Atherosclerotic cardiovascular disease is the leading cause of morbidity and mortality in the United States and worldwide. Because lipids in children and adolescents play a role in the development of atherosclerosis, many researchers have focused on whether screening blood lipid levels in youth could contribute to prevention of adult cardiovascular disease.

One understudied issue has been the relationship between lipid levels in youth and markers of atherosclerosis in adulthood. In this issue of *Pediatrics*, Juonala et al report the relationship between non-high density lipoprotein (HDL) cholesterol levels in childhood and high carotid intima-media thickness (cIMT) in adulthood. Participants included 4582 females and males from 4 cohort studies (3 international and 1 domestic) that collected data at ages 3 to 19 years and again in adulthood, an average of 26 years later. The authors found some relationships between non-HDL cholesterol levels among adolescents $\geq 15$ years old and high cIMT during adulthood. For example, across all 4 cohorts, the adjusted relative risk among 15- to 17-year-olds with dyslipidemia was 1.72 (95% confidence interval: 1.08–2.72). The relative risks for participants with improved levels from youth to adulthood were lower than the relative risks for those who had persistently high levels, suggesting that reduction in non-HDL cholesterol over time can improve the atherosclerotic burden.

Despite these observed relationships, the findings of Juonala et al challenge the benefits of screening non-HDL cholesterol among 9- to 11-year-olds, which, as the authors point out, the nearly decade-old National Heart, Lung, and Blood Institute (NHLBI) 2011 expert panel guidelines had recommended. First, the area under the receiver operating curve was only 0.62, implying prediction that was not much better than the null value of 0.50. Second, a modest association with the intermediate outcome of cIMT suggests that associations with actual health outcomes (eg, cardiovascular disease events) would be even weaker. Third, the authors found no relationship between non-HDL cholesterol at ages 9 to 11 and high adult cIMT. Fourth, the associations were driven exclusively by the Cardiovascular Risk in Young Finns Study, questioning the relevance to an American population. The NHLBI guidelines also recommended screening at 17 to 21 years old; the study lacked enough lipid data at those ages for precise estimates of associations with cIMT.

Several other challenges to youth lipid screening exist, ranging from a questionable balance of long-term benefits and risks of treatment to physician acceptance. American Academy of Pediatrics or its Committees. DOI: https://doi.org/10.1542/peds.2020-0159 Accepted for publication Jan 21, 2020 Address correspondence to S. Sonia Arteaga, PhD, Environmental Influences on Child Health Outcomes Program, Office of the Director, National Institutes of Health, Bethesda, Maryland. Opinions expressed in these commentaries are those of the authors and not necessarily those of the American Academy of Pediatrics. PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275). Copyright © 2020 by the American Academy of Pediatrics FINANCIAL DISCLOSURE: The authors have indicated they have no financial relationships relevant to this article to disclose. FUNDING: Funded by the National Institutes of Health (NIH). POTENTIAL CONFLICT OF INTEREST: The authors have indicated they have no potential conflicts of interest to disclose. COMPANION PAPER: A companion to this article can be found online at www.pediatrics.org/cgi/doi/10.1542/peds.2019-2114. To cite: Arteaga SS and Gillman MW. Promoting Ideal Cardiovascular Health Through the Life Span. *Pediatrics*. 2020;145(4):e20200159

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observed improvements in the distributions of total cholesterol from 1999 to 2016 and in HDL and non-HDL cholesterol in more recent years. The mean level of non-HDL cholesterol (ie, the target for screening that Juonala et al\textsuperscript{4} evaluated) decreased from 108 to 100 mg/dL between 2007 and 2008 and between 2015 and 2016.

Promoting and preserving ideal cardiovascular health (CVH) from birth through childhood to adulthood is an attractive alternative to screening for lifelong prevention.\textsuperscript{9,10} Ideal CVH consists of 7 metrics: 3 physiologic factors (optimal levels of total cholesterol, blood pressure, and fasting glucose) and 4 behaviors (nonsmoking, normal BMI, adequate physical activity, and healthful diet).\textsuperscript{9,11} Adults with ideal CVH have a low lifetime risk of cardiovascular disease and long life expectancy.\textsuperscript{11} However, <1% of adults who are ≥20 years old have optimal levels of all 7 CVH metrics.\textsuperscript{12} Among US adolescents ages 12 to 19 years, 45% to 50% exhibit at least 5 of the 7 ideal CVH metrics\textsuperscript{13} and 39% of 8- to 11-year-olds have ideal levels of 3 of the 4 measured CVH metrics (diet, BMI, cholesterol, and blood pressure).\textsuperscript{14} Among both adults and youth, it appears that ideal CVH is highest in childhood and declines as people age. In addition, African American and Hispanic youth exhibit fewer metrics of ideal CVH.\textsuperscript{12–14} The findings raise the possibility that maintaining ideal CVH from the earliest stages of development will be effective in preventing later cardiovascular disease. This was the underlying theme of an expert panel workshop promoting CVH among children who were 0 to 5 years old that was sponsored by the NHLBI.\textsuperscript{15}

Among the NHLBI workshop’s recommendations was new research that takes a developmental approach and that addresses the best metrics for CVH, trends with age, determinants of maintenance or loss of ideal CVH, including effects of adversity, and issues of equity. Filling many of these research gaps requires longitudinal data from birth, or before, through childhood and adolescence and even beyond. One forthcoming resource will emanate from the National Institutes of Health–sponsored Environmental Influences on Child Health Outcomes (ECHO) program. In ECHO’s observational component, the ECHO-wide cohort is weaving together data and biospecimens from 72 preexisting and ongoing cohort studies that span the prenatal period to adolescence with an overall sample size of ~50,000 children from diverse backgrounds.\textsuperscript{16}

Although focusing on ideal CVH is important, it is also worth noting that even that approach defines ideal as a “lack of adverse” for many metrics. For example, an optimal BMI is <85th percentile for age and sex, which means that the 10th and 80th percentiles are in the same group. Another approach to examining ideal health is to focus on the positive end of the spectrum. The domain of positive child health focuses on well-being by examining biological, functional, behavioral, and experiential health assets that promote the attainment of goals and satisfaction of needs.\textsuperscript{17} ECHO incorporates positive health as 1 of its 5 main health outcomes.\textsuperscript{16} Positive health may not only be an important health outcome itself but also a factor in the maintenance of ideal CVH.

We believe that virtually all children are born with the potential to maintain ideal CVH or to attain positive health. We look forward to researchers, clinicians, and public health professionals working together to address the challenges of achieving these goals among both more- and less-advantaged populations.

**ABBREVIATIONS**

- cIMT: carotid intima-media thickness
- CVH: cardiovascular health
- ECHO: Environmental Influences on Child Health Outcomes
- HDL: high density lipoprotein
- NHLBI: National Heart, Lung, and Blood Institute

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