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Educational programs for parents of premature babies and their relationship with motor development: an integrative review

Programas educativos para pais de prematuros e sua relação com o desenvolvimento motor: revisão integrativa

Programas educativos para padres de bebés prematuros y su relación con el desarrollo motor: revisión integradora

RESUMO

Objetivo: Identificar programas educativos de intervenção motora, utilizados pelos pais de crianças prematuras hospitalizadas em Unidade de Terapia Intensiva Neonatal, e sua contribuição para o desenvolvimento motor. **Métodos:** Revisão integrativa de literatura, nas bases de dados PubMed, Embase, Web of Science, Lilacs, CINAHL, Livivo, PEDro, ProQuest Dissertations & Theses Global, Catálogo de Teses e Dissertações Capes, Google Scholar. **Resultados:** Foram identificadas 3.514 referências. Após remoção de duplicatas e leitura dos títulos e resumos, foram selecionados 43 documentos para leitura na íntegra; nove atendendo aos critérios de elegibilidade. O Norwegian Physiotherapy Study in Preterm Infants foi o programa mais utilizado e obteve resultados diferenciados em relação ao desenvolvimento motor. **Conclusão:** São necessários estudos para verificar a influência do desenvolvimento cerebral, ambiente, dor, estresse, nutrição, sono no desenvolvimento dos prematuros e como isso pode influenciar no desenvolvimento motor.
Palavras-chave: Unidade de Terapia Intensiva Neonatal; Recém-nascido prematuro; Pais; Educação em saúde; Atividade motora.

ABSTRACT

Objective: To identify educational motor intervention programs used by parents of premature infants hospitalized in a Neonatal Intensive Care Unit and their contribution to motor development. **Methods:** Integrative literature review in the databases PubMed, Embase, Web of Science, Lilacs, CINAHL, Livivo, PEDro, ProQuest Dissertations & Theses Global, Capes Dissertation and Thesis Catalogue, and Google Scholar. **Results:** A total of 3,514 references were identified. After removing duplicates and reading the titles and abstracts, 43 documents were selected for full reading; nine met the eligibility criteria. The Norwegian Physical therapy Study in Preterm Infants was the most widely used program and obtained differentiated results in relation to motor development. **Conclusion:** Studies are needed to verify the influence of brain development, environment, pain, stress, nutrition, and sleep on the development of premature infants and how this can influence motor development.
Keywords: Neonatal Intensive Care Unit; Premature newborn; Parents; Health education; Motor activity.

RESUMEN

Objetivo: Objetivo: Identificar programas de intervención educativa motora utilizados por los padres de niños prematuros hospitalizados en la Unidad de Cuidados Intensivos Neonatales y su contribución al desarrollo motor. **Métodos:** Revisión utilizando PubMed, Embase, Web of Science, Lilacs, CINAHL, Livivo, PEDro, ProQuest Dissertations & Theses Global, Catálogo de Tesis y Disertaciones Capes y Google Scholar. **Resultados:** Se identificaron 3.514 referencias y, tras eliminar duplicados y leer los títulos y resúmenes, se seleccionaron 43 documentos para su lectura completa; nueve cumplían los criterios de elegibilidad. El Norwegian Physiotherapy Study in Preterm Infants fue el programa más utilizado y obtuvo diferentes resultados motores. **Conclusión:** Se necesitan estudios para verificar la influencia del desarrollo cerebral, entorno, dolor, estrés, nutrición y sueño en el desarrollo de los prematuros y cómo esto puede influir en el desarrollo motor.
Palabras clave: Unidades de Cuidado Intensivo Neonatal; Recién nacido prematuro; Padres; Educación en salud; Actividad motora.

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INTRODUCTION

The birth of a premature newborn (PTNB) causes numerous repercussions throughout their life, making them vulnerable to higher rates of morbidity and mortality. PTNBs commonly present difficulties in several systems and health problems, both during hospitalization and after discharge from the Neonatal Intensive Care Unit (NICU). In addition, there is a greater risk of impairments in motor, sensory, language and cognitive development[1-2].

There are significant differences in the motor development of children born premature, when compared to those born at term[3]. The prevalence of motor impairment in extremely premature children is high and early signs linked to the delay can be seen in the first months of life[4]. This is due to the fact that the last quarter of pregnancy is the time when rapid neurological development occurs. Premature birth can interrupt genetic growth and programmed patterns of brain development, associated with non-ideal environmental influences, leading to reduced motor skills, lack of postural control and predisposition to muscle fatigue[5].

To minimize motor complications in premature infants, early intervention programs can be used to improve brain connections and, consequently, brain development, since the brain is extremely neuroplastic during the period in which the premature infant is hospitalized[6]. Neuroplasticity facilitates the structural and functional reorganization of the brain with experiences and active participation, using early intervention as a strategy to modify the neurodevelopment of premature infants[4,6].

There are early intervention programs with the direct participation of parents in carrying out activities or stimuli with their children[7-8] in the NICU. In addition to stimulating the development of the premature infant, parents develop a bond with their children and self-confidence in caregiving[9]. These programs present different results in relation to motor development and differ in the type of activity developed, the period in which it occurred and the duration of the intervention[8-10]. Since being born prematurely negatively interferes with brain development[11] and the Central Nervous System is affected by the NICU environment and the stimuli that the premature infant receives, it is pointed out that, in addition to family participation in care for better neonatal development[12], it is necessary for these parents to participate in educational programs that aim at early motor stimulation of the premature infant in the NICU.

Therefore, identifying intervention programs developed for parents and their outcomes in relation to motor development is important to structure standardized educational programs, since this type of program is not common in Brazilian NICUs. Due to ambiguous results in the literature regarding the influence of early intervention programs developed for parents on the motor development of premature infants, this integrative review was proposed, aiming to identify in the scientific literature the educational programs of early motor intervention, used by parents of premature children hospitalized in the Neonatal Intensive Care Unit, that contribute to motor development.

METHODS

Research design

Integrative literature review structured in five stages: elaboration of the re-

search question; literature search; data evaluation; analysis of studies and presentation of the results of the integrative review[13].

Elaboration of the research question

The PICo[14] strategy (Population; Interest; Context) was used to elaborate the research question of the study: Population (P) refers to PTNBs; Interest (I), educational programs aimed at motor development, used by parents; and Context (Co), to NICUs. Therefore, the research question is: What are the educational programs aimed at motor development of PTNBs, used by parents in the NICU, that are available in the literature?

Inclusion and exclusion criteria

The studies eligible for this review were those published in full, involving the population of PTNBs hospitalized in NICUs, in which family members were responsible for carrying out early motor intervention with observational, randomized or non-randomized experimental designs. Studies that presented high methodological quality and low risk of bias, without restrictions on language and publication date, were also included. The excluded studies refer to those that involved only full-term newborns; studies that did not present interventions aimed at motor development and did not describe the education plan for parents, either in the study itself or in cited complementary literature. Materials from qualitative studies and books from the gray literature, among other non-indexed documents, were also excluded. Furthermore, studies that presented low methodological quality and high risk of bias, according to the classification model proposed by the Joanna Briggs Institute (JBI) were also excluded15).

