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Associations Between Parental Depression, Self-efficacy, and Early Childhood Development in Malnourished Haitian Children

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Abstract

Background. Haiti lacks early childhood development data and guidelines in malnourished populations. Literature shows that developmental interventions are crucial for improving developmental outcomes malnourished children. This study examines the prevalence of early childhood development delays in a cohort of malnourished Haitian children and their associations with parental depression and self-efficacy. *Methods*. We used cross-sectional data from 42 patients 6 months to 2 years old in Saint-Marc, Haiti. We assessed their developmental status using the Ages and Stages Questionnaire. Parents were surveyed on depression symptoms and self-efficacy using validated surveys developed for low-resource settings. Demographic and socio-economic data were included. Prevalence of early childhood development delays and high parental depression risk were calculated. Multivariable logistic regression analyses were used to test whether parental depression risk and low self-efficacy were associated with a higher risk for childhood developmental delays. *Results*. Among participants, 45.2% (SD = 7.7%) of children with a recorded ASQ met age-specific cutoffs for developmental delay in one or more domains. 64.3% (SD = 7.4%) of parents were at high risk for depression. 47.6% (SD = 7.7%) of parents reported relatively low self-efficacy. Multivariable analysis showed that low parental self-efficacy was strongly associated with developmental delays (OR 17.5, CI 1.1-270.0) after adjusting for socioeconomic factors. Parental risk for depression was associated with higher odds (OR 4.6, CI 0.4-50.6) of children having developmental delays but did not reach statistical significance in this study. *Conclusion*. Parental self-efficacy was protectively associated with early childhood developmental delays in malnourished Haitian children. More research is needed to design contextually appropriate interventions.

Keywords

Haiti, malnutrition, early childhood development, parental depression, parental self-efficacy

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Background

Worldwide, 250 million children under 5 are at risk for not reaching their full potential, and evidence points to the first 1000 days as a crucial window to intervene.[1] A growing body of literature in low-and-middle-income countries demonstrates that integrated nutrition and early childhood development (ECD) interventions in malnourished children increase cognitive and school performance, with benefits extending into school age and adulthood.[2,3] While the World Health Organization (WHO) Early Childhood Development Guidelines recommends such an integrative approach[4], implementation research in this area is lacking in Haiti, where prevalence is high of childhood stunting (up to 41.7%), wasting (up to 37.3%), and anemia.[5,6] Haiti ranks among the lowest countries on the United Nations Human Development Index.[7] It has the worst childhood mortality[6] and malnutrition[8] outcomes in the Western hemisphere. To date, only one study has directly examined early childhood development outcomes in malnourished Haitian children, where nutritional status predicted language and motor milestone achievements.[9] Sadly, natural disasters, the COVID-19 pandemic, and political unrest in recent years threatened to double the number of malnourished Haitian children.[10] No national guidelines exist for integrating early childhood development in malnutrition treatments.

Parental involvement is key to success in both nutritional and early childhood development interventions. Parents of children with developmental delays endure more stress than parents of typically developing children.[11-14] In turn, poor parental mental health can lead to negative parenting practices, exacerbating child behaviors.[15-17] This bidirectional cycle supports the finding of associations between parental mental health problems and early childhood developmental delays.[16,18,19] In low-and-middle-income countries (LMICs), every 2 in 5 pregnant women and half of new mothers report mental health issues.[20] Research is urgently needed to delineate modifiable risk factors and design effective interventions for perinatal maternal depression in low-resource settings.[21] No study to date has examined the associations between parental depression, parental self-efficacy, and early childhood development in malnourished Haitian children.

Methods

Sample Collection

This is a cross-sectional convenience sample from 42 children 6 months to 2 years old enrolled into an outpatient malnutrition clinic upon hospital discharge from L'Hopital St Nicolas, a public hospital in Saint-Marc, Haiti. The hospital covers a catchment area of 2 million people. Each eligible family was screened by a trained community health worker for their inclusivity and consented to enter the study. The sample was recruited during a 6-month enrollment period in 2017 as part of a baseline early childhood development study among malnourished children planned for a later home-based developmental interventional trial. Assuming a significance level of 0.05 (2-sided) and a power of 0.8, a 0.5 SD minimal detectable difference, our minimal sample size was calculated to be 34.

