

Optimizing Interventions for Early Childhood Development

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Early childhood is a critical period for development.^{1,2} The estimated costs of children not reaching their full developmental potential during this period are high and persist throughout life, including lower economic productivity and poorer health.^{1,3} Attaining full developmental potential has been recognized as the



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right of every child,^{1,2} and investing in early childhood development is key to breaking intergenerational cycles of poverty, increasing human capital, and improving population health and well-being.³⁻⁵ Yet the most recent estimates indicate that about 43% of children younger than 5 years in low- and middle-income countries remain at risk of poor development due to poverty and stunting alone.⁶ There is a pressing need for action to improve early childhood development in these settings, which must be informed by high-quality evidence from experimental studies on the most impactful interventions.

Maternal factors at the time of conception may be important determinants of early childhood development, with increasing research outlining the key influence of this initial period, including on later life neurological impairment.^{7,8} Maternal health around conception is understood to affect development through epigenetic, physiological, and other mechanisms.⁸ Intervening in the preconception period to ensure optimal health at conception could therefore plausibly hold value for improving early childhood development. However, although research has focused on antenatal and early childhood strategies to improve developmental outcomes,^{5,7,9} limited evidence exists regarding the impact of interventions in the preconception period.^{7,10}

Similarly limited is research regarding comprehensive interventions addressing a range of risk factors. Multiple exposures at the individual, parental, and broader environmental level influence developmental outcomes in early childhood; these include nutritional, clinical, and psychosocial factors, and their relative contribution may change over time.⁷ Given that several risk factors may coexist, particularly in lower-income settings, interventions targeting single domains may not result in effective or sustained gains for developmental outcomes. Although previous studies have examined interventions addressing more than one domain,^{5,9,11,12} evidence regarding comprehensive strategies addressing a range of risk factors remains scarce.

The recently conducted Women and Infants Integrated Interventions for Growth Study (WINGS) trial¹³ contributes to evidence addressing these 2 major knowledge gaps regarding preconception and multidomain interventions for improving child development in the early years. Based in

a low- and middle-income population in New Delhi, India, this factorial trial tested the effect of a package of integrated interventions targeting risks related to nutrition, health, psychosocial well-being, and hygiene in preconception alone; pregnancy and early childhood alone; or both periods together on child development at 24 months.¹³ Development was assessed using the Bayley Scales of Infant and Toddler Development.¹³ Delivery of the intervention package during preconception was associated with higher cognitive scores at 24 months, whereas delivery of the intervention package in pregnancy and early childhood resulted in increased cognitive, language, socioemotional, and motor scores, with corresponding reduced risks of developmental delay. Positive effects were also observed with receipt of the intervention package from preconception through early childhood, although with no clear evidence of increased or synergistic impacts. We commend the WINGS trial team for the high quality of implementation of this complex and important study.

Although most previous research aiming to improve early childhood development has focused separately on either the pregnancy or the postnatal period,^{7,11} the WINGS trial provides new and critical insights regarding direct effects of a comprehensive range of interventions during preconception, pregnancy, and early childhood. Its results raise several important points to consider. The intervention package, particularly when delivered during pregnancy and early childhood, had a notable effect on developmental scores, although this was relatively modest when compared with previous studies targeting fewer domains including early childhood stimulation.¹⁴ The authors attribute this to more intensive early childhood stimulation interventions in such previous studies,¹³ which raises an important question: Are specific components of the integrated package driving the impact on developmental outcomes, and could they be further enhanced? Previous evidence suggests the relative contribution of specific intervention components may indeed be distinct.^{5,14} Given that WINGS was designed as an efficacy trial, and the range and number of interventions delivered as part of this study may not be readily translatable into practice in all settings, some clarity into the most effective components may be useful to inform the optimization and testing of a leaner package of interventions. Such an exercise would be particularly important for low-resource settings, where delivery of a large number of interventions through health systems may not be feasible and may result in compromised quality. Secondary analyses examining differences in effect across groups with varying adherence to specific intervention components could be a useful starting point to identify potentially more promising components.

Another key finding of this trial was the comparatively limited effect of the intervention package in preconception alone, which was observed only on cognitive scores.¹³ Although this suggests smaller influences of preconception vs later interventions on early childhood development, this does not rule out the potential importance of focusing on the preconception period, for several reasons. Preconception interventions in the WINGS trial¹⁵ were initiated on average at about 4 months prior to conception, and it is unclear whether duration of delivery may influence impact. Furthermore, delivery of the intervention package in preconception resulted in reduced risks of low birth weight and small-for-gestational age,¹⁵ indicating important benefit for neonatal health, although results from the current analysis suggest that this may not translate into neurodevelopmental benefits in early childhood.¹³

From an implementation perspective, given evidence of late initiation of antenatal care in low- and middle-income countries,¹⁶ interventions targeting the preconception period may help to maximize the coverage of care throughout pregnancy and enhance its impact and facilitate timely delivery of established interventions during critical early periods, such as folic acid supplementation to prevent neural tube defects.^{7,10} A preconception approach also provides an opportunity to address other risks by integrating strategies to promote appropriate timing and spacing of pregnancies, reducing the likelihood of adverse pregnancy outcomes, with subsequent implications for early childhood development.¹⁷⁻¹⁹ Although the WINGS trial¹⁵ included a family planning component for specific subgroups, prior data indicate that risks related to inadequate pregnancy spacing were relatively low in the study population, with an average interpregnancy interval of at least 33 months. Other potential benefits are also evident when taking a broader view and recognizing the overlap between preconception and adolescence. Improved health and delayed pregnancy enables adolescents to improve education, increase economic potential, and reduce the risk of poverty, an important contributor to poor early childhood development.^{3,19} Although the WINGS trial focuses on an important question

regarding preconception care to address more proximal risk factors for childhood development, further research is also required on the impact of interventions targeting such distal determinants in preconception.

Overall, the WINGS trial improves our understanding of the potential gains in early childhood development that are possible with concerted, comprehensive care throughout preconception, pregnancy, and early childhood. Similar trials testing comprehensive interventions are needed in sub-Saharan Africa and other regions, where the range and distribution of risk factors may be distinct. This is especially important for sub-Saharan Africa, which has the highest proportion (66%) of young children at risk of not meeting their full developmental potential.⁶ Translation to real-world settings will be key, and future studies should also explore aspects of feasibility, cost-effectiveness, sustainability, and other measures including acceptability and receptivity to interventions over time. Further exploration of the potential effectiveness of approaches among higher-risk vs general populations, such as those who are undernourished¹¹ or below a specific income level, may help to determine the value of more targeted approaches to increase impact and save costs. Longer-term follow-up of the WINGS cohort and those of similar studies will be particularly informative and valuable to assess the direct impact of such interventions on later-life outcomes in terms of adolescent development, gains in educational attainment and income, and health.⁵

Regardless, the current results of the trial underline an important role of comprehensive care particularly in pregnancy and early childhood to improve developmental outcomes among children, with important implications for low- and middle-income populations. Importantly, these are in addition to significant effects on maternal health in pregnancy, birth weight, birth weight for gestational age, and early childhood growth that were reported previously.¹⁵ Although questions remain regarding exactly how early before pregnancy to intervene and how much to include in interventions, the WINGS trial indicates that investing in integrated interventions is key for early childhood health and development.

ARTICLE INFORMATION

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