
















MEETING HIGHLIGHTS

American Heart Association EPI|Lifestyle Scientific Sessions: 2021 Meeting Highlights

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The annual American Heart Association (AHA) EPI|Lifestyle Scientific Sessions for 2021 was held in a virtual format from May 20 to 21, 2021. The AHA EPI|Lifestyle Scientific Sessions were combined meetings of the Council on Epidemiology and Prevention (EPI) and the Council on Lifestyle and Cardiometabolic Health. The 2021 conference's theme was Health Equity and Social Justice and highlighted keynote sessions on health equity, structural racism, and COVID-19 and cardiovascular disease (CVD) research. Results from observational studies and randomized controlled trials were presented at the meeting, including research on topics such as social determinants of health, maternal and child health, omics, nutrition, physical activity, and sleep. Participants of the virtual conference included clinicians, public health professionals, and trainees. Over 600 people took part in this year's event, which hosted 212 poster presentations, 66 moderated posters, and 80 oral presentations. The meeting chair representing the Council on Lifestyle and Cardiometabolic Health was Dr Kristie Lancaster from New York University, and Dr Pamela Lutsey from the University of Minnesota represented the EPI council. The vice chairs were Dr Marie-France Hivert from Harvard University representing

the Council on Lifestyle and Cardiometabolic Health, and Dr Alvaro Alonso representing the EPI council.

CONFERENCE THEME: HEALTH EQUITY AND SOCIAL JUSTICE

In welcoming remarks, Dr Mitchell Elkind, AHA president, recognized that 2020 was a year characterized by a pandemic and an increased focus on structural racism, social justice, and the impacts of social determinants of health. To address the COVID-19 crisis, the AHA created a rapid special response grant mechanism, and studies are ongoing. Additionally, as a result of the Presidential Advisory on Structural Racism published in November 2020,¹ the AHA is committing \$100 million over the next 5 years toward health equity and structural racism research.

KEYNOTE SESSIONS

Health Equity and Social Justice

The opening keynote session, Health Equity and Social Justice, featured Drs Olajide Williams and LaPrincess

Key Words: cardiovascular diseases ■ COVID-19 ■ epidemiology ■ health equity ■ healthy lifestyle

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All abstracts published in conjunction with the American Heart Association's EPI|LIFESTYLE 2021 Scientific Sessions can be found online here: https://www.ahajournals.org/toc/circ/143/Suppl_1

Supplemental Material is available at <https://www.ahajournals.org/doi/suppl/10.1161/JAHA.121.024765>

For Sources of Funding and Disclosures, see page 10.

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Brewer, and was moderated by Dr Kristie Lancaster. Dr Olajide Williams from Columbia University presented an overview of the relationship between racism and poor health. Intense amygdala activation and greater startle response occur when unfamiliar Black male faces are shown, and this is associated with higher unconscious bias, starting in early adolescence. The effects of racism have seeped into every sector of US society. In working to prevent the detrimental effects of racism on cardiovascular health, Dr Williams used Dr Camara Jones' cliff analogy.² If a group of people are at the edge of a cliff of good health, secondary and tertiary prevention strategies would focus on treating those who fall off, for instance by providing medical care to those who have fallen off the cliff (tertiary prevention) or positioning a trampoline halfway down the cliff to soften the fall (secondary prevention, safety-net program). Primary prevention strategies would aim to prevent people from falling in the first place. Even more effective, however, would be to implement primordial prevention strategies that move people back from the edge of the cliff face. Furthermore, interventions to address the determinants of equity would address the unequal distribution of populations at the edge of the cliff and resources for prevention. In the context of cardiovascular health, Dr Williams discussed the importance of addressing structural racism and racism in all its forms.