Inclusion and Exclusion

Children being discharged from the inpatient malnutrition ward at L'Hopital St-Nicolas in Saint-Marc were screened for eligibility before initiating outpatient treatment. Inclusion criteria included entry ages of 6 months to 2 years old with a diagnosis of malnutrition requiring inpatient treatment but improved enough to transition to outpatient treatment. Typically, these patients were admitted for severe acute malnutrition (SAM, z-score $<$-3 compared to age-specific growth curves, with acute symptoms such as edema or dehydration requiring hospitalization). Participants were enrolled within 7 days of discharge from the inpatient program before starting weekly outpatient malnutrition management, which provides nutritional supplementation and medical follow-ups by trained malnutrition nurses. All participants planned to follow up at the Saint-Marc malnutrition outpatient clinic with an adult caregiver (age 18 or older). Exclusion criteria were the following: any medical condition other than malnutrition that may affect appetite or eating, such as a congenital heart disease, HIV, TB, or chronic renal disease; known vision or hearing impairment, or if the family planned to follow up at a different outpatient location. All participants were recruited through a trained community health worker in Haitian Creole. Written informed consents were obtained by a local nurse, who was part of the study staff. Data were collected by one of two trained community health workers. This study was approved by the institutional review boards at Boston Children's Hospital (USA) and at Zanmi Lasante, which oversees research procedures at the L'Hopital St-Nicolas (Haiti).

Dependent Variables

The primary outcome was early childhood developmental delays, which were assessed at enrollment using a translated and adapted Ages and Stages Questionnaire.[22]

The questionnaire was delivered in Haitian Creole by a trained local community health worker based on participant age. The ASQ has been a widely recognized screening tool for developmental screening in many developed and developing countries for more than 40 years[23,24] (Fernald et al 2012). It comprises 21 questionnaires that screen children from 1 to 66 months old in the following 5 domains: communication, gross motor, fine motor, problem-solving, and personal-social. It is designed to be answered by parents on easily observed or elicited skills that reflect essential developmental milestones by age. Each questionnaire contains 30 scored items, where parents can choose "yes," "sometimes," and "not yet" for the item being asked. If the child enrolled has a history of prematurity, an appropriate ASQ would be used by subtracting the number of weeks of prematurity from the child's chronological age. Sensitivity ranges from 75% to 100% depending on the age of the child, with an overall 86% agreement.[25] Specificity ranges from 70% to 100% with an overall 85% agreement.[25]

Independent Variables and Covariates

Independent variables included parental depression (binary categories of high risk vs low risk based on locally validated cut-off[26]) and parental self-efficacy (binary categories of high vs low self-efficacy based on original study cut-off[27]). Covariates included self-reported demographic and socio-economic data, including household income in Haitian gourdes, number of siblings, parental education, family size, and hours of travel to reach the clinic.

Parental depression was measured using a screening tool developed and validated in Haiti.[26] The authors used rigorous analysis to develop an inventory of symptoms most closely linked to depression in the local context and approved by the Haitian Ministry of Health. The survey had 13 items in Haitian Creole inquiring about signs and symptoms of major depression in that past 2 weeks, for example, "thinking too much" (kalkile twop), using locally adapted creole idioms familiar to participants. Another example of symptoms translated into local language include "You feel you've lost the taste for doing anything" as "preske pa pran gou nan fe aktivite" to assess anhedonia. These questions are read by a trained community health worker to each participant, who chooses between fours answers—"not at all," "for a few days," "more than a week," and "almost every day." The community health worker then codes the responses using scores of 0 to 3. A composite score is derived by adding the scores of all 13 items. In Rasmussen et al.'s original validation study, internal reliability was good (Cronbach's alpha of 0.89) for respondents between 14 and 75 years old. The same study established a score of 13 or higher out of 39 total possible points as the optimal cut-point for screening in depression cases with a sensitivity and specificity of 85.4% and 50.9%, respectively.