Search strategies

The virtual libraries searched were: PubMed, Embase, Web of Science, Lilacs, CINAHL, Livivo, PEDro, ProQuest Dissertations & Theses Global, Catalog of Theses and Dissertations Capes and Google Scholar, using the controlled descriptors specific to each database. The terms were cross-referenced using search strategies, using the Boolean operators AND and OR, according to the search protocol presented in Box 1. The searches were carried out by one researcher and, when there was any doubt, two other researchers were consulted: one with experience in prematurity and another with expertise in the research method. Data collection took place between November 1 and 15, 2023.

Box 1 - Total number of references found in the databases according to their respective cross-references

Database	Keywords	References
PubMED	*("Education" [MeSH Terms] OR "Education" [All Fields] OR "Health Education" [All Fields]) OR ("Early Intervention, Educational" [MeSH Terms] OR "Early Intervention, Educational" [All Fields] OR "Health Education" [All Fields]) AND ("Child Development" [MeSH Terms] OR "Child Development" [All Fields] OR "Motor Activity" [MeSH Terms] OR "Motor Activity" [All Fields]) AND "Parents" [All Fields] OR "Parents" [MeSH Terms] OR "Fathers" [MeSH Terms] OR "Father" [All Fields] OR "Mothers" [MeSH Terms] OR "Mother" [All Fields]) AND ("infant, premature" [MeSH Terms] OR "Preterm" [All Fields] OR "Premature" [All Fields] OR "Prematurity" [All Fields]) AND ("Motor" [MeSH Terms] OR "Motor" [All Fields])*	132