Dr LaPrincess Brewer from the Mayo Clinic spoke about community-based participatory research to address cardiovascular disparities. Dr Brewer is the principal investigator of fostering African-American improvement in total health (FAITH!), a culturally tailored mobile health intervention that integrated community-based participatory research approaches to address cardiovascular health disparities within Black communities.³ Dr Brewer highlighted the importance of engaging community members in the research process when conducting studies addressing cardiovascular disparities. According to Dr Brewer, successful community-based participatory research (1) is a partnership between community members, organizations and academics (of the people), (2) obtains community input and support from the beginning of the research (by the people), and (3) supports sustainability and dissemination for long-term population health (for the people).

COVID-19

The second day of the conference featured keynote lectures on COVID-19 and cardiovascular health, and was moderated by Dr Pamela Lutsey. The first speaker was Dr Scott D. Solomon from Brigham and Women's Hospital who presented on COVID-19 and the cardiovascular system. Cardiovascular risk factors and

comorbidities are associated with severe COVID-19. Endothelial damage may be the link between cardiovascular complications/risk factors and severe COVID-19. Additionally, symptoms of postacute sequelae of COVID-19 are linked to various organ systems including the cardiovascular system. Unfortunately, the extent of cardiovascular consequences of postacute sequelae of COVID-19 are not yet fully known, and further rigorous epidemiologic research is needed.

The second speaker was Dr Mercedes Carnethon from Northwestern University. Dr Carnethon presented on how disparities in cardiometabolic and cardiovascular morbidities contributed to the disproportionate burden of severe COVID-19. Structural racism and its effects on social determinants of health increase the risk of both COVID-19 infection and cardiometabolic and cardiovascular conditions, which are associated with severe COVID-19 outcomes. As a result, across the spectrum of COVID-19, from infection to postacute sequelae of COVID-19, marginalized groups, including communities of color, have disproportionately suffered. To address COVID-19 disparities, it would be important to expand access to health care, establish equitable care models, and address social determinants of health.

DAVID KRITCHEVSKY MEMORIAL LECTURESHIP

The David Kritchevsky Memorial Lectureship was created in 2007 in honor of Dr David Kritchevsky for his important influence on our understanding of the role of diet in the pathophysiology of atherosclerosis.⁴ This year's honoree was Dr Serge Hercberg from the University of Sorbonne, Paris, France. Dr Hercberg began his lecture by acknowledging previous honorees, all of whom have made significant contributions to the field of nutritional science. His talk focused on the Nutri-Score, a summary, graded, color-coded, front-of-pack nutrition label first adopted in France in 2017 and subsequently in several other European countries.⁵ The Nutri-Score rating system is designed to help consumers make healthier food choices at the point of purchase and incentivize manufacturers to reformulate their products. Dr Hercberg presented a summary of evidence used to support the implementation of the Nutri-Score system, including understanding of Nutri-Score among European consumers, comparisons with other front-of-pack labels on consumer purchase intentions, validation of the nutrient profile system underlying the Nutri-Score, and associations of Nutri-Score scores with prospective health outcomes. For example, consumption of foods in the poorest quartile of the Nutri-Score rating conferred a 61% higher risk of CVD.⁶

ORAL ABSTRACT PRESENTATIONS

Following the keynote and named lecture sessions, oral abstracts were presented on a broad range of topics, described below. Moderated poster presentations are detailed in Data S1.

Health Equity and Social Justice

Abstracts presented in this session, moderated by Dr Bertha Hidalgo from the University of Alabama at Birmingham aligned with the conference theme of health equity and social justice and highlighted research among Hispanic and Latinx, South Asian, and Black adults, incarcerated persons, and individuals living in rural communities.

