

Research Article

Repercussions of Parental Self-Efficacy on Preterm Infants' Growth after Hospital Discharge: A Systematic Review

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Submitted: 04 October 2022

Accepted: 04 November 2022

Published: 07 November 2022

ISSN: 2373-9312

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OPEN ACCESS

Keywords

- Infant
- Premature
- Growth
- Self-efficacy
- Parenting

Abstract

Objective: Systematic review to search for evidence on the influence of parental self-efficacy on preterm growth infants after hospital discharge.

Methods: The inclusion criteria were preterm births as a target population, which referred to parental self-efficacy (PSE), related to Bandura's Social Cognitive Theory, and child growth. Exclusion criteria were studies involving the full-term population, studies that assessed only growth failures associated with biological or sociodemographic elements or isolated parental feelings. Searches were performed in eight databases and the gray literature searches. Independent reviewers identified the studies for phase 2.

Results: 7,197 records were identified in the databases, 3,864 remained. Two study studies were eligible for synthesis and analysis. The first study showed that mothers of infants who exhibited excessive growth had higher PSE than mothers of infants who exhibited slow growth. The second study showed that perceived maternal self-efficacy was the determining variable for growth by logistic regression. Since they are observational studies had a higher risk of bias with a low level of evidence.

Conclusion: Two studies were eligible, marking a gap to search. The evidence between the association of growth and parental self-efficacy is not well established, especially in the population at highest risk, which are premature infants.

INTRODUCTION

Preterm birth, that is, one that occurs before 37 weeks of gestational age, constitutes the leading cause of mortality in children under five years of age. In addition, it is associated with morbidities related to the preterm birth itself and its consequences. Each year, approximately 15 million preterm infants are born worldwide, with 15% of them occurring at less than 32 weeks of gestational age. This specific group requires more care during hospitalization in Neonatal Intensive Care Units and a long hospital stays. In recent decades, advances in humane care and technological improvements have led to a gradual increase in the survival of these premature infants at lower gestational ages. However, although the survival rates among preterm infants have increased due to the advanced health care, this group has a higher risk of developing short- and long-term morbidities [1,2].

Repercussions of premature birth are respiratory distress syndrome, bronchopulmonary dysplasia, periventricular leukomalacia, intraventricular hemorrhage, seizures, cerebral palsy, infections, feeding difficulties, hearing, visual and cognitive deficits [3,4]. Furthermore, growth repercussions are observed

among these complications. Numerous factors influence the growth of preterm infants in the postnatal period, such as, the degree of prematurity, nutritional status at birth, complications during neonatal hospitalization, and nutritional practices. Added to these biological factors, sociodemographic and psychosocial factors may also influence growth [6]. Among the psychosocial factors, parenting and building parental self-efficacy are aspects of child health. Parental self-efficacy building is a crucial step for family members after birth, considered essential for appropriate parenting practices, improving child health and development. Based on the Social Cognitive Theory (SCT) of Self-regulation, self-efficacy is having been defined as how good an individual feels to organize and perform a task effectively and successfully. Factors that directly contribute to the formation of self-efficacy include previous individual experiences (both successes and failures); similar experiences of others nearby; social support; and psychological state (anxiety, depression, self-esteem [7].

Therefore, self-efficacy is the parents' self-perception of their ability to provide care to their children, and inadequate self-efficacy can negatively interfere in child health, especially in its growth and development. In this context, a systematic literature review was conducted, aiming to search for evidence on the

influence of parental self-efficacy on the growth of preterm infants after hospital discharge.

METHODS

Research question and eligibility criteria

The study focused on the following question: is there an association between parental self-efficacy and preterm growth after hospital discharge?

The PECOS framework and the elements were as follows:

(P) premature newborn; (E) parents' self-efficacy and self-confidence; (C) not applicable; (O) failure to thrive; growth; (S) observational and experimental studies. There were no language or publication time restrictions.

