Population Health: The Power of Prevention

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Modifiable lifestyle factors are profoundly powerful in maximizing health span and lifespan. Numerous long-term epidemiologic studies provide compelling evidence that self-care behaviors, such as being physically active, eating a nutritious diet, maintaining a healthy weight, not smoking, avoiding excessive alcohol intake, and getting sufficient sleep, are critically important for maintaining cardiometabolic health (e.g., favorable lipid, glucose, and blood pressure levels). Moreover, these factors have been linked to a lower risk of developing coronary heart disease (CHD), stroke, heart failure, cancer, type 2 diabetes, dementia, and other chronic conditions (*Table 1*), as well as to slowing of biologic aging (as reflected in biomarkers such as DNA methylation, the epigenetic clock, and telomere length).

Much of the literature on this topic over the last quarter-century is relevant to women's health. In the Women's Health Initiative (WHI), a diverse cohort of more than 160,000 US postmenopausal women aged 50–79 followed for 10–17 years, women with a healthy lifestyle were about one-seventh as likely to develop cardiovascular disease (CVD) and one-fourth to one-third as likely to develop heart failure than their counterparts with an unhealthy lifestyle (Foraker et al., 2016). Also, women with both a healthy weight and higher physical activity level had less than one-third the risk of type 2 diabetes than those with obesity and lower physical activity (Ma et al., 2012). Similarly, data from the Nurses' Health Study, which followed 85,000 US female nurses aged 35–59 for decades, suggest that 82 percent of CHD cases, 74 percent of total CVD cases, 91 percent of type 2 diabetes cases, and 41 percent of cancer cases in women could be prevented by engaging in regular physical activity, eating nutritious food, maintaining a healthy weight, not smoking, and limiting alcohol consumption (Stampfer et al., 2000). Data from younger female cohorts show that healthy lifestyle behaviors are associated with lower risks of preeclampsia and other adverse pregnancy-related events and also modulate the association between such events and later-life cardiometabolic risks.

Lifestyle is equally important for men's health. In a combined analysis of 30-year data from the Nurses' Health Study and a parallel cohort of US male health professionals, individuals with the 6 low-risk behaviors noted at the beginning of this commentary had an 86 percent, 80 percent, and 83 percent lower risk of CHD, stroke, and total CVD, respectively, than those with no low-risk factors, and two in three CVD cases were attributable to poor adherence to a healthy lifestyle. Data from these cohorts also indicate that adherence to a healthy lifestyle at age 50 extends life expectancy free of CVD, cancer, and type 2 diabetes from 23.7 to 34.4 years in women and from 23.5 to 31.1 years in men (0 vs. 4–5 low-risk lifestyle factors). In an 8-year study of eight low-risk factors (5 of the 6 noted above, plus stress management, social connections, and no opioid use disorder) among 276,000 US male and female veterans aged 40 years or older, individuals with just one low-risk factor were 24 percent less likely to die, and individuals with all eight factors were 87 percent less likely to die, than those with no factors. Each additional factor predicted a further 19 percent reduction in mortality. Male and female veterans with all eight factors had life expectancies that were 24.0 and 20.5 years longer, respectively, than their counterparts with no factors.

Statistics from other countries are similar. An analysis of data from more than 135,000 UK adults found that a high cardiovascular health level, defined as a favorable composite score on a set of factors called "Life's Essential 8" by the American Heart Association—diet, physical activity, tobacco/nicotine exposure, sleep, body mass index, non-HDL cholesterol, blood glucose, and blood pressure—was associated with an extension of health span by 9 years in women and 7 years in men (Wang et al., 2023). In a cohort of more than 1.5 million adults from 34 countries, 57 percent and 53 percent of cases of incident CVD among women and men, respectively, and 22 percent and 19 percent of deaths from any cause among women and men, respectively, were attributable to elevated body mass index, blood pressure, and non-HDL cholesterol; diabetes;