Jonathan Oxman from the Albert Einstein College of Medicine examined the relationship of perceived discrimination with cardiac structure and function in the HCHS/SOL (Hispanic Community Health Study/Study of Latinos): ECHO/SOL (Echocardiographic Study of Latinos) ancillary study. Stigmatization/devaluation and experiencing discrimination at work or school predicted left arterial volume index, and total discrimination score predicted left ventricular ejection fraction.⁷ Dr Alex Montiel Ishino from the National Institute on Minority Health and Health Disparities presented data from the MASALA (Mediators of Atherosclerosis in South Asians Living in America) study. Using a syndemic framework, findings showed that the latent profile at the highest risk of cardiometabolic disease was more likely to use an assimilation acculturation strategy.⁸

Research by Dr Shabatun Islam from Emory University examined the relationship of neighborhood characteristics with arterial stiffness among participants from Jackson, Mississippi, and Atlanta, Georgia.⁹ Social cohesion and activity with neighbors were associated with better arterial health in both settings, whereas lower violence was associated with improved arterial health in Jackson, and improved food access was associated with better arterial health in Atlanta. Dr Chelsea Singleton from the University of Illinois presented research showing physical inactivity and obesity were associated with higher violent crime rates in majority Black or Hispanic census tracts, but not majority White census tracts in Chicago, Illinois.¹⁰

Among women with a history of breast and gynecologic cancers, Dr Duke Appiah from the Texas Tech University Health Sciences Center found that the prevalence of cardiovascular mortality was higher among women living in rural compared with urban areas, which could be explained by individual- and neighborhood-level factors. Dr Stephen Clarkson from the University of Alabama at Birmingham discussed predictors of establishing care in an interprofessional heart failure clinic following heart failure hospitalization at a hospital

in Birmingham, Alabama. Black individuals residing in rural areas were least likely to establish care and more likely to have other comorbidities such as hypertension and alcohol use disorder than urban dwellers.¹¹ Ary Spilkin from Northern Arizona University examined dietary content in a rural Southwest jail in comparison to guidelines for a heart-healthy pregnancy. Sodium and saturated fat exceeded recommended amounts, whereas whole grains were inadequate.¹²

Cardiovascular Outcomes and Risk Prediction

In the session on risk prediction, moderated by Dr Alvaro Alonso from Emory University, multiple presentations leveraged machine-learning approaches. Dr Zhi Yu from the Broad Institute used data from the ARIC (Atherosclerosis Risk in Communities) study to address the impact of time-varying risk factors on predicting the risk of sudden cardiac death using a novel machine-learning approach.¹³ Dr Matthew Matheson from Johns Hopkins University tested the ability of random survival forest algorithms to identify the most important markers for incident CVD among 155 108 Japanese adults >40 years of age.¹⁴

The value of longitudinal, cardiovascular cohorts was also displayed. Dr Rebecca Song from Boston University explored the prognostic usefulness of subclinical disease measures, such as coronary artery calcium score, left ventricular hypertrophy, and microalbuminuria, in the Framingham Offspring and Third Generation cohorts.¹⁵ Dr Mercedes Sotos-Prieto of Universidad Autónoma de Madrid hypothesized that the Healthy Heart Score, a lifestyle-based score, would improve the prediction of cardiovascular risk in the Jackson Heart Study, but it did not improve prediction of midlife CVD events beyond age alone.¹⁶ Using data from 6 US population-based cohorts, Dr Priya Freaney from Northwestern University found Black women are 3 times more likely to experience premature natural menopause (<40 years) than White women, which was associated with a 40% higher risk of coronary heart disease in both Black and White women, emphasizing premature menopause should be assessed as a risk-enhancing variable in clinical prevention decisions.¹⁷ Using data from the ARIC study, Dr Scott Mu from Johns Hopkins University found that the lowest mean value of self-rated health occurred 1 year after hospitalization, and that poor self-rated health was strongly associated with adverse outcomes, including a 4-fold greater risk of mortality compared with excellent self-rated health.¹⁸ Dr Zakaria Almuwaqqat from Emory University showed there was a synergistic association of posttraumatic stress disorder and mental stress-induced myocardial ischemia on the risk of adverse cardiovascular outcomes in a cohort of individuals with stable coronary artery disease.¹⁹