Inclusion and exclusion criteria

Studies eligible were the study population contained preterm infants - newborns under 37 weeks gestational age; studies that referred to parental self-efficacy, related to the terms of Bandura's Social Cognitive Theory⁷ and parenting formation.

Parental self-efficacy could be assessed by instruments measuring global, general, or specific domains of confidence and parenting. It could be related to general tasks or specific items. In the literature, there are several instruments with this purpose, such as the Parenting Sense of Competence Scale, Maternal Efficacy Questionnaire, Infant Care Survey, Parenting Self-efficacy Scale, Parenting Expectations Survey, Perceived Maternal Parenting Self-efficacy tool, Preterm Parenting & Self-efficacy Checklist, and Neonatal Intensive Care Unit Parental Belief Scale [8,9].

Regarding child growth, this could have been assessed over time, in longitudinal follow-up, with serial checks of anthropometric measurements - weight, height, head circumference, by measurement units (grams, centimeters) or even by Z score plotted on reference curves. Childhood growth failure was Z scores below -2 standard deviations, or even a drop in Z score on reference curves [10-12]. Included: observational studies (cross-sectional, cohort and, case-control) and randomized or non-randomized experimental studies. Exclusion criteria were studies involving only the full-term population, studies that evaluated only growth failures associated with biological or sociodemographic elements, isolated parental feelings about premature birth or premature care. Excluded: animal studies and qualitative studies.

Information sources and search strategy

An initial search was made using Boolean operators to determine the MeSH terms (descriptors used in the PubMed database) and the Health Science Descriptors (used in the LILACS database) in English and Spanish to establish the search strategy. The strategy was defined and adapted for each database, performed searches in the following databases: PubMed, EMBASE, Scopus, Web of Science, PsycInfo, CINAHL, LILACS, and LIVIVO. The adapted strategy used for the gray literature searches: Google Scholar, OpenGrey and ProQuest, and CAPES Catalog of Theses and Dissertations (Dissertations and Thesis) [Appendix 1]. The search included all studies published until July

21, 2021. An updating search was performed in the databases on June 02, 2022, including the references published in 2021 and 2022, using the same strategy described before. EndNote Web manager reference used to collect references and remove duplicate articles.

Study selection and data extraction

The selection of the studies was composed of two distinct phases. In phase 1, references were imported to the Rayyan QCRI reference management, used for the systematic review methodology. Duplicates were identified, with manual removal by Reviewer 1 (M.S.R.) of the real duplicates. Titles and abstracts were independently read by Reviewer 1 and Reviewer 2 (L.C.R.). Records were included or excluded according to the inclusion criteria, facing of a review disagreement; the decision was joint or referred to Reviewer 3 (C.S.V.) for the final decision. In phase 2, the full texts selected in phase 1 were read by the same reviewers 1 and 2 independently, using the same inclusion criteria. In case of selection disagreement, the reviewers with reviewer 3 decided. Included article's references were independently reviewed.

The data needed for the evaluation were collected by reviewers 1 and 2 independently. After data collection, the third reviewer analyzed the data for any discrepancies. If there was a disagreement, it was defined among the three reviewers.

Risk of bias assessment

The risk of bias was independently assessed by reviewers 1 and 2 using the Newcastle-Ottawa Quality Assessment Form for Cohort Studies (NOS). Reviewer 3 was consulted in case of disagreement, reaching a consensus on the final score after careful discussion among the three reviewers. The NOS score was categorized into three groups: very high risk of bias (0 to 3 points), higher risk of bias (4 to 6 points), and low risk of bias (7 to 9 points) [13].

Grading the quality of evidence

Regarding the level of evidence, the Grading of Recommendations for Evaluation, Development, and Assessment (GRADE) was applied, the classification system has four levels of evidence: very low, low, moderate, and high. These levels imply a gradient of confidence in the treatment effect estimates and consequent strength of inference. Evidence from randomized controlled trials starts at high quality and, due to residual confounding, evidence that includes observational data starts at low quality certain. Some criteria in the GRADE system could increase the confidence in the evidence. First is effect size (larger magnitude of effect), the second is when there is a dose-response gradient. The third is the residual confounding likely to decrease rather than increase [14].

