

**Title:**

From detection early in life to the primordial prevention of elevated blood pressure

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**Abbreviations:** BP, blood pressure; CVD, cardiovascular disease

## **Body of the text**

Elevated blood pressure (BP) in children and adolescents is a public health concern. Childhood BP tracks into adulthood and is associated with cardiac and vascular damage, such as left ventricular hypertrophy and increased carotid intima-media thickness during both childhood and adulthood<sup>1,2</sup>. In the view of this evidence, prevention of adult cardiovascular disease (CVD) starting early in life, e.g., during childhood, is advocated. One approach is the primordial prevention of CVD, which aims to prevent the development of elevated BP and other CVD risk factors since conception, for example, through improving maternal nutrition during pregnancy or reduction in salt intake among children<sup>3,4</sup>. Another approach, more clinically oriented, is through screening and treatment of elevated BP. However, the medical community remains divided on whether and when recommending screening in children and adolescents, mainly due to complex screening tools and a lack of evidence on the benefits and harms of universal screening<sup>5-7</sup>.

In the effort to simplify screening tools in children and align to standards in adults, in the current issue of the Journal of Clinical Hypertension, Fan et al evaluated the performance of a simplified BP threshold ( $\geq 120/80$  mmHg) in identifying elevated BP in individuals aged 13-17 years<sup>8</sup>. Using a rich dataset from the National Health and Nutrition Examination Survey, authors concluded that the simplified threshold performed well in identifying elevated BP compared to traditional thresholds based on age-, sex-, and height-specific percentiles. Indeed, the simplified threshold had perfect specificity overall and across subgroups defined based on age, sex, or age- and sex-specific height percentiles, thus attenuating the risks related to false-positives and over-detection (e.g. anxiety, stress, extra time and financial resources for diagnosis confirmation). Sensitivity varied from 40% to 100%, depending on age and height. However, the positive predictive values and negative predictive values of the simplified threshold were

above 90% in all age- and height-specific subgroups. The strengths of this paper are notably the population-based large sample size, which facilitates generalizability of findings, and the good quality BP measurement based on multiple readings.

We congratulate Fan and al for their study, which advances the knowledge on the development and accuracy of user-friendly tools to help improve recognition of elevated BP in the pediatric age group. Simplifying the screening process and agreeing on simple, easy to remember, hypertension thresholds will indeed facilitate the uptake of screening in practice, assuming that screening in children is useful. However, when a child has elevated BP, pediatricians face a series of questions regarding what other investigations should be conducted (e.g. ambulatory BP measurement, etiology assessment, cardiac or vascular echography) or which therapy would be most effective and safest on the long-term (e.g. lifestyle measures, drug therapy or combination of both) to decrease adult BP, subclinical, or manifest CVD <sup>6</sup>. Further, universal screening of elevated BP starting in childhood remains highly challenged. According to the US Preventive Services Task Force (USPSTF) “current evidence is insufficient to assess the balance of benefits and harms of screening for primary hypertension in asymptomatic children and adolescents to prevent subsequent cardiovascular disease in childhood or adulthood” <sup>9</sup>. Until more evidence becomes available, targeted screening of at-risk individuals, such as those exposed to prematurity or obesity, rather than universal screening, is probably preferable <sup>5</sup>.

Considering these open questions on early screening, should we rather concentrate our efforts toward the primordial prevention of elevated BP? From a public health perspective, several arguments exist in favor of this shift in paradigm. Firstly, acting early in life, when diet and other lifestyle preferences are formed, may influence CVD risk behaviors across the life course <sup>3,10</sup>. Secondly, health promotion and primordial prevention strategies can target multiple CVD

risk factors simultaneously. Thirdly, within a Developmental Origins of Health and Disease (DOHaD) framework, interventions during critical periods of development may have long-term impact on programming BP trajectories and cardiometabolic health <sup>11</sup>. Nonetheless, as for screening, stronger evidence is needed to guide primordial prevention policy.

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