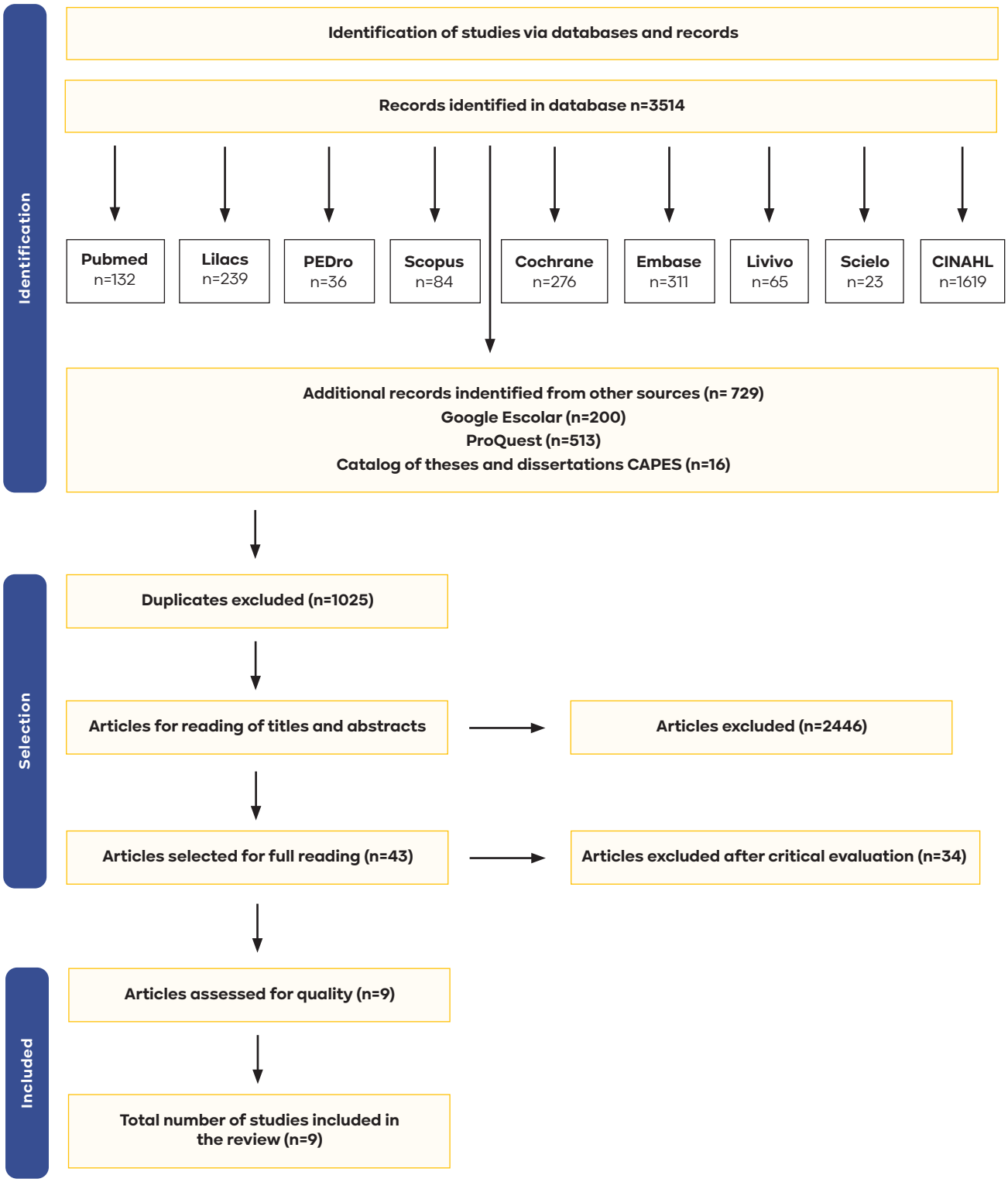
Continua

Database	Keywords	References
	("Education" OR "education" OR "health education" OR educação OR educação em saúde OR "educación" OR educación para la salud) AND (parenting OR parents OR parenthood OR parental OR fathers OR father OR mothers OR mother OR "Poder Familiar" OR parental OR parentais OR maternalidade OR maternidade OR parentalidade OR paternalidade OR pais OR pai OR mães OR mãe OR "Responsabilidad Parental" OR parentales OR maternalidad OR maternidad OR parentalidad OR paternalidad OR padre OR padres OR madres OR madre) AND (infant OR infants OR preterm OR premature OR prematurity OR baby OR babies OR prematuro OR prematuros OR pré-termo OR prematuridade OR lactante OR lactantes OR pretérmino OR prematuridad OR bebe) AND ("child development" OR "motor development" OR "desarrollo motor" OR "desenvolvimento infantil" OR "desarrollo infantil" OR "desenvolvimento motor" OR motor OR motor activity OR atividade motora OR actividad del motor OR early intervention OR intervenção precoce OR interción temprana OR intervención precoz) AND (db:("Lilacs"))	239
PEDro	*development motor preterm infant*	36
Scopus	*(TITLE-ABS-KEY (education) OR TITLE-ABS-KEY ('health AND education) AND TITLE-ABS-KEY (mother) OR TITLE-ABS-KEY (mothers) OR TITLE-ABS-KEY (parental) OR TITLE-ABS-KEY (parents) AND TITLE-ABS-KEY (motor) OR TITLE-ABS-KEY ('motor AND development') OR TITLE-ABS- KEY ('child AND development') OR TITLE-ABS-KEY ('motor AND activity) OR TITLE-ABS-KEY ('early AND intervention') AND TITLE-ABS-KEY (preterm) OR TITLE-ABS-KEY (premature) OR TITLE-ABS-KEY (baby) OR TITLE-ABS-KEY (babies) AND NOT TITLE-ABS-KEY (feeding) AND NOT TITLE-ABS-KEY (kangaroo AND care) OR TITLE-ABS-KEY (infant) OR TITLE-ABS-KEY (infants) OR TITLE-ABS-KEY (parenthood) OR TITLE-ABS-KEY (parenthood)*	84
Cochrane	*(Education OR Health Education) AND (Mother OR Mothers OR Father OR Fathers) AND (Motor Development OR (Motor OR Motor Activity) AND (Preterm OR Infants OR Infant OR Premature) AND (Early Intervention)*	76
Embase	*(((((education OR "health education" OR "mother education") AND (father OR father) AND (mothers OR mother) AND (preterm OR premature OR baby OR babies OR prematurity OR infants OR infant) AND ("premature motor development" OR "child development" OR "early intervation") NOT feddding NOT "kangaroo care" NOT pain NOT autism NOT language NOT cognition NOT child AND physiotherapy*	311
Livivo	*(Education OR health education) AND (Parenting OR Parents OR Parenthood OR Parental OR Mothers OR Mother) AND (Infant OR Infants OR Preterm OR Premature OR Prematurity OR baby OR babies) AND (Early Intervention) AND (Motor Development OR Motor OR Activity Motor OR Child Development) AND (physiotherapy)*	65
SciELO	*(prematuro OR pré-termo) AND (desenvolvimento motor OR motor OR atividade motora) AND (educação OR educação em saúde) OR (mãe OR mães OR madre OR madres OR pai OR padres pais OR padres) AND (intervenção precoce OR intervención precoz OR intervención temprana)*	23
CINAHL	*(Education OR "health education") AND (Parenting OR Parents OR Parenthood OR Parental OR Fathers OR Father OR Mothers OR Mother) AND (Infant OR Infants OR Preterm OR Premature OR Prematurity OR baby OR babies) AND (Motor Development OR Motor OR Activity Motor OR Child Development) AND (Early Intervation)*	1.619
Google Scholar	*(mother's education OR self efficacy) AND (Parenting OR Parental OR Mothers OR Mother) AND (Preterm OR Premature OR infant preterm OR preterm baby OR preterm babies) AND (motor development) AND (preterm development) AND (early intervention) AND (physiotherapy) AND (neonatal) AND (home care)*	200
ProQuest Dissertations & Theses Global	*Noft (Education OR "Health Education") AND noft (Parenting OR Parents OR Parenthood OR Parental OR Fathers OR Father OR Mothers OR Mother) AND noft (Infant OR Infants OR Preterm OR Premature OR Prematurity OR baby OR babies) AND noft (Child Development OR Motor Development OR Motor OR Activity Motor) AND noft (Early Intervention)*	513
Catalog of Theses and Dissertations Capes	*(Prematuros OR Pré-Termo OR bebe) AND (desenvolvimento motor OR Motor OR Desenvolvimento Motor) AND (Intervenção Precoce)*	16
Total		**3.514**

Source: Study data, 2024.

After selection, the articles were submitted to the Mendeley® reference management tool to exclude duplicate titles (Figure 1), in addition to reviewing duplicates by manual removal.

Figure – Informative flowchart of the integrative review phases anchored in the Prisma flowchart, 2021



Source: Study data, 2024.

Data extraction

From the articles eligible for review, information was extracted using a specific instrument, covering the following variables: title of the articles; name and objective of the educational program analyzed in each study; sample and study design; type of intervention proposed by the program for parents; motor development assessment measures and main conclusions.

Analysis of articles

For critical analysis of the included articles, the reliability, relevance and results of the selected articles were analyzed. Critical evaluation tools for each type of study design available in the JBI(15) were selected, in which the answers to each article analysis question correspond to one of four options: yes (Y), no (N), unclear (UC) and not applicable (NA). The percentage of risk of bias and the methodological quality of the study under analysis were calculated by the number of "Y" answers obtained in the checklist, with "NA" answers not being considered. Scores of up to 49% were considered high risk of bias and low methodological quality; from 50% to 70% moderate risk and methodological quality; above 70% low risk of bias and high methodological quality[16].

Data categorization

Subsequently, the studies were divided into categories, according to previous classification, which could be by type of incidence, chronology or sample characteristics, as well as by some predetermined conceptual classification[17]. The categorization was based on the characteristics of the intervention programs chosen by the analyzed study, categorized by the implementation phases indicated by the program: during hospitalization in the NICU and during hospitalization in the NICU followed by home care.

RESULTS AND DISCUSSIONS

Selection of studies and their characteristics

Initially, 3,514 references were identified, after the exclusion of duplicates, leaving 2,489, of which the titles and abstracts were read. After this phase, 43 articles were selected to be read in full, of which nine met the eligibility criteria, as shown in Box 2.

Box 2 – Program described in each reviewed article, objectives and sample, evaluation measures and main conclusions of each program in stimulating the motor development of premature newborns, 2024

Article title and reference	Educational Program	Objective	Sample and design	Type of intervention for parents	Motor development evaluation measures	Main conclusions
Does a parent-administrated early motor intervention influence general movements and movement character at 3 months of age in infants born preterm?[18]	The Norwegian Physiotherapy Study in Preterm Infants (NOPPI)	To examine the effect of a parent-administered early intervention program for premature infants at 34 to 36 weeks of	ECR GC=59 GI=71	A physical therapist teaches parents how to stimulate their premature infants hospitalized between 34 and 36 weeks of gestational age. The parents learned to perform	General Movements Assessment	The intervention performed by the parents had no effect on General Movements at three months of age, that is, in the short term.