RESULTS

Study selection and study characteristics

6,519 references have been identified from the databases, and after removing duplicates, 3,467 remained for evaluation of title and abstract (Phase 1). Nine articles were selected for full reading in Phase 2. One of the selected articles was in Indonesian and was translated into Portuguese at www.onlinedoctranslator

for reading. Eight articles were excluded according to eligibility criteria (Appendix 2). An updated search on June 02, 2022, were made using the same strategy described and another 586 references published in 2021 and 2022 were founded. After removing the duplicates (189 duplicates), 397 references were included in the updated review. A flow chart detailing the entire process was showed in Figure 1. Two articles were selected for synthesis and analysis at the end of phase 2. One study, published in April 2020 [6], was North American, written in English, and had two publications (thesis and paper). The other article was from Indonesia, written in English, in January 2022 [15] (Table 1).

Risk of bias in studies

The risks of bias in the included studies are summarized and detailed in Appendix 3. The first study had a high risk of bias, a

well-defined selected population group, clearly delimiting the group, which does not represent the general population. There was also no control cohort group. In the other items evaluated, there was a good score. The other study does not detail the methodology about the selection of the group, or the instrument used to collect maternal data or a control group.

Level of evidence quality

Quality of the level of evidence: According to GRADE certainty ratings, observational design studies are considered low-quality evidence. Furthermore, the effect size in the first study was small and plausible confounding, which would reduce the effect not analyzed in the study. However, due to a consistent increase in the effect associated with increasing exposure, the evidence becomes more robust. In this sense, by the dose-response gradient criterion, there is an increase of one level of