Diabetes and Obesity

Dr Justin Echouffo-Tcheugui from Johns Hopkins University moderated the session on diabetes and obesity. Based on maternal birth record data for live births from 2016 to 2018, Dr Natalie Cameron from Northwestern University observed that the proportion of women with favorable prepregnancy cardiometabolic health (normal body mass index, no smoking, no diabetes, and no hypertension), has declined, with the lowest rates in the Southern and Midwestern states.²⁰ Dr Ambarish Pandey from University of Texas Southwestern presented on the risk of heart failure for different measures of body composition and observed that higher fat mass and waist circumference were associated with a higher risk of heart failure among people with diabetes or prediabetes.²¹ Dr Di Zhao from Johns Hopkins University used a mobile application to evaluate the effect of time-restricted eating on weight, and found that a higher number of medium or large meals was associated with weight gain, whereas a higher number of snacks was associated with decreased weight trajectory.²² Based on data from the action for health in diabetes (Look AHEAD) trial, Dr Mike Bancks from Wake Forest University found that the effect of the intensive lifestyle intervention on cardiovascular disease prevention may differ according to diabetes subgroup. Dr Rikuta Hamaya from Brigham and Women's Hospital used data from the Women's Health Study to identify modifiable lifestyle factors for serum levels of branched-chain amino acids, which are associated with insulin resistance and type 2 diabetes.²³ Body mass index was the only risk factor that explained a substantial portion of the variation in serum branched-chain amino acid levels. Dr Xiang Gao from Colorado State University examined moderators and mediators of the relationship between the vasoconstrictor endothelin 1 and risk for diabetes in Black adults in the Jackson Heart Study.²⁴ Dr Carolina Ochoa-Rosales from Erasmus University found the beneficial effect of coffee on type 2 diabetes risk was partially mediated by improvements in systemic inflammation, as reflected in C-reactive protein and adiponectin levels.²⁵

Nutrition

Dr David Jacobs from the University of Minnesota moderated the nutrition session, which featured several presentations on dietary patterns. Fenglei Wang from Harvard University reported that among 10 684 participants of the Nurses' Health Study, Nurses' Health Study II, and the Health Professionals Follow-Up Study, metabolomic signatures of plant-based diets were associated with a significant 18% lower risk of incident type 2 diabetes.²⁶ Dr Stephen Juraschek from Beth Israel Deaconess Medical Center presented a secondary

analysis of the dietary approaches to stop hypertension (DASH)-Sodium trial, which showed that compared with the control diet, participants randomized to a combined low-sodium and DASH diet had lower levels of high-sensitivity cardiac troponin I, N terminal pro-B-type natriuretic peptide, and high-sensitivity C-reactive protein.²⁷ Dr Sun Young Jeong, an internal medicine resident at Beth Israel Deaconess Medical Center, demonstrated that individuals randomized to a DASH diet or a diet more broadly emphasizing fruits and vegetables had an average 10% and 11% reduction, respectively, in their 10-year arteriosclerotic cardiovascular disease risk compared with those randomized to a control diet over an 8-week period.²⁸ Dr Marialaura Bonaccio from IRCCS Neuromed showed that individuals with greater adherence to a Mediterranean diet over 12.7 years experienced a reduction in inflammatory markers, including the granulocyte-to-lymphocyte ratio, compared with those with lower adherence.²⁹ Dr Kathy Trieu from the George Institute for Global Health presented systematic review data suggesting that higher levels of dairy fat biomarkers (15:0 and 17:0) were associated with a lower risk of incident arteriosclerotic cardiovascular disease.³⁰

Novel CVD Risk Factors

In this oral abstract session, moderated by Dr Deepak Gupta from Vanderbilt University, a variety of novel environmental, endogenous, and behavioral CVD risk factors were presented.