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Article title and reference	Educational Program	Objective	Sample and design	Type of intervention for parents	Motor development evaluation measures	Main conclusions
		gestational age on restless movements and overall movement characteristics at three months of age.		motor stimulation in the supine, prone, sitting and lateral positions to improve the infants' posture, head control and midline orientation.		The authors emphasize that the assessment of General Movements (GMA) may not be the most appropriate, due to the fact that half of the participating premature infants had motor signs predictive of later neurological sequelae.
Early parent-administered physical therapy for preterm infants: a randomized controlled trial. Pediatrics[19]	The Norwegian Physiotherapy Study in Preterm Infants (NOPPI)	To investigate the short-term effect of parent-administered physical therapy on the motor performance of premature infants.	ECR GI 71 GC 79	In the study protocol, the parents learned to perform motor stimulation in the supine, prone, sitting and lateral positions to improve the infants' posture, head control and midline orientation.	Test Infant of Motor Performance (TIMP) e Test Infant of Motor Performance Screening Items (TIMPSI)	The GI had a positive and greater effect on motor performance in the short term, after three weeks of motor intervention. They considered the program adequate, as it improved the motor performance of premature infants at 37 weeks.
Effects of a parent-administered exercise program in the neonatal intensive care unit: dose does matter: a randomized controlled trial number[9]	The Norwegian Physiotherapy Study in Preterm Infants (NOPPI)	To examine the effectiveness of a parent-developed exercise program in the NICU on the motor outcomes of premature infants at three months and the effect of the amount of stimulation time on motor development.	ECR GI 74 GC 79	The NOPPI protocol was used in this study. The parents performed motor stimulation on their hospitalized infants in the prone, supine, sitting and lateral positions.	Test Infant of Motor Performance (TIMP)	There was no difference in motor performance between IG and CG at three months of CA (short term). When verifying the duration of the stimuli performed by the parents, it was observed that in cases where the children received longer stimulation, they presented better motor performance.

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Article title and reference	Educational Program	Objective	Sample and design	Type of intervention for parents	Motor development evaluation measures	Main conclusions
General movement optimality score and general movements trajectories following early parent-administrated physiotherapy in the neonatal intensive care unit[8]	The Norwegian Physiotherapy Study in Preterm Infants (NOPPI)	To evaluate in detail the general movements from 34 to 36 weeks and the motor repertoire from three to five months of CA of premature infants who participated in the NOPPI intervention.	ECR GI 65 GC 76	In this study, the NOPPI protocol was also used, with the parents stimulating the hospitalized premature infants.	General Movements Assessment	No changes were observed in the general movements of those who participated in the GI between three and five months. They concluded that early physiotherapy does not alter, from the current perspective, the neurological outcome of premature babies.
Two-year motor outcomes associated with the dose of NICU based physical therapy: The Noppi[10]	The Norwegian Physiotherapy Study in Preterm Infants (NOPPI)	To examine the effect on motor performance at 24 months after a parent-developed intervention with premature infants in the NICU.	ECR GI 62 GC 65	NOPPI was used, with the parents performing the stimulation activities in the prone, supine, lateral and sitting positions.	Peabody Developmental Motor Scales-2	No significant difference was found in motor performance between the groups at 24 months, that is, in the long term. However, there was a positive association between children who received more parental stimulation and the gross motor assessment score.
Early physiotherapy intervention program for preterm infants and parents: a randomized, single-blind clinical trial[6]	Early Physiotherapy Intervention Program for Premature Babies, Children and Parents	To evaluate the effectiveness of an early physical therapy intervention on the overall motor performance of premature infants, on development and on the parents' stress index.	ECR GI 24 GC 24	In the NICU, parents learned about the baby's needs, how to provide tactile and kinesthetic stimulation, and typical development, recommended toys, and different positions to stimulate and play with the baby. After discharge from the NICU, parents were instructed to encourage the baby to bring his or her hands to the midline, play in the prone position, encourage rolling, and place small toys in the baby's hands to promote exploration of objects.	Alberta Infant Motor Scale e Ages and Stages Questionnaires Third Edition (ASQ-3)	GI showed better development of fine motor coordination, but did not show any progress in overall motor development. They believe that low parental adherence may have influenced the results. In individual analysis, in cases where adherence was higher, paternal behavior helped to reduce maternal stress.

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Article title and reference	Educational Program	Objective	Sample and design	Type of intervention for parents	Motor development evaluation measures	Main conclusions
A randomized controlled trial of an early intervention program in low-birth-weight children: outcome at 2 years[20]	The Mother Infant Transaction Program (MITP)	To examine the effects of an early intervention program on cognitive, motor, and behavioral skills and parental stress among low birth weight children at two years corrected age.	ECR GI 69 GC 67	Transition program from the hospital to the home phase. Hospital: teaching parents about behavioral status and how to help the child with self-regulation and discuss motor behavior. Home: focused on building the repertoire of interactive play experiences between parents and the child.	Bayley Scale II	There was no difference between the groups in cognitive or motor outcomes at age two. The authors believe that outcomes could have been better if the hospital phase had begun one week before hospital discharge at least 34 weeks before birth.
Effect of an early intervention programme on development of moderate and late preterm infants at 36 months: a randomized controlled study[21]	The Mother Infant Transaction Program (MITP)	To examine the long-term effect of an early intervention for premature infants on cognitive, gross motor, and behavioral outcomes at 36 months of CA.	ECR GI 32 GC 30	MITP was used, which has two phases, one in the hospital and one at home. This program helps parents understand motor behavior and self-regulation and how to interact with their child.	The Mullen Scale of Early Learning and Ages and Stages Questionnaires	At 36 months, no positive effect on gross motor development was evident. The premature infants in the study were moderate and late. The authors believe that the lack of positive effect on GI may be attributed to improvements in the standard care administered to all infants in the NICU.
Supporting play exploration and early developmental intervention versus usual care to enhance development outcomes during the transition from the neonatal intensive care unit to home: a pilot randomized controlled trial[22]	Supporting Play Exploration and Early Development Intervention (SPEEDI)	To evaluate the initial effectiveness of SPEEDI in improving exploratory problem-solving and reaching.	ECR - pilot GI 14 GC 14	This program has both a hospital and home phase. Hospital: focused on helping parents identify the ideal times to interact with the baby, provide developmentally appropriate interaction, and provide experience with variable movements. Home: parents used the skills acquired during the hospital phase to provide the baby with daily opportunities for motor play and problem-solving.	Test Infant of Motor Performance (TIMP) Bayley e Early Problem Solving Indicator	SPEEDI appears to provide some benefit to very premature infants, contributing to exploratory problem-solving skills in the first months of life. More research is needed, but preliminary evidence is promising regarding the impact of SPEEDI on motor outcomes in childhood.

Legend: CG: Control Group; IG: Intervention Group; CA: Corrected Age; PTNB: Premature Newborn; RCT: Randomized Clinical Trial.
Source: Study data, 2024.

Box 3 contains descriptions of the analysis of the methodological quality and level of evidence of the articles selected for this review.