Parental self-efficacy was assessed, due to a lack of locally validated measures, using a 10-item tool developed in Chile for parents of children 0 to 2 years old with good internal reliability of 0.85.[27] Examples of statements to be rated by parents include " I feel constantly criticized or judged by others in my role of parent," "I feel that I do a good job as a parent," "Being a parent makes me satisfied and happy." Respondents were read these statements by the community health worker and asked to rate their degree of agreement in a Likert score from 0 to 10. A total score can be obtained by adding the scores from all ten items and dividing them by ten to obtain a final score. A cutoff of 8.0 or above was used based on the original study to categorize the result into "high" versus "low" parental self-efficacy.[27]

Data Analysis

Sample prevalence of early childhood developmental delays in all 5 domains, parental depression symptoms meeting the high-risk definition and parental low self-efficacy meeting survey cut-off was calculated. Multivariate logistic regression analyses adjusting for family socio-economic factors were used to test whether high parental depression risk and low self-efficacy were associated with a higher risk for childhood developmental delays. All analysis was performed using STATA 15.0.

Results

Table 1 shows a summary of child and family characteristics including developmental delays (yes or no), age and gender of the child at enrollment in months, and family characteristics including monthly household income, family size, number of siblings and travel time to clinic, parental relationship to child and education level, as well as parental depression risk and self-efficacy. The sample prevalence of one or more developmental delays was 55.9%. Most enrolled children were between 12 and 23 months of age (66.7%), and gender was evenly distributed. The mean family monthly income was 1708 Haitian gourdes, roughly equivalent to 17 dollars per month, or less than 1 dollar a day. The mean family size was six people with SD of ± 4. Most of the enrolled children had 2 to 3 siblings (mean of 2.4, SD 2.6). It took families more than an hour and a half on average to reach the malnutrition clinic from home (mean = 1.6 hours, SD 1.6). In

Table 1. Summary of Child and Family Characteristics.

Variable	Subcategories	*n* (%)
Child characteristics		
Early Childhood developmental delay	No	15 (44.1)
	Yes	19 (55.9)
Age (months)	6–11	11 (26.1)
	12-23	28 (66.7)
	24-35	3 (7.1)
Gender	Male	22 (56.4)
	Female	17 (43.6)
Family characteristics	**Mean**	**SD**
Household income (gourdes/month)	1708.3	1125.6
Family Size (persons)	6.2	4.0
Number of siblings	2.4	2.6
Travel time to clinic (hours)	1.6	1.6
	Subcategories	**n (%)**
Parental relationship to patient	Mother	29 (85.3)
	Grandmother	4 (11.8)
	Other	1 (3.0)
Parental education	Elementary school	32 (94.1)
	Secondary school	2 (5.9)
Parental depression symptoms	<13 Low risk	15 (35.7)
	≥13 (high risk)	27 (64.3)
Parental self-efficacy	low	20 (47.6)
	high	22 (52.4)

terms of parental characteristics, the majority of the caregivers were mothers of the child (85.6%), most had elementary school level education (94.1%). More than half of the caregivers screened positive for high risk for depression (64.3%). Using the cut-off from the original Chilean study, nearly half of the caregivers were categorized into relatively lower self-efficacy (47.6%). This distribution was comparable to the original study from Chile.

Figure 1 Visually represent the percentage of the sample with the number of delays found concurrently in each participant with a range of 0 to 5. Out of the whole sample, 44.1% of malnourished children had no delays, 26.5% had 1 delay, 8.8% had 2 delayed domains, 2.9% had 3 delayed domains, and 14.7% had 4 delayed domains. A small proportion (2.9%) had delays in all 5 aspects assessed by the ASQ. Therefore, a majority (55.9%) of the malnourished children in this sample had 1 or more delays in their age-specific development.

Figure 2 Visually represents the frequency of developmental delays by domain in our sample. Out of the 5 domains, the most frequently delayed was fine motor development (N=14), followed by gross motor development (N=9), personal-social development (N=7), problem-solving development (N=5), and finally communication (N=4).

