Letters

Impact of Socioeconomic Background on Cardiovascular Health Promotion in Early Childhood

Family socioeconomic status (SES) affects childhood health and may influence the effect of health promotion interventions.[1,2] This work evaluated the impact of SES in 3 randomized controlled trials of health promotion in preschoolers: the SI! Program, conducted in Bogotá, Columbia,[3] Madrid, Spain,[4] and Harlem, New York.[5] Ethics committee approval was obtained from the Fundación Cardioinfantil, Madrid Regional Committee for Clinical Research, and the Icahn School of Medicine at Mount Sinai, respectively. We analyzed the effect of household income (HI) and educational level (EL) on baseline values and the difference between intervention groups in the change from baseline to immediately post-intervention in terms of knowledge, attitudes, and habits (KAH) and body mass index z-scores (zBMI).

Children's KAH, height, and weight were assessed by trained staff, and parents/caregivers self-reported SES at baseline and immediately postintervention (median follow-up time: 6.7 months [IQR: 6.0-7.1 months]). In Madrid and Harlem, annual HI was categorized as below or above €22,500 and USD $25,000 respectively; and EL was categorized as low, intermediate, and high, according to the International Standard Classification of Education. In

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What is the clinical question being addressed?

Does socioeconomic status influence the effect of school-based health promotion interventions?

What is the main finding?

Preschool children with lower socioeconomic status have poorer health and benefit less from lifestyle interventions than those at higher socioeconomic status.

Bogotá, 6 local socioeconomic strata based on postal code and national data were defined. HI was classified as low (strata 1-2, Col$859,941 or less) or high (strata 3-6), and EL was categorized based on the average within each local stratum.

Adjusted baseline KAH scores (range: 0-80 points) and zBMI were calculated by using SES. For KAH, sex and age were handled as fixed effects, and school and country as random effects; for zBMI, only random effects were included. Bonferroni correction was used for multiple pairwise comparison. To assess the impact of SES on intervention effects, an individual participant-level meta-analysis was performed using a random effects model (DerSimonian-Laird method). Similar linear mixed models were used to assess between-group differences in KAH and zBMI by adding intervention group as a fixed effect.

A total of 3,839 children were included at baseline: 1,216 in Bogotá (47.0% female; mean age 3.5 ± 0.5 years), 2,061 in Madrid (49.5% female; mean age 4.2 ± 0.9 years), and 562 in Harlem (51.1% female; mean age 4.1 ± 0.6 years). The overall adjusted baseline KAH was 46.3 points (95% CI: 46.0-46.7), and direct associations were observed between overall KAH and SES (Figure 1A). Children with higher parental EL displayed higher KAH scores than those of parents with low EL (47.2 [95% CI: 43.9-50.5] vs 45.7 [95% CI: 42.4-48.9], respectively). A similar trend was seen for children of high HI families vs those from low HI families (47.4 [95% CI: 44.6-50.2] vs 45.8 [95% CI: 43.0-48.6]). Inverse associations were observed for zBMI. Children from families with high EL and HI had a lower zBMI than their counterparts (EL: 0.23 [95% CI: -0.20 to 0.67] vs 0.47 [95% CI: 0.03-0.90]; HI: 0.25 [95% CI: -0.15 to 0.66] vs 0.44 [95% CI: 0.04-0.85]).