Box 3 – Evaluation of the methodological quality of articles, according to the tools proposed by the Joanna Briggs Institute, 2024

JBI Critical Appraisal Checklist															
Randomized clinical studies															
Reference	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Score	Level of Evidence
Fjørtoft et al., 2017[18]	S	S	S	N	S	S	S	S	S	S	S	S	S	92,30%	High
Ustad et al., 2016[19]	S	S	S	N	N	S	S	S	S	S	S	S	S	84.61%	High
Oberg et al., 2020[9]	S	S	S	S	S	S	S	S	S	S	S	S	S	100%	High
Ustad et al., 2021[8]	S	S	S	S	S	S	S	S	S	S	S	S	S	100%	High
Oberg et al., 2022[10]	S	S	S	S	S	S	S	S	S	S	S	S	S	100%	High
Ochandore-na-Acha et al., 2022[6]	S	S	S	S	S	S	S	S	S	S	S	S	S	100%	High
Kaaresen et al., 2008[20]	S	S	S	S	S	S	S	S	S	S	S	S	S	100%	High
Kino et al., 2012[21]	S	S	S	S	S	S	PC	S	S	S	S	S	S	100%	High
Dusing et al., 2018[22]	S	S	S	S	S	S	S	S	S	S	S	S	S	100%	High

Source: Study data, 2024.

Four different types of educational programs were identified to be carried out by parents with hospitalized PTNBs. Five studies (55.55%) used the NOPPI protocol; two (22.22%), the MITP; one (11.11%), the SPEEDI; and one (11.11%), the early physiotherapy intervention program. Seven were carried out in Norway (NOPPI and MITP); one in Spain; and the SPEEDI program study in the United States. All had a randomized clinical trial design.

The studies were grouped according to the moments in which the educational program was carried out, characterized by the location of the protocol: in-hospital and/or at home.

NOPPI is developed only in the hospital environment, while MITP, SPEEDI and the early physiotherapy intervention program began in the hospital environment, but with a second phase at home. The objective, characteristics, frequency and intensity of stimuli carried out in each program are described.

Box 4 shows data on studies that used the NOPPI Protocol [8-10,18-19], developed in the NICU.

Box 4 – Description of the objective, characteristics and frequency of the NOPPI protocol

NOPPI	
Place of performance	Hospital environmental
Objective	Improve cervical and trunk control, antigravity midline and orientation of the head, trunk and limbs in supine, prone, lateral and sitting postures with inclination and support.
Protocol Characteristics	Parents learn how to perform motor stimulation taught by the physiotherapist and receive a manual with a description of the activities and respective photographs. Gentle movements in all planes and adjusted and intermittent compression on muscles and joints are encouraged. Activities are also added in which the premature newborn is guided from the supine to the lateral position and from the supine to the side and sitting with support. Parents also learn how to check their children's behavioral state, how to calm them down and when is the best time to stimulate them.
Frequency and intensity of stimuli	Duration of three weeks, daily stimulation, twice a day, for 10 minutes each intervention. Thus, the complete protocol lasts 420 minutes.

Source: Study data, 2024.

The studies by Ochandorena-Acha et al., (2022)[6], Kaaresen et al., (2008)[20], Kino et al., (2012)[21] and Dusing et al. (2018) [22] began during hospitalization in the NICU, with assessment and stimulation at home, whose objectives, characteristics, frequency and intensity of the programs are listed in Box 5.

Box 5 – Description of the objective, characteristics and frequency of the early physiotherapy intervention program protocols, MITP and SPEEDI

Early physiotherapy intervention program[6]	
Place of performance	Started in a hospital environment, with a second phase at home.
Objective	Improving motor development, enhance parent-child relationships and teach parents tips and strategies for managing premature newborns.
Characteristics	Parents learn to understand their children's communication signals, recognize signs of distress, and respond to them sensitively. Regarding motor stimulation, the physiotherapist explains about positioning (prone, supine, and lateral) and touch, and teaches how to perform tactile and kinesthetic stimulation. After discharge from the hospital, parents are instructed to encourage their premature newborns' movements by moving their heads and limbs toward the midline, improve head and posture control, promote antigravity skills, and facilitate play in different positions.
Frequency and intensity of stimuli performed	It begins with parents receiving six educational sessions over two to three weeks, each lasting one hour and held approximately two sessions per week. After learning how to perform sensorimotor stimulation, they performed 10 minutes of tactile stimulation and then five minutes of kinesthetic stimulation, twice over 15 days, totaling 450 minutes. The program continued until the premature infant was two months old – parents were encouraged to perform the activities for 15 to 20 minutes, twice a day (with a 4 to 5 hour interval between them), five days a week.
	MITP[20-21]
Place of performance	Started in a hospital environment, with a second phase at home.
Objective	Improving interactions between parents and children, enabling parents to appreciate their child's unique characteristics and temperament, stimulating his development. The model followed by the program is transactional, which emphasizes the effects of the child and the environment so that the experiences provided by the environment are not seen as independent of the child.

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MITP[20-21]	
Characteristics	It begins with parents sharing experiences of their child's hospital stay. The intervention aims to sensitize them to the newborn's signals, especially those that indicate overload of stimuli, distress and readiness for interaction, teaching them to respond appropriately to these signals in order to facilitate mutually satisfactory interactions. Regarding motor development, there was a discussion about motor behavior. In the home phase, visits are made dedicated to observing behavioral signs of child distress/disorganization through observation and discussion of motor behaviors. Techniques are emphasized to lead the child to a state of alertness and silence, so that he responds better to social interaction. Techniques are taught to achieve sensitivity and responsiveness in the daily routines of care and a repertoire of interactive playful experiences between parents and the child.
Frequency and intensity of stimuli performed	After the initial session, in which parents are invited to report experiences during their child's hospitalization, the intervention is implemented with daily one-hour sessions with parents and the premature infant, on seven consecutive days, starting one week before the planned discharge. Four home visits are carried out.
SPEEDI[22]	
Place of performance	Initiated in a hospital setting, with a second phase at home.
Objective	Teaching and support parents to provide an enriched environment and increased opportunities for infant-initiated movement through collaborative interactions between parents, physical therapist, and infant in the first months of life, aiming to improve development during and after the intervention period.
Characteristics	In phase I (hospital), parents learn about behavioral states, environmental modification, and choice of feeding times and play-based interactions. For motor development, it provides experience with variable, self-directed movement and social interaction without physiological or behavioral stress. All sessions were planned to include some time with the premature infant, discussion of behavioral and developmental signs, and answers to parental questions. Videos were provided for parents to review between sessions, and an activity booklet was reviewed with them during the last visits in phase I in preparation for phase II. This occurred at home with five home visits, but could begin in the NICU if the premature infant was not discharged after 21 days of intervention. Parents are encouraged to provide motor and cognitive opportunities in a variety of positions, games, environments, and objects. They learned to provide gradual postural support, observe spontaneous movements in response to their support, vary postural support to encourage different opportunities and sensory stimuli, vary the position with minimal support, and encourage variable movements.
Frequency and intensity of stimuli performed	Phase I lasts 21 days after the clinical stability of the premature infant. Phase II lasts 12 weeks and parents were encouraged to provide activities daily, with a goal of at least 20 minutes of activities per day, five days a week, totaling 1,200 minutes. They pointed out that frequency and intensity should be analyzed in future studies, as they demonstrated that some participants did not adhere to the stimulation of their children, which may have interfered with the results.