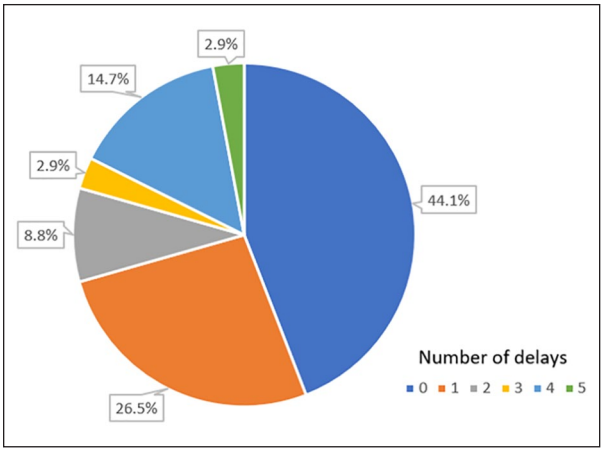

Figure 1. Percentage of participants with multiple delays.

Table 2 shows the associations between parental depression, parental self-efficacy, and early childhood developmental delays by showing their unadjusted and adjusted odds ratios and *P*-values from the regression models. The multivariable logistic regression models adjusted for child age, gender, family socioeconomic, and educational factors. Low parental self-efficacy was associated significantly with early childhood developmental delays after adjusting for child and family

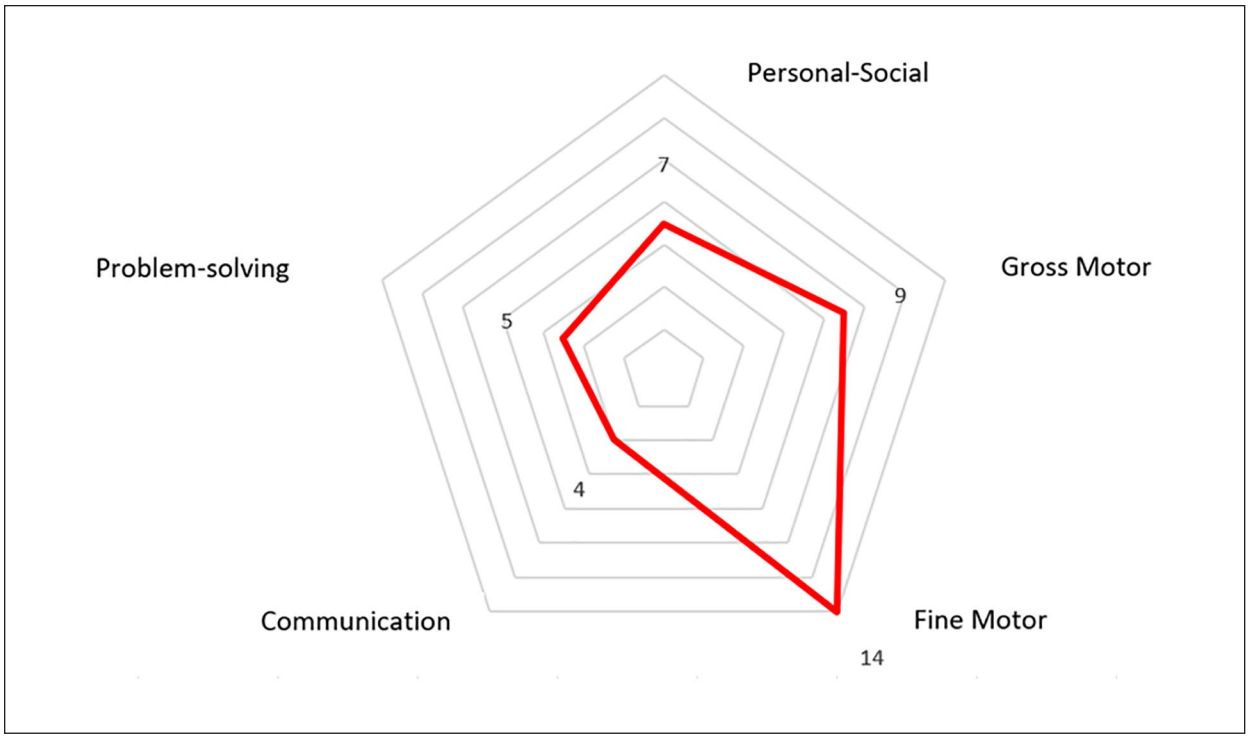

Figure 2. Frequency of delays by developmental domain.