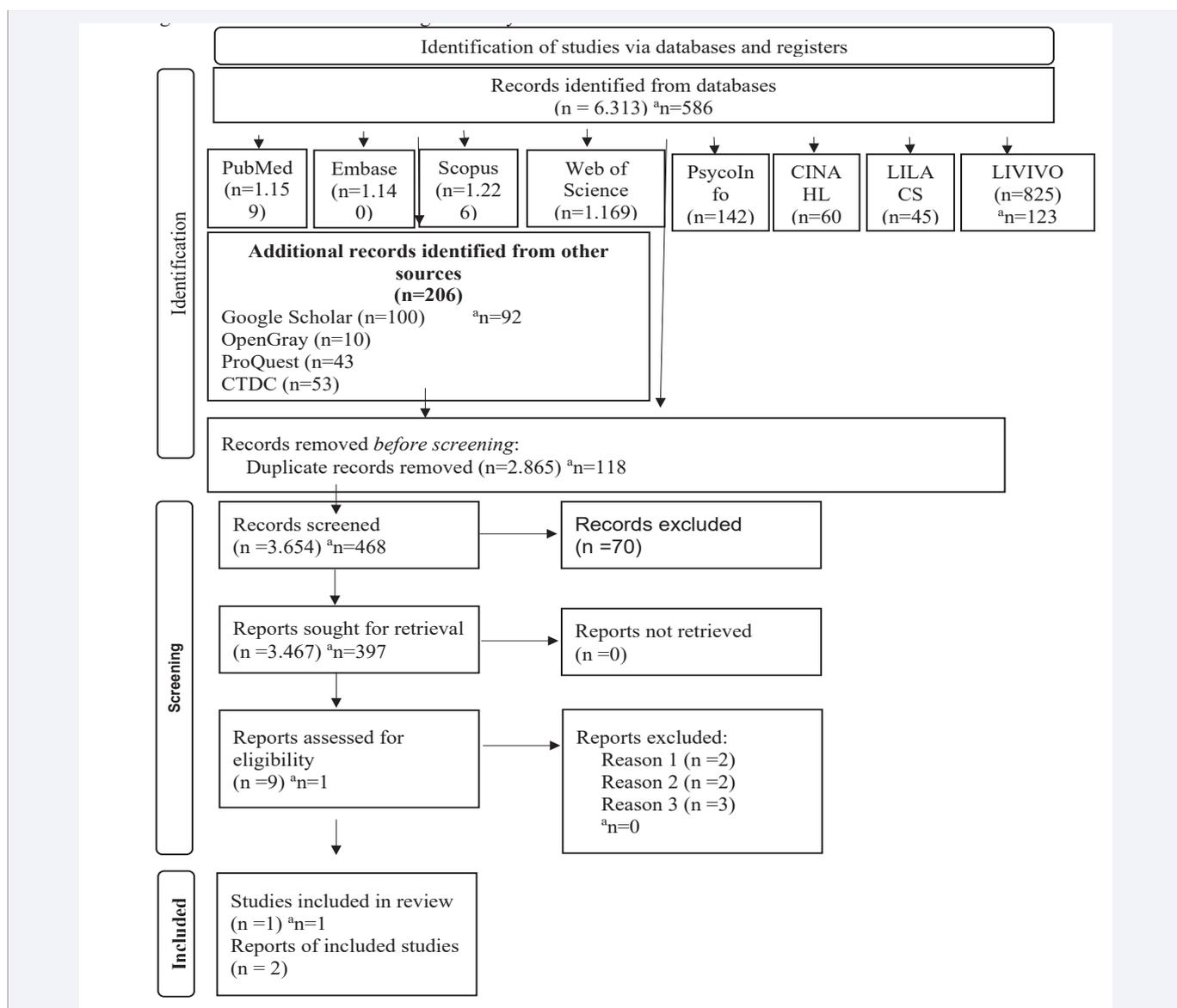


Figure 1 PRISMA 2020-Flow Diagram for Systemic Reviews. a Search references updated Jun 02, 2022.

Table 1: Summary of included studies.

Study ID (Author/Year)	Country	Study Design	Methods				Key Findings
			Sample Dyads	Sample Infant anthropometrics	Sample Mothers	Outcome (s)	
Bahorski et al. (2020)	EUA	Observational Longitudinal Prospective (Secondary analysis with data from the Infant Care, Feeding, and Risk of Obesity)	127 mother-infant dyads African American Low-Income First-time mothers North Carolina	Infant birth weight (*M±†SD) 3.26±0.49kg Born > 35 weeks gestation (*M±†SD) (? ±?)	Maternal age (*M±†SD) 22.7±3.8 years Maternal ‡BMI 30.5±7.2 Maternal marital status single n=111(86.7%) Maternal education level: no college education 65(50.8%) Duration of breastfeeding (*M±†SD) 4.1±4.5 Maternal perception of infant weight at 3 months, concordance – Yes: 79(66.4%) Maternal depression risk – Not at risk (§CESD<16): 93(73.2%)	Growth (Infant weight-for-length z score (**WLZ) from age 3 to 12 months Maternal PSE (¶PSOC subscale efficacy) Association between PSE and **WLZ change Association between **WLZ Change and Covariates (Infant birthweight, Mom age, Mom ‡BMI, Mom education, Mom marital status, Mom depression -3 months, Infant temperament, Duration of breastfeeding, Age of first complementary food, Concordant perception of infant weight at 3m, ever breastfed	1. Infant **WLZ trajectories -Expected 59(46.1%) -Excessive 46(35.9%) -Slow 23(18.0%) 2. PSE (3m) -(*M±†SD) 38.5±4.6 -Ranged 23 to 48 -8 questions (total score from 8 to 48) 3. Mothers of infants with excessive **WLZ change reported PSE approximately 3 points higher than mothers with infants who exhibited slow **WLZ change (p=0,03) 4. Infant birth-weight was the only covariate significantly associated with the **WLZ change.
Wilujeng et al. (2022)	Indonesia	Observational Cross-sectional study Random sampling Based on the Health Promotion Model	217 mothers with infants aged 3-12 months Answered a questionnaire to independent variables Pre-screening Development Questionnaire - development Banayuwangi District Health Center in 2020	Infant growth: body length compared to the WHO NCHS standard data Infant birth weight * (*M±†SD) 2.92±0.38kg Infant's gestational age (*M±†SD) 38.2±1.83 weeks Born<37 weeks: 28 (13%)	Maternal age (*M±†SD) 29±5.57 years Maternal education level: Senior High School 177(81.5%) Mother's motivation: Strong 118 (54%) Mother's perceived benefits of action: Positive 112 (52%) Mother's perceived self-efficacy: Strong 108 (49,7%) Mother's behavior in meeting the needs of growth and stimulation of infant development: Good 168 (77%)	Mother's behavior in fulfilling children's nutrition using the ††HPM theory approach Analysis of factors related to the growth and development of infants aged 3-12 months with a theoretical approach to the ††HPM Independent Variables: mother's motivation, infant's gestational age, perceived benefit, perceived barrier, perceived self-efficacy, activity-related affect Dependent variable: growth and development	1. Infant growth Good nutrition 124 (57%) Malnutrition 64 (30%) Very malnutrition 29 (13%) 2. Results of the logistic regression analysis of risk factors with the growth of infants aged 3-12 months: - Mother's perceived self-efficacy (p=0.013) OR 3.731 95% CI 1.318-10.562 - Gestational Age (p=0.017) OR 3.290 95% CI 1.239-8.736 3. Mother's self-efficacy in meeting nutritional needs of infant has been shown a relationship with the growth status of infants aged 3-12 months