TABLE 1 | Adherence to Healthy Lifestyle and Disease Risk Reductions

Health Outcome	Risk Reduction
Cardiovascular events (composite)	↓ 75-85%
Coronary heart disease	↓ ~80%
Myocardial infarction	↓ ~80%
Stroke	↓ ~70%
Heart failure	↓ 60–70%
Atrial fibrillation	↓ ~40%
Type 2 diabetes	↓ 80–90%
Cancer	↓ 40–50%
Dementia	↓ ~30–40%
Chronic kidney disease	↓ 50–60%
Osteoporosis (bone mineral density T-score ≤ 2.5), in women	↓ ~50%
Chronic obstructive pulmonary disease	↓ ~75%
Autoimmune disease	↓ 50–60%
All-cause mortality	↓ ~45%

NOTE: Comparisons are for highest (or ideal) vs. lowest (or poor) adherence.

and smoking. Globally, the largest share of cancers is also attributable to unfavorable lifestyle behaviors.

The strong connection between lifestyle and health occurs in people of all races and ethnicities. In the WHI, for example, increasing amounts of moderate or vigorous physical activity, as well as time spent walking, were associated with stepwise reductions in major CVD events of similar magnitude in White and Black women (Manson et al., 2002). Among both groups, the most physically active individuals were 40–50 percent less likely to develop CVD than those who were inactive. Similarly, White and Black women with healthy weight and regular physical activity had comparable and substantial (60–70 percent) reductions in incident type 2 diabetes compared with their counterparts with obesity and sedentary lifestyle (Ma et al., 2012).

However, a healthy lifestyle is not equally accessible to all groups, at least in part because of socioeconomic disparities in, for example, access to affordable nutritious foods and safe areas to walk. Recent data highlight the role of such factors in health disparities. In a nationally representative cohort of more than 50,000 US adults followed for 9 years, Black adults had a 50 percent higher risk of CVD mortality than did White adults. Adjustment for racial differences in behavioral factors attenuated the risk differential by 40 percent but did not fully erase it. On the other hand, adjustment for social determinants of health, including family income, food insecurity, unemployment, and lack of home ownership, eliminated the excess risk among the Black community.

That said, the vast majority of US adults of all races and ethnicities do not engage in optimal lifestyle behaviors despite their salutary effects. Only 2.7 percent of US adults have a healthy lifestyle, defined as being sufficiently physically active (at least 2.5 hours/week of moderate to vigorous activity), eating a nutritious diet, not smoking, and having a recommended body fat percentage (Loprinzi et al., 2016). Thus, it is perhaps not surprising that 90 percent of the $4.3 trillion annual cost of US healthcare is spent on medical care for chronic diseases that are largely preventable by lifestyle improvements. On the other hand,

what is surprising is the relative paucity of healthcare dollars spent on research to develop effective strategies for implementing and sustaining healthy lifestyle changes in the US population, including (and perhaps especially) in disadvantaged groups. Increased investment in this area—together with follow-on healthcare, public health, and social policies—is urgently needed. With respect to research, it is encouraging that the US Preventive Services Task Force recently introduced a new tool to point researchers and funders to critical evidence gaps that, once filled, will allow development of robust recommendations for effective preventive strategies, including in disadvantaged high-risk groups. More also needs to be done to implement strategies known to be effective. As one example, patient referral rates to intensive lifestyle intervention programs are abysmally low (less than 5 percent of US adults with prediabetes or history of gestational diabetes report ever receiving such a referral (Venkataramani et al., 2019)) despite the fact that such programs have been found in randomized trials to sharply curtail the transition from prediabetes to type 2 diabetes. Indeed, in the US, just 25 percent of patients with diabetes, and 15 percent of other patients, receive *any* diet or exercise counseling at healthcare visits.

In summary, a healthy lifestyle is the primary bulwark against chronic disease and premature mortality. Thus, preventive care that promotes and facilitates self-care behaviors deserves at least equal, if not more, attention and funding as reactive care to move the population toward better health.

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