Table 2. Regression Models Testing Association of Key Child and Parental Factors With Early Childhood Developmental Delays.

		Unadjusted bivariate associations		Multivariable logistic regression model	
Variable	Subcategory	Odds ratio	*P* value	Odds ratio	*P* value
Child characteristics					
Age (months)	≥12 versus <12 months	0.31	.14	0.47	.47
Gender	Female versus Male	1.05	.94	1.10	.90
Parental mental health					
Parental depression risk	High versus low	1.33	.67	2.60	.33
Parental self-efficacy score	Low versus High	2.50	.16	11.6	.025**

Confounding variables were adjusted in the multivariable regression model, including family characteristics such as parental education, household income and family size. **p-value < 0.05.

characteristics (OR 11.6, *P* .025). Parental depression was associated with higher odds ratios of having early childhood developmental delays, but in our sample, the *P*-values showed a lack of statistical significance.

Discussion

Research on early childhood development in low-and-middle-income countries (LMIC) has expanded significantly since 2000, with a rise in awareness of its burden and inequality.[28] Sadly, 43% of children under 5 years old in these countries are still at risk for not reaching their full potential throughout their life courses.[1] Implementation studies in LMICs like Bangladesh and Jamaica have shown promise in optimizing developmental and behavioral outcomes.[29,30] Our study shows that in Haiti, where literature and guidelines are still lacking, malnourished children are at especially high risk for early childhood developmental delays. Results also highlight that low parental self-efficacy is associated with developmental delays even after adjusting for other child characteristics and socio-economic factors.

Parental depression was associated with higher odds of developmental delays, but this association did not reach statistical significance in our small sample.

Our study estimates that more than half (55.9%, SD 7.7%) of the enrolled malnourished children, ages 0 to 2 years old, had one or more developmental delays. This prevalence is higher than the global average of 43% in LMICs.[31] It confirms the recent findings of significant between-country inequalities from a large study analyzing national data from 63 LMICs,[32] where suspected delays ranged from 3% in Barbados to 67% in Chad. More efforts need to be directed toward low-income countries like Haiti to ease this inequality even amongst LMICs.

Our results indicate that a key entry point for ECD outcomes in malnourished children lies in the parents—their self-efficacy and mental health conditions like depression may impact developmental outcomes in their children regardless of their SES. According to psychological models of behavioral change, changing parental behavior to improve developmental outcomes in children would require significant levels of awareness, intention, and action.[33] For malnourished children, caretakers must understand the link between their behaviors and the survival and development of their children. Next, they must be aware that malnutrition and developmental issues constitute a problem in their family and community. Third, parents need self-efficacy along with knowledge and skills to intervene to ensure child survival and healthy development. In addition, they must have access to resources to overcome environmental constraints and must decide to engage in more beneficial practices when faced with a health and developmental issue associated with their child. Future interventions in early childhood development in LMICs like Haiti must include resource building and improved access to interventions targeting parents of malnourished children.[34,35]

Parental self-efficacy can be defined as "a parent's belief in their ability to influence their child and the environment in ways that would foster the child's development and success."[36] If parents believe that their actions will have a positive impact on their children, they are more likely to engage in positive parenting strategies and be resilient in the face of adversity and environmental stressors.[36] According to Bandura's social learning theory, self-efficacy is grounded in individual factors but also in contextual factors and, therefore, can be malleable.[37] Within the context of parenting, self-efficacy can be influenced by a parent's experience with a child and the emotions associated with those experiences, the feedback given by others regarding their parenting, and societal comparisons.[37] For example, responsive caregiving, defined as providing appropriate and timely feedback to a child's behavior and signals, has been recognized globally as an essential step to promote positive ECD outcomes in multiple domains and settings.[38,39] Literature from developed countries has shown a positive effect of parenting interventions on children with developmental disabilities.[40] In LMICs, interventions targeting parental efficacy often target a single knowledge area such as breastfeeding or newborn care, have focused mostly on maternal rather than pediatric outcomes, and the best implementation timing and methodology are yet to be clarified.[41] Promotion of parental self-efficacy may be one target through which ECD interventions can improve children's early developmental outcomes and deserves future investigation and promotion.