Source: Study data, 2024.

Early motor intervention for hospitalized premature newborns can help to understand which programs provide better development, preventing or mitigating motor alterations that can affect this population [6,10]. Motor impairments may be related to the immaturity of the brain, which is vulnerable to brain injury and can undergo changes due to premature birth and hospitalization in the NICU, creating a more favorable environment for these degenerations[11]. These impairments can be mitigated with Neonatal Therapy, which provides brain protection, environmental optimization and intervention to improve developmental outcomes and support for parents to deal with the challenges of prematurity and support newborns at risk of delay[23].

Brain protection is related to the risks to which premature newborns are exposed and which can damage the CNS, leading to motor impairments, including CP[7]. Environmental optimization and intervention increase the premature newborn's ability to overcome brain injury or ensure the prevention of motor impairments, since neuroplasticity is rapid during this

period. Furthermore, the developing brain in the womb and during the first years of life is highly vulnerable to environmental influences[24]. Neonatal Therapy also refers to the implementation of intervention programs that involve parents, leading to increased self-efficacy and reducing anxiety and signs of depression. Parents can learn to provide postural support and assisted movement opportunities, in addition to repetition of motor skills[7,22].

When analyzing the programs described in the studies of this review, the following aspects were highlighted: two-stage programs, motor results, instruments for assessing motor development, frequency and intensity of stimuli performed.

For studies that analyze long-term motor results, it is recognized that they present greater difficulties in pointing out paths, since the data on children and their families are multifactorial and uncontrollable, especially over long periods[25]. It is emphasized that the use of programs with a longer duration can lead to better motor results in the long term[26]. Neonatal Therapies for PTNBs promote motor benefits in the short and long term[27-28]. Among the results of programs carried out by parents in the NICU, there was short-term motor development in a study that used the NOPPI protocol[19]. In this protocol, parents are trained to facilitate movements, postural adjustments and midline[9].

Regarding programs with long-term results, there were studies that tested the NOPPI[10] and MITP[21] protocols, but did not observe a significant effect on the motor development of participants. However, another study observed development in fine motor coordination, but not in gross motor coordination[6]. Long-term results may be better if motor intervention is continuous, since experiences influence brain development. Furthermore, several assessments over time may also be useful for better analysis of results.

Educational programs developed in two stages were characterized by the fact that the first occurred during the hospitalization of the PTNB; and the second, after hospital discharge[6, 21]. In the home stage, family adherence may be affected reflecting on the results, since the PTNBs who demonstrated greater motor development were those whose mothers had greater participation[6,9,20]. It is noteworthy that in educational programs for parents, the feasibility of each program must be verified[29]. Furthermore, the impressions and difficulties of parents regarding the interventions must be analyzed so that the results are more promising [22].

The Home-Based Preventive Care Program (VIBeS), used in one of the investigations, did not show positive results in motor development[27]. The authors highlighted that if the program had started during the hospital phase, it could have had a different outcome, corroborating the review that highlighted the importance of Neonatal Therapy for premature newborns during the hospital period[23].

It is evident that motor stimulation of premature newborns should begin as soon as possible during hospitalization in order to obtain effective results. Early interventions are performed to improve brain connections during the critical period in which the premature newborn is found. Although some interventions are provided only during the hospital period or at home, the duration does not seem to be long enough to compensate for the losses of premature birth(23,29). There are studies that conclu-

ded that interventions started in the NICU and continued after discharge are the most recommended, since better motor results may be attributed to changes in the CNS[9]. In addition to a motor intervention program during the hospital period, outpatient monitoring of these premature infants may be important for the continuity of treatment and guidance to parents.

The time and frequency of motor intervention may be related to the better motor development of the premature infant. Oberg et al.[10] verified the influence of increasing time and frequency on motor development, improving the structural and functional capacity of the CNS in response to the amount of experience – time and frequency of stimuli[29].

When the program used was NOPPI, the scores showed that motor function had a significantly positive relationship with the increase in intervention time. Parents who dedicated more than 222 minutes to the intervention had better success in the premature infant's motor development[9]. In the study that used an early program without a defined nomenclature[6], the hospital stage lasted 15 minutes, twice a day, for ten days, a shorter time than the NOPPI protocol, and the authors concluded that the intervention was not effective in the overall motor results[7]. Since early intervention helps to reorganize the brain structure, a higher frequency of intervention can lead to greater changes in the CNS[9,30-32].

In the SPEEDI protocol, which had a three-week first phase (in the hospital) and a 12-week home phase[22], parents were encouraged to provide daily opportunities for motor stimulation, using supports for cervical and arm control, stimulating reaching in the supine, prone, and lateral positions. The authors concluded that the results were promising and this may be related to the longer stimulation time, totaling 15 weeks.

In another study[6], the intervention program in the hospital phase lasted 15 days, lasting 10 minutes, twice a day. In the home phase, parents stimulated their children for 15 to 20 minutes, twice a day, five days a week, from full-term to two months of age. No effective results were observed in motor development and the authors highlighted that this may be related to the frequency of the activities; Furthermore, poor parental adherence may have influenced.

The frequency and duration of parental intervention were not mentioned in studies that used the MITP protocol[20-21], which includes 11 one-hour consultations for guidance. The frequency and intensity of stimuli appear to have a strong influence on motor outcomes – the importance of multidisciplinary work that encourages parents to feel confident and safe to stimulate their children is highlighted.

Another aspect that should be highlighted refers to the choice of development measurement instruments, which may have interfered with the results. The study by Fjørtoft et al.[18], which evaluated the NOPPI protocol, used the General Movements Assessment instrument to characterize the general movements of premature infants at three months of age, and did not observe any motor changes, which may be related to the objective of the protocol, which aims at the development of cervical control and the acquisition of the midline, and to the choice of an instrument that is not sensitive to this.

Ochandorena-Acha et al. (2022)[6], in the description of the early physiotherapy

intervention program, highlighted as a limitation the use of only one instrument for motor assessment, the AIMS, for premature newborns after 40 weeks, not using an instrument for the phase prior to post-term age, which would be important, since the intervention began in the hospital phase.