The mean difference between intervention groups in KAH change from baseline to immediately post-intervention was 4.76 points (95% CI: 2.78-6.74 points). The effect of the intervention on KAH change displayed a trend toward larger differences for children from families with high HI and intermediate/high parental EL (Figure 1B). The overall mean difference in zBMI change between groups was -0.06 (95% CI: -0.14 to 0.02) with no significant differences by SES.
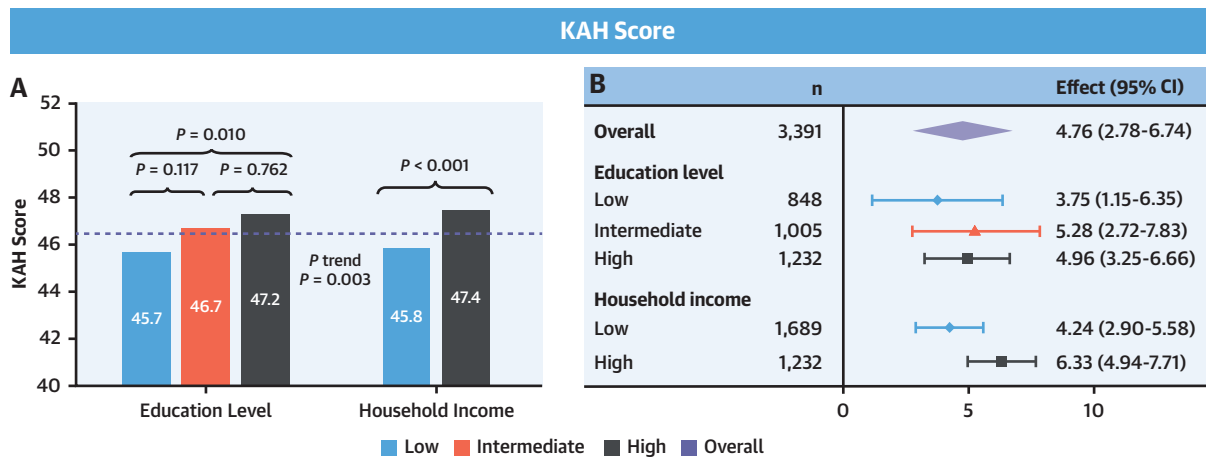
These results support other findings showing that children with low SES may have poorer health

FIGURE 1   Baseline KAH Scores and Differences Between Groups According to Socioeconomic Status

(A) Adjusted mean baseline knowledge, attitudes, and habit (KAH) scores. (B) Mean differences between intervention groups and 95% CIs in KAH changes from baseline to immediately postintervention.

indicators and generally benefit less from lifestyle interventions.[2] The risk of increasing inequality through such interventions is usually lower when different settings and levels of the community are included.[1,2] The SI! Program is a multilevel intervention with simple educational objectives that can be easily adapted to different socioeconomic settings and harmonize with health promotion strategies at the local level.[2] Although the maximum possible sustained public health benefit would come from multiple interventions in multiple settings, schools play an essential role because they provide a contact point with several generations. Further research is needed to clarify factors such as SES that influence child health and effectiveness of school-based interventions.

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REFERENCES

1. Venturelli F, Ferrari F, Broccoli S, et al. The effect of public health/pediatric obesity interventions on socioeconomic inequalities in childhood obesity: a scoping review. *Obes Rev*. 2019;20(12):1720–1739. https://doi.org/10.1111/obr.12931

2. Santos-Beneit G, Fernandez-Jimenez R, de Cos-Gandoy A, et al. Lessons learned from 10 years of preschool intervention for health promotion: JACC State-of-the-Art Review. *J Am Coll Cardiol*. 2022;79(3):283–298. https://doi.org/10.1016/j.jacc.2021.10.046

3. Cespedes J, Briceno G, Farkouh ME, et al. Targeting preschool children to promote cardiovascular health: cluster randomized trial. *Am J Med*. 2013;126(1):27–35.e3. https://doi.org/10.1016/j.amjmed.2012.04.045

4. Penalvo JL, Santos-Beneit G, Sotos-Prieto M, et al. The SI! Program for Cardiovascular Health Promotion in Early Childhood: a cluster-randomized trial. *J Am Coll Cardiol*. 2015;66(14):1525–1534. https://doi.org/10.1016/j.jacc.2015.08.014

5. Fernandez-Jimenez R, Jaslow R, Bansilal S, et al. Child health promotion in underserved communities: the FAMILIA trial. *J Am Coll Cardiol*. 2019;73(16):2011–2021. https://doi.org/10.1016/j.jacc.2019.01.057