Adolescence is an important time period for development of lifestyle behaviors and risk factors that can set the course for future cardiovascular disease later in adulthood. For instance, higher adolescent body mass index (BMI) is associated with premature cardiovascular disease events (e.g., heart attacks) independent of later adult BMI [1]. However, the utility of cardiovascular health screenings in adolescence remains an active topic of debate.

In this issue of the *Journal of Adolescent Health*, Kiechl et al. [2] conduct school-based vascular health screening in a representative sample of 2,088 adolescents from Tyrol, Austria and South Tyrol, Italy. The study screened for cardiovascular and metabolic risk conditions such as anthropometrics, blood pressure, and fasting blood analysis. Overall, the health screening detected risk factors for later cardiovascular disease in 45.4% of boys and 37.4% of girls, most commonly elevated blood pressure (16.7%) or hypertension (10.2%), overweight (12.2%) or obesity (9.1%), and hypertriglyceridemia (9.7%) or hypercholesterolemia (7.6%). The probability of newly detecting risk conditions increased with age (43.4% in 14- to 16-year-olds vs. 49.8% in 17- to 19-year-olds), for boys (55.8% for boys vs. 37.4% for girls), and across BMI categories (40.8% in normal weight adolescents vs. 71.4% in adolescents with obesity).

It is important for health care providers to be aware of the high rates of unknown cardiovascular disease risk factors in adolescents, which this study highlights. This accords with previous research showing high rates of unawareness of hypertension and other cardiovascular disease risk factors in adolescents and young adults in the U.S. [3–5].

These findings can also inform discussions and debates about screening for cardiovascular disease risk factors in adolescents. Screening for obesity in adolescents and offering or referring to comprehensive, intensive, behavioral interventions by clinicians is supported by several professional organizations including the American Academy of Pediatrics [7] which advocate for annual blood pressure measurement in adolescents, the U.S. Preventive Services Task Force finds insufficient evidence primarily because of the limited evidence for long-term effectiveness or potential harms of therapies initiated in childhood on subsequent outcomes [8]. The current study identified 26.9% of adolescents with new elevated blood pressure or hypertension. There is even more controversy over cholesterol screening. The National Heart, Lung, and Blood Institute [9] and American Heart Association [10] advocate for universal lipid screening in adolescence; however, the U.S. Preventive Services Task Force finds insufficient evidence for cholesterol screening in adolescence again because of the limited evidence base for initiation of therapies in childhood [11]. The USPSTF recommendation on lipids is currently being updated. Of note, most of the guidance reviewed is specific to screening by a clinician with the ability to provide context for the diagnosis, counseling, and treatment or referral.

The current study used a school-based screening approach, which is a different context than clinic-based screening. With such a high prevalence of cardiovascular risk factors identified, serious discussion about universal community or school-based programs to improve cardiovascular health is warranted. Prior school- and community-based cardiovascular health promotion programs for adolescents have been piloted, with mixed findings [12–15]. Of note, the current study represents the baseline examination of the larger Tyrolean early vascular ageing-study, a non-randomized controlled trial [16]. Adolescents in the intervention group will next receive individual medical counseling based on the results from the baseline examination, education about cardiovascular disease, an online health promotion tool, and involvement in planning and implementation of health promotion projects [16]. The future findings of this intervention will be of great interest for the evidence base on school-based screening and intervention for cardiovascular disease risk prevention.

The authors acknowledge that their study on its own cannot determine the benefits and harms of screening. In order for
screening to be effective, it must prompt a set of actions or interventions that will change the cardiovascular risk trajectories of these adolescents. However, school-based screening does not necessarily guarantee follow-up, access to interventions or medicines, or behavior change. School-based screening could plausibly have harms. The receipt of a new diagnosis without appropriate clinical context, support, and intervention could lead to anxiety, worry, or stigma. For instance, adolescents already experience substantial weight stigma [17], and receiving a diagnosis of “obesity” without support and guidance could lead to a negative self-image and engagement in unhealthy weight control behaviors which could lead to development of an eating disorder [18]. Furthermore, it is unclear if receiving a diagnosis without context would actually change adolescents’ behaviors. For instance, does knowing that one is “obese” lead to behavior change? Even if not based on formal BMI classifications, many adolescents and their parents may already be aware of their body size. Furthermore, screening is not the only approach to promoting behavior change. For instance, if the main recommendation after a positive cardiovascular screen is to promote physical activity and healthful eating, an alternate approach could be to promote this messaging at schools to all adolescents.

In addition, this study included adolescents of mostly Caucasian descent from Switzerland and Italy, high-income countries in Europe. Although cardiovascular disease risk is increasingly recognized in low- and middle-income countries, the availability to act upon screening findings in adolescents in these contexts should also be considered. In these contexts, if there is no primary care screening for children and adolescents, perhaps school-based screening could be a safety net for detection. School-based screening could be a novel strategy to detect the very low prevalence of significant pathology, such as familial hypercholesterolemia syndromes and severe hypertension, which could be treated with pharmacotherapy in addition to behavior changes [19]. However, the prescription of medication would necessitate medical intervention and follow-up, even in low-resource settings.

One of the challenges of the field of adolescent health is that little is known about the long-term impacts of adolescent health screening and interventions. Pediatricians who counsel on behavior change in adolescence will not know if their motivational interviewing made a difference decades later. Studies of interventions for adolescents rarely receive funding to follow participants for decades until the development of cardiovascular disease events. However, linked electronic medical record data, longitudinal cohort studies, and statistical modeling could be leveraged in future studies to provide more evidence regarding the effectiveness of adolescent health screenings for cardiovascular disease risk. These types of studies could move some current recommendations out of the “insufficient evidence” categories.

Until then, the current study highlights that adolescents have relatively high rates of cardiovascular disease risk factors and underscores the urgency of the problem. Older adolescents, boys, and those in higher BMI categories have greater probability of having these cardiovascular risk conditions undetected. Although the decision to screen, where to screen, and what to do with a screen may be controversial, the missed opportunity to improve cardiovascular health in adolescence should not be.

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References