Fan He of Pennsylvania State University used 24-hour individual-level acute particulate matter PM_{2.5} monitors and concurrently measured 24-hour ECG recordings in the Penn State Child Cohort, and found that within 2 hours of exposure, every 10- $\mu\text{g}/\text{m}^3$ increase in PM_{2.5} was associated with a 5% increase in counts of premature ventricular contractions.³¹ Dr Erin Richard from the University of California San Diego used a Mendelian randomization approach to investigate the associations of various kidney function biomarkers and cognitive function in adults from the UK Biobank study, and found no evidence of causal effects for genetically determined levels of serum uric acid, creatinine-based estimated glomerular filtration rate, or cystatin C-based estimated glomerular filtration rate with cognitive performance.³² Dr Brandilyn Peters-Samuels from the Albert Einstein College of Medicine examined the impact of menopause on the microbiome and related associations with metabolic syndrome in the HCHS/SOL. There were similarities in the microbiomes of men and postmenopausal women, with a reduced abundance of potentially pathogenic bacteria *Escherichia coli* and *Shigella dysenteriae*.³³

Adam Haines from the Albert Einstein College of Medicine found that use of nonbenzodiazepine

gamma-aminobutyric acid receptor agonists, but not other prescription hypnotic use, was associated with increased risks of incident CVD and all-cause mortality in older women with known sleep disturbances in the WHI (Women's Health Initiative).³⁴ Yifei Lu from the University of North Carolina presented research from the ARIC study showing both higher midlife metabolic dysregulation and greater changes in metabolic dysregulation over time were associated with reduced later-life physical function.³⁵

Dr Megan Nelson from the University of Idaho showed that over a 3-hour bout of uninterrupted sitting, both physically active and inactive adults experienced negative physiological effects, including a worsening hemodynamic profile and increased levels of biomarkers interleukin-6 and endothelin-1.³⁶ Dr Steven Nguyen from the University of California San Diego used ARIC data to examine the association of GrimAge, a DNA methylation-based measure of aging that predicts all-cause mortality, with incident heart failure and its potential usefulness for risk prediction.³⁷

Sleep

Dr Chandra Jackson from the National Institute of Environmental Health Sciences moderated the session on sleep. Using data from the Nurses' Health Study and the Health Professionals Follow-Up Study, Dr Marta Guasch-Ferré from Harvard University found that a healthy lifestyle score including sleep duration was associated with lower incidence of total CVD, coronary heart disease, and stroke. Adding sleep duration to the traditional lifestyle score improved the model's prediction.³⁸ Dr Faris Zuraikat from Columbia University presented a randomized crossover outpatient trial of adequate sleep versus sleep restriction characterized by a 1.5-hour delay in bedtime. Chronic short sleep patterns were associated with greater sedentary time and lower physical activity, particularly among women.³⁹

Vivian Cao from Columbia University presented results of a cross-sectional analysis of a diverse cohort of women, which showed a history of weight cycling (weight loss and regain) was associated with shorter sleep duration, poorer sleep quality, greater insomnia severity index, more sleep disturbances, and daytime dysfunction.⁴⁰ Dr Julio Fernandez-Mendoza from Pennsylvania State University presented findings showing that cumulative exposure to sleep-disordered breathing over 15 years was associated with increased risk of endothelial dysfunction in young adults in the Penn State Child Cohort.⁴¹ Dr Adam Knowlden from the University of Alabama used National Health and Nutrition Examination Survey data to determine whether short sleep and insomnia represented independent constructs and if these constructs predicted obesity, hypertension, and diabetes.⁴² Claire Zhang from the University of California, San Diego discussed

a novel, low-cost tool that passively captures respiration during sleep via mechanical sensors placed under the legs of a bed to enable long-term home investigation of periodic breathing.⁴³

COVID-19 and CVD

This session included timely individual- and community-level investigations related to COVID-19 and CVD, and was moderated by Dr Elizabeth Oelsner from Columbia University.

Dr Joshua Elliott from