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Early-life Nutritional Supplementation Protects Against Home Environmental Risks in Ghanaian Children's Social-Emotional Development

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Abstract: Children in low- and middle-income countries (LMICs) face increased risks of undernutrition and adverse home environments, contributing to social-emotional difficulties. Using a randomized controlled trial in Ghana, we examined the direct and interactive effects of prenatal lipid-based nutrient supplementation (LNS) and home environment factors on children's social-emotional development at age 4-6 years ($N = 962$). Path analysis models showed that LNS was associated with fewer total difficulties and peer relationship problems, while high-quality home environments—including more responsive caregiving, fewer punitive discipline practices, and greater access to learning materials—predicted better social-emotional outcomes. Multi-group comparisons revealed that LNS moderated associations between home environment factors and children's total difficulties ($\chi^2(5)=13.746$, $p=.017$) and hyperactivity/inattention ($\chi^2(5)=16.176$, $p=.006$). LNS was linked to fewer difficulties and less hyperactivity/inattention in safer physical environments, whereas the physical environment was not predictive for the control group. Children in the control group had higher hyperactivity/inattention when academic stimulation was lower, an association not observed in the LNS group. These findings suggest that early-life nutritional supplementation differentially interacts with distinct home environment factors, influencing Ghanaian children's social-emotional development. Integrated interventions targeting both early-life nutritional supplementation and supportive home environments may promote children's social-emotional development in LMICs.

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