The instrument chosen for the assessment and how the motor analysis of premature newborns will be performed are important aspects in conducting a study. In this sense, two articles highlighted as a limitation the choice of the instrument, and another the lack of an instrument that assessed motor performance in the period prior to 40 weeks of gestational age. The two studies that used the NOPPI protocol did not observe positive motor changes[8,18]. These studies used the General Movements assessment, which assesses movements that occur in full-term and premature infants and that are related to the integrity of the cortical subplate[33]. This assessment is a predictor of cerebral palsy and is not known as an assessment tool for motor intervention[18]. The absence and abnormality of movements assessed by General Movements may be related to damage or dysfunction of this cortical subplate, leading to the loss of neurons, impairing thalamocortical connections[33]. Therefore, changing these movements through early intervention may not be possible in children who present abnormality of these movements in the short term[19].

The study by Ochandorena-Acha et al., (2022)[6] used the Alberta Infant Motor Scale, indicated from full-term age, but there was no assessment during the hospitalization period, that is, in the first stage of the intervention (35-39 weeks). The authors reported in their discussion that there is a more sensitive and appropriate assessment for this period, which is the TIMP. Therefore, the PTNBs participating in the program may have had better motor development that was not conveniently analyzed due to the method used to assess them.

The other studies used instruments that were appropriate for the purpose and age of the children: the TIMP test was used to assess the motor performance of hospitalized premature infants[9-10,19]; the Bayley scale of development was used to assess cognitive and motor outcomes at two years of age[20]; and the Mullen Scale of Early Learning (MSEL) was used to measure five subscales: gross motor, fine motor, visual reception, receptive language, and expressive language[21]. To assess reach, the children were positioned in a chair at a 20-degree angle and, while being filmed, were encouraged to reach a baby rattle held in the midline of the child's chest and at 75% of arm length in four attempts for 30 seconds. [22].

To introduce an educational program for parents, it is important to verify its feasibility, focusing on the hospital routine and individual aspects, i.e., emotional and social, with the aim of increasing family participation and, consequently, better motor outcomes for hospitalized premature infants. Although these are motor intervention programs, the assistance of other professionals, such as psychologists, may be beneficial for increasing family participation.

Studies on educational programs for parents of hospitalized premature infants have reported difficulties due to the heterogeneity of participants, both from the clinical point of view of the premature infants and the emotional and social point of

view of the parents. This review found that there is still a gap regarding which would be the best program and whether it would contribute to different realities, since most studies are European. Furthermore, the family's opinion regarding the child's development should be taken into account. Therefore, in addition to using instruments to assess the development of premature infants, the use of means to assess how parents perceive their children's development should be considered. In Brazil, the Ages and Stages Questionnaires are a validated questionnaire for monitoring child development to support early intervention. This questionnaire allows parents and educators to participate in monitoring child development[34].

Despite all the advances in knowledge of neonatal neurology, there are still aspects that need to be explored in greater depth, such as the neurobiological effects of the environment, pain, stress, nutrition, and sleep on premature infants during prolonged hospitalization[11]. In addition to family participation, which can improve neurodevelopmental outcomes, testing educational programs in this diverse reality is a major challenge. Based on the evidence obtained, it can be seen that there are many aspects that can interfere with development and affect each premature infant individually, making research that analyzes early intervention programs difficult. However, due to current knowledge about brain development in the neonatal period and brain plasticity, the use of strategies during NICU admission and after hospitalization can contribute to better brain development. This literature review was limited by the lack of Brazilian studies.

FINAL CONSIDERATIONS

This integrative review investigated educational programs that trained parents to stimulate their premature infants and that showed results in motor development, with NOPPI being the most widely used. The contribution of the programs was influenced by duration, intensity, assessment instrument, family adherence, program feasibility, environmental enrichment, and monitoring period. Regarding early motor intervention in hospitalized premature infants, further studies are still needed, as there are gaps in brain development and how the environment, pain, stress, nutrition, and sleep interfere in the development of premature infants and how this can influence the response to early intervention. Furthermore, there are still questions about the best type of intervention to achieve gains in motor acquisition, since four different programs were described in this review that presented different periods and intervention times and used different tools to assess premature infants.

REFERENCES

1. Yates N, Gunn AJ, Bennet L, Dhillon SK, Davidson JO. Preventing brain injury in the preterm infant: current controversies and potential therapies. Int J Mol Sci. 2021;22(4):1-25. DOI: 10.3390/ijms22041671.

2. Molloy EJ, E-Dib M, Soul J, Juul S, Gunn AJ, Bender M, et al. Neuroprotective therapies in the NICU in preterm infants: present and future (neonatal neurocritical care series) behalf of the newborn brain society guidelines and publications committee. Pediatr Res. 2024;95(5):1224–36. DOI: 10.1038/s41390-023-02895-6.

3. Jooyeon K, Hyun K, Lim HK. Motor

development comparison between preterm and full-term infants using Alberta infant motor scale. Int J Environ Res Public Health. 2023;20(5):1-10. DOI: https://doi.org/10.3390%2Fijerph20053819.

4. Valentini NC, Borba LS, Panceri C, Smith BA, Procianoy RS, Silveira RC. Early detection of cognitive, language, and motor delays for low-income preterm infants: a brazilian cohort longitudinal study on infant neurodevelopment and maternal practice. Front Psychol. 2021;12(e753551) DOI: 10.3389/fpsyg.2021.753551.

5. Kara OK, Sahin S, Kara K, Arslan M. Neuromotor and sensory development in preterm infants: prospective study. Turk Pediatri Ars. 2020;55(1):46-53. DOI: 10.14744/TurkPediatriArs.2019.88709.

6. Ochandorena-Acha M, Terradas--Monllor M, Sala LL, Sánchez MEC, Marti MF, Pérez IM, et al. Early physiotherapy intervention program for preterm infants and parents: a randomized, single-blind clinical trial. Children (Basel). 2022;9(6):895-913. DOI: https://doi.org/10.3390/children9060895.

7. Hutchon B, Gibbs D, Harniess P, Jary S, Crossley SL, Moffat JV, et al. Early intervention programmes for infants at high risk of atypical neurodevelopmental outcome. Dev Med Child Neurol. 2019; 61(12):1362-67. https://doi.org/10.1111/dmcn.14187.

8. Ustad T, Fjørtoft T, Øberg GK. General movement optimality score and general movements trajectories following early parent-administrated physiotherapy in the neonatal intensive care unit. Early Hum Dev. 2021; 163(e105488). DOI: https://doi.org/10.1016/j.earlhumdev.2021.105488.

9. Øberg GK, Girolami GL, Campbell SK, Ustad T, Heuch I, Bjarne K, et al. Effects of a parent-administered exercise program in the neonatal intensive care unit: dose does matter: a randomized controlled trial number. Phys Ther. 2020;100(4):860-69. DOI: https://doi.org/10.1093/ptj/pzaa026.