*M = media; †SD = standard deviation; ‡ BMI = body mass index score; §CESD = Center for Epidemiologic Studies Depression scale; ||PSE = Parental self-efficacy; ¶PSOC = Parenting Sense of Competence Scale; **WLZ = weight-for-length z score; ††HPM = Health Promotion Model

evidence for the first article. The second article maintains a low level of evidence, not having consistently described methodology, instruments, and domains that can increase the certainty of evidence.

Results of syntheses

One study is an observational, cohort study that aimed to verify whether parental self-efficacy is associated with weight-height Z-score change in infants aged three to 12 months. The sample evaluated consisted of 127 mother-infant dyads, followed up to 18 months. At three months of age of their infants, mothers responded to the Parenting Sense of Competence Scale (PSCS) to measure parenting self-efficacy. To calculate the growth was used the difference between the weight-stature Z-score from 3 to 12 months of age. The data from Infant Care, Feeding, and Risk of Obesity considered the covariates for infant growth. The birth weight was the only covariate significantly associated with a change in Z-score weight-stature. Thus, controlling for birth weight, parental self-efficacy at three months was associated with a change in Z-score weight height. Mothers of children with above-expected growth (change in z-score above > 0.67) had higher parental self-efficacy.

The second article is an analytical observational research, which analyzed factors related to the growth and development of infants aged 3 to 12 months, using a theoretical approach based on the Health Promotion Model. Data from 217 mothers was collected from the Bamyuwangi Regency Health Center in 2020, using a questionnaire for independent variables (perceived maternal self-efficacy was one of them) and infant height measure (compared to standard WHO curves). The logistic regression analysis showed that the mother's perceived maternal self-efficacy is a determinant factor in optimizing the growth of infants aged between 3 and 12 months (Table 1).

DISCUSSION

This review aimed to identify the association between parental self-efficacy and short-term growth after hospital discharge. Only two studies were identified that met the inclusion criteria, revealing a gap in knowledge on the topic. Therefore, the relationship between growth and parental self-efficacy is not well established, showing that psychosocial aspects are still poorly studied concerning infant growth, especially in preterm infants, who is a population at higher risk for growth repercussions [16,17]. These results, and the small number of included studies do not allow a conclusive statement about the influence of parental self-efficacy on the growth of preterm infants. Thus, it demonstrates the need for further research in the field.

Compare preterm growth with parental self-efficacy are not as promising. Mothers of infants with excessive weight-stature z-score change reported three points higher than those mothers of children with lower variation in Z-score, demonstrating a significant association between parental self-efficacy and increased growth between 3 and 12 months of age.

