
Visual Tactile Integration	6.89 (1.41)	10.11 (2.37)	$\leq 0.001$
Ocular Motor Control	1.61 (0.50)	1.94 (0.23)	0.010
Reactivity to Vestibular Stimulation	8.17 (1.97)	11.11 (1.32)	$\leq 0.001$
Total	31.00 (4.11)	45.28 (3.42)	$\leq 0.001$
<b>AHEMD-IS Scores</b>			
Physical Space	2.44 (1.72)	2.56 (1.85)	0.163
Variety of Stimulation	9.83 (1.29)	12.11 (1.32)	$\leq 0.001$
Fine-Motor Toys	6.56 (2.47)	8.72 (2.19)	$\leq 0.001$
Gross-Motor Toys	6.72 (2.34)	10.39 (2.47)	$\leq 0.001$
Total	25.50 (4.87)	33.83 (4.03)	$\leq 0.001$
<b>IMMQ</b>			
Activity	25.22 (3.38)	36.78 (3.90)	$\leq 0.001$
Exploration	14.17 (2.03)	21.22 (2.26)	$\leq 0.001$
Motivation	16.06 (1.92)	22.11 (3.14)	$\leq 0.001$
Adaptation	13.33 (1.45)	17.89 (2.02)	$\leq 0.001$
Total	68.78 (7.28)	98.00 (10.21)	$\leq 0.001$

## Conclusion

- Results suggest that the HEP® Approach intervention is **safe, feasible, and acceptable** to implement.
- Outcome measures were meaningful and sensitive in identifying **improved motor development, individualized parental goals, sensory functions, caregivers' use of environmental opportunities, and movement motivation** in premature at-risk infants.
- Results suggest **further studies** on the HEP® Approach are feasible, and highlight the potential of this intervention to inspire and guide future research in this field.

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