10. Øberg GK, Handegård BH, Campbell SK, Ustad T, Fjørtoft T, Kaaresen PI, et al. Two-year motor outcomes associated with the dose of NICU based physical therapy: the Noppi RCT. Early Hum Dev. 2022;174(e 105680). DOI: https://doi.org/10.1016/j.earlhumdev.2022.105680.

11. Inder TE, Volpe JJ, Anderson PJ. Defining the neurologic consequences of preterm birth. N Engl J Med. 2023; 389(5):441-53. DOI: 10.1056/NEJMra2303347.

12. Soleimani F, Azari N, Ghiasvand H, Shahrokhi A, Rahmani N, Fatollahierad S. Do NICU developmental care improve cognitive and motor outcomes for preterm infants?: A systematic review and meta--analysis. BMC Pediatr. 2020;20(67):1-16. DOI:/10.1186/s12887-020-1953.

13. Russel CL. An overview of the integrative research review. Prog Transplant. 2005;15(1):8-13. DOI: https://doi.org/10.1177/152692480501500102.

14. Araújo WCO. Recuperação da informação em saúde: construção, modelos e estratégias. ConCL: Conv. Ciênc. Inform. 2020;3(2):1-35. Disponível em://periodicos.ufs.br/conci/article/view/13447/10713.

15. Joanna Briggs Institute JBI. Critical

for appraisal tools. [Internet]. Disponível em: https://jbi.global/critical-appraisal-tools.

16. Joanna Briggs Institute Manual for evidence synthesis. The Joanna Briggs Institute, 2020. [Internet]. Disponível em: https://doi.org/10.46658/JBIMES-20-09.

17. Ganong LH. Integrative reviews of nursing research. Res Nurs Health. 1987;10(1):1-11. [Internet]. Disponível em: https://pubmed.ncbi.nlm.nih.gov/3644366/.

18. Fjørtoft T, Ustad T, Follestad T, Kaaresen, PI, Øberg GK. Does a parent-administrated early motor intervention influence general movements and movement character at 3 months of age in infants born preterm?. Early Hum Dev. 2017;112:20-24. DOI:org/10.1016/j.earlhumdev.2017.06.008.

19. Ustad KA, Evensen SK, Campbell GL, Girolami J, Helbostad L, Jorgensen L, et al. Early parent-administered physical therapy for preterm infants: a randomized controlled trial. Pediatrics. 2016;138(2):e20160271. DOI: https://doi.org/10.1542/peds.2016-0271.

20. Kaaresen PI, Rønning JA, Tunby J, Nordhov SM, Ulvund SE, Dahl LB. A randomized controlled trial of an early intervention program in low-birth-weight children: outcome at 2 years. Early Hum Dev. 2008;84(3):201-09. DOI: https://doi.org/10.1016/j.earlhumdev.2007.07.003.

21. Kino NM, Ravn IH, Lindemann R, Fagerland MW, Smeby NA, Torgersen AM. Effect of an early intervention programme on development of moderate and late preterm infants at 36 months: a randomized controlled study. Early Hum Dev. 2008;84(3):201-09. DOI: https://doi.org/10.1016/j.infbeh.2012.09.004.

22. Dusing C, Tripathi T, Marcinowski EC,hacker LR, Brown LF, Karen D, et al. Supporting play exploration and early developmental intervention versus usual care to enhance development outcomes during the transition from the neonatal intensive care unit to home: a pilot randomized controlled trial. BMC Pediatr. 2018;18(1):1-12. DOI:10.1186/s12887-018-1011-4.

23. Khurana S, Kane AE, Brown SE, Tarver T, Dusing, SC. Effect of neonatal therapy on the motor, cognitive, and behavioral development of infants born preterm: a systematic review. Dev Med Child Neurol. 2020; 62(6):684-92. DOI: https://doi.org/10.1111/dmcn.14485.

24. Ross K, Heiny E, Conner S, Spener P, Pineda R. Occupational therapy, physical therapy and speech-language pathology in the neonatal intensive care unit: patterns of therapy usage in a level IV NICU. Res Dev Disabil. 2017;64:108-17. DOI: https://doi.org/10.1016/j.ridd.2017.03.009.

25. Spencer-Smith MM, Spittle AJ, Doyle LW, Lee KJ, Lorefice L, Suetin A, et al. Long-term benefits of home-based preventive care for preterm infants: a randomized trial. Pediatrics. 2012;130(6):1094-101. https://doi.org/10.1542/peds.2012-0426

26. Øberg GK, Ustad T, Jørgensen L, Kaaresen PI, Labori C, Girolami GL. Parents' perceptions of administering a motor intervention with their preterm infant in the NICU. Eur J Physiother. 2018;21(3):1-8. DOI:

http://dx.doi.org/10.1080/21679169.2018.1503718.

27. Miguel PM, Pereira LO, Silveira PP, Meaney MJ. Early environmental influences on the development of children's brain structure and function. Dev Med Child Neurol. 2019;61(10):1127-33. DOI: https://doi.org/10.1111/dmcn.14182.

28. Vergara E, Anzalone M, Bigsby R, Gorga D, Holloway E, Hunter, J. Specialized knowledge and skills for occupational therapy practice in the neonatal intensive care unit. Am J Occup Ther. 2006;60(6):659-68. DOI: https://doi.org/10.5014/ajot.60.6.659.

29. Synnes AR, Petrie J, Grunau RE, Church P, Kelly E, Moddemann D, et al. Family integrated care: very preterm neurodevelopmental outcomes at 18 months. Canadian Neonatal Network Investigators. Arch Dis Child Fetal Neonatal Ed. 2022;107(1):76-81. DOI: https://doi.org/10.1136/archdischild-2020-321055.

30. McGowan EC, Betty R, Vohr, MD. Neurodevelopmental follow-up of preterm infants what is new? Pediatr Clin North Am. 2019;66(2):509-23.DOI: https://doi.org/10.1016/j.pcl.2018.12.015.

31. Ismail FY, Fatemi SA, Johnston MV. Cerebral plasticity: windows of opportunity in the developing brain. Eur J Paediatr Neurol. 2017;21(1):23-48. DOI: https://doi.org/10.1016/j.ejpn.2016.07.007.

32. Belsky J, de Haan M. Annual research review: parenting and children's brain development: the end of the beginning. J Child Psychol Psychiatry. 2011;52(4):409-28. DOI: https://doi.org/10.1111/j.1469-7610.2010.02281.x.

33. Hadders-Algra M. Putative neural substrate of normal and abnormal general movements. Neurosci Biobehav Rev. 2007;31(8):1181-90. DOI: https://doi.org/10.1016/j.neubiorev.2007.04.009.

34. Filgueiras A, Pires P, Maissonette S, Fernandez L. Psychometric properties of the brazilian-adapted version of the ages and stages questionnaire in public child daycare centers. Early Hum Dev. 2013;89(8):561-67. DOI: 10.1016/j.earlhumdev.2013.02.005.

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