The main findings indicated that one of the included studies in the review realized with preterm infants above 35 gestational ages. Therefore, the sample included late preterm infants, the mean birth weight was 3.26 ± 0.49 kg. In this context, with this

average weight, the number of preterm infants weighing less than 1.500 kg, considered at higher risk for complications, were not regarded in the sample. In the other study, the growth of only 28 preterm infants (13%) was observed, with an average weight between 2.92 ± 0.38 kg.

Growth, especially of premature newborns, should consider all aspects of vulnerability since it is part of a broad context influenced by socioeconomic conditions and the entire structure and relationship of the family environment [18]. The Health Promotion Model (HPM) theory is a widely used model for health promotion, based on social cognitive theory, where cognitive-perceptual factors (perceived benefits, barriers, and self-efficacy) influence engagement in health-promoting behaviors [19]. Thus, the mother with a positive perception of self-efficacy can promote infant growth in infants 3 to 12 months, 3.731 times more than those mothers who have a negative perception of self-efficacy. Even considering the small number of preterm infants in the sample studied (13%), this finding can be considered important to carry out further studies using this concept.

Assumed the multifocal nature of child growth, the social determinants of health such as family income, social class, education, and housing should be considered when analyzing growth. As well as ponder the emotional context of parents, exposure to maternal stress and depression, the formation and quality of parenting, and confidence in caregiving, which may influence the parental self-efficacy [20,21]. In this context, one of the included studies was a secondary analysis conducted with data from the Infant Care, Feeding, and Risk of Obesity Study, which demonstrated that would be important for analyzing infant growth, such as birth weight, infant temperament, maternal sociodemographic factors - age, marital status, education. Also see mother's body mass index, level of maternal depression, maternal perception of the child's weight status, breastfeeding, breastfeeding time, age of introduction of complementary diet. No morbidities presented during the follow-up period were identified, just like was described that children with syndromes, cerebral palsy, and children who had presented any alteration that made feeding difficult, such as the cleft palate and food allergy, were excluded. However, morbidities in the neonatal period and the longitudinal follow-up, as well as hospitalizations, can influence the growth of premature newborns [22].

In addition, the study population was exclusively African American, low-income, primiparous mother-baby dyads. Parents who previously had children have significantly higher domain-specific self-efficacy when compared to first-time parents [23]. The specific domain is one of three domains used to measure self-efficacy and involves parents' belief in their ability to parent at a level or under certain conditions, directly related to parenting. To this end, domain-specific has superior predictive validity and is more sensitive in predicting competence in each task when compared to the other measures of global or general domain self-efficacy [7,23].

Anzman-Frasca and colleagues (2013) [24], demonstrated that parental self-efficacy plays a moderating role between children's negative reactivity and obesity risk. Therefore, positive maternal self-efficacy in the early period (3 weeks of the child's life) seems to be protective for the risk of weight gain in children

aged one to three years. The results suggest that a temperament comprised of high negative reactivity may be a risk factor in some environments but does not imply that a child is destined to be overweight.

Following the high standards of systematic reviews and making additional attempts to collect unpublished results were the strengths of the present review. This review has several limitations that should be noted. The main concern stems from the small number of studies included, which shows that we cannot generalize the results. One reason for the low number of studies meeting our inclusion criteria may be our restriction on working specifically with preterm infants; some articles were with older children born at term. Another reason may be the focus on self-efficacy based on Bandura's concepts, as there is confusion related to parental self-efficacy, parental confidence, and competence [3].

Furthermore, the included studies are observational, without a control group or randomization, with a low degree of evidence. Studies with a defined and careful methodology are needed for better evidence.

CONCLUSION

Only two studies were eligible by the inclusion criteria, marking a gap to search in the future. The evidence between the association of growth and parental self-efficacy is not well established, especially in the population at highest risk, which are premature infants.

OTHER INFORMATION

Registration and Protocol

The systematic review followed the recommendations by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) [25] (Appendix 4). Registered in the International Prospective Register of Systematic Reviews number CRD42021259393.

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