Finally, parental depression, though not found to be statistically significantly associated with early childhood developmental delays in this study, has shown odds ratios in the range of 1.33 to 2.60 in our regression models. The lack of significance could be due to our small sample size. Maternal depression has been reported by global literature to be a factor of influence on early childhood development.[42] Depression has also been linked to a lack of parental self-efficacy, primarily in studies in developed nations,[43,44] and is an area for further exploration in LMICs. After mental health issues such as depression started receiving more attention after the 2010 earthquake in Haiti, community-based health services and capacity building have shown promise toward long-term solutions to improve mental health.[45] Improving maternal depression may benefit both adult and pediatric health outcomes and should be explored by future research in Haiti.

Our study has several strengths: it is the first study to look at parental depression, self-efficacy, and developmental delays in malnourished children. It is one of the only 2 existing studies estimating the prevalence of early childhood developmental delays in Haitian children. Ages and Stages is a widely used tool in early childhood developmental screening that has been validated across LMICs and, therefore, can be used to compare results to other countries with low resources. Our study also has several significant limitations: we used a small, cross-sectional sample due to financial and logistical constraints in a politically unstable country. The data came from a single institution and has limited generalizability. Ages and Stages is a self-reported measure of childhood development subject to biases and was not validated in Haiti. Cultural norms may influence perceptions of what is "normal" at a certain age. Recently, other development assessments and screening tools have been validated in various LMICs.[46] These newer, evidence-based tools designed for global health use should be considered for use in future studies.

Conclusion

Early childhood developmental delays are alarmingly common among malnourished children in Haiti and should be an integral target of malnutrition interventions. Parental self-efficacy was protectively associated with developmental delays. More research is needed to understand the mechanism of association and to design contextually appropriate interventions to bolster parental self-efficacy.

Author Contributions

She, X- Contributed to conception and design; Contributed to analysis and interpretation; Drafted the manuscript; critically revised the manuscript; Gave final approval; Agrees to be accountable for all aspects of work ensuring integrity and accuracy.
Perera, S- Contributed to design; contributed to acquisition, and interpretation; critically revised the manuscript; Gave final approval; Agrees to be accountable for all aspects of work ensuring integrity and accuracy.
Andre, M- Contributed to conception; contributed to acquisition; critically revised the manuscript; Gave final approval; Agrees to be accountable for all aspects of work ensuring integrity and accuracy.
St Fleur, J- Contributed to conception; contributed to acquisition; critically revised the manuscript; Gave final approval; Agrees to be accountable for all aspects of work ensuring integrity and accuracy.
Hilaire, J- Contributed to conception; contributed to acquisition; critically revised the manuscript; Gave final approval; Agrees to be accountable for all aspects of work ensuring integrity and accuracy.
Evans, A- Contributed to conception; contributed to acquisition; critically revised the manuscript; Gave final approval; Agrees to be accountable for all aspects of work ensuring integrity and accuracy.
Long, J- Contributed to conception; contributed to acquisition; critically revised the manuscript; Gave final approval; Agrees to be accountable for all aspects of work ensuring integrity and accuracy.
Wing, D- Contributed to conception; contributed to acquisition; critically revised the manuscript; Gave final approval; Agrees to be accountable for all aspects of work ensuring integrity and accuracy.
Carpenter, C- Contributed to conception; contributed to acquisition; critically revised the manuscript; Gave final approval; Agrees to be accountable for all aspects of work ensuring integrity and accuracy.
Wilson, K-Contributed to conception and design; critically revised the manuscript; Gave final approval; Agrees to be accountable for all aspects of work ensuring integrity and accuracy.
Palfrey, J-Contributed to conception and design; critically revised the manuscript; Gave final approval; Agrees to be accountable for all aspects of work ensuring integrity and accuracy.
Stulac, S- Contributed to conception and design; contributed to acquisition; critically revised the manuscript; Gave final approval; Agrees to be accountable for all aspects of work ensuring integrity and accuracy.

Declaration of Conflicting Interests

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Statement of Authorship

The submitting author affirms that all individuals listed as authors have met the criteria of authorship.

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