Heart failure with preserved ejection fraction (HFpEF) (diastolic heart failure) is a clinical syndrome that now accounts for at least half the cases of heart failure in adult patients. Decompensated HFpEF is a common and costly reason for admission to the hospital. From a pathophysiologic perspective, the left ventricle (LV) is stiff or noncompliant and characterized by an altered pressure-volume relationship. Asymptomatic LV diastolic dysfunction is a precursor to this clinical heart failure syndrome, and obesity and hypertension are the major risk factors for both diastolic dysfunction and HFpEF. Patients with early-stage HFpEF are characterized by euvolemic dyspnea. As the syndrome advances, congestion and atrial fibrillation develop. In late stages, pulmonary hypertension and the cardiorenal syndrome are common. The clinical course often results in recurrent hospital admissions for decompensated heart failure. Guideline-directed medical and device therapy, often beneficial for patients with heart failure with reduced ejection fraction (systolic heart failure), does not exist for patients with HFpEF. Decongestion is usually the only therapeutic option for patients with decompensated HFpEF, but diuresis can prove difficult in patients with the cardiorenal syndrome. Caring for such patients is frustrating and difficult.

Why would a pediatrician care about a heart failure syndrome in adults? Because obesity and inactivity during childhood may lay the foundation for HFpEF in adulthood. In this issue of Pediatrics, Heiskanen et al report on the relationship between cardiovascular risk factors in children and left ventricular diastolic dysfunction in adulthood. The Cardiovascular Risk in Young Finns Study (YFS) was an ambitious multicenter longitudinal study of cardiovascular risk factors from childhood to adulthood in the general population of Finland. The baseline study was conducted in 1980 and included 3596 children and adolescents (51% female participants). Follow-up data were collected in 1983, 1986, 1989, 2001, 2007, and 2011. Echocardiography was performed on 1994 of the participants in 2011 (ages 34–49 years). Using a clinically accepted noninvasive Doppler-derived assessment of LV diastolic function and LV filling pressure (mitral E/e' ratio [E: velocity of early diastolic filling of the LV; e': velocity of the mitral annulus during diastole]), the authors identified 3 major childhood risk factors that were associated with diastolic dysfunction in adulthood: increased childhood adiposity, decreased physical activity, and increased systolic blood pressure. The associations of childhood adiposity and physical activity with adult diastolic dysfunction were independent of adulthood levels of the same factors, whereas childhood systolic blood pressure was not.

The YFS suggests that, in some patients, LV myocardial structural changes may
start decades before the onset of the clinical heart failure syndrome we call HFP EF. Over the years, millions of dollars have been spent on negative clinical trials looking for the “holy grail” of HFP EF treatment. In reality, it is unrealistic to think that a drug is going to reverse structural changes that started decades before drug treatment commenced.

What, then, is the answer to HFP EF? Prevention. Given the results of the YFS, prevention should begin during childhood. Focusing on prevention early should result in a reduced burden of HFP EF as well as other medical problems commonly seen in adults. Where do we start? In 2010, the American Heart Association defined national goals for cardiovascular health promotion and disease reduction for children and adults. This gave rise to My Life Check Life's Simple 7. The Simple 7 included the following: manage blood pressure, control cholesterol, reduce blood sugar, get active, eat better, lose weight, and stop smoking. The Simple 7 outlines a comprehensive way to improve one's health and reduce cardiovascular risk for children and adults. But implementing 7 actionable items is difficult for most individuals, especially children. Rather than the Simple 7, for children, I would start with the Terrific 2: increased physical activity and sodium restriction. Implementing these 2 actionable items is far simpler than 7 and should result in reduced rates of obesity and hypertension in adulthood.

Right now, adult cardiologists are overwhelmed by the sheer volume of patients with HFP EF and frustrated by the lack of treatment options. One day, it would be nice to ask what happened to all of the patients with HFP EF. Although the Simple 7 are more comprehensive, adoption of the Terrific 2 is a step toward the lofty but achievable goal of decreasing the number of adults with HFP EF and other cardiovascular problems.

**ABBREVIATIONS**

HFP EF: heart failure with preserved ejection fraction
LV: left ventricle
YFS: Cardiovascular Risk in Young Finns Study

**REFERENCES**


Childhood Lifestyle Choices, Left Ventricular Diastolic Dysfunction, and the Terrific 2
William E. Hopkins
Pediatrics 2021;147;
DOI: 10.1542/peds.2020-025908 originally published online February 8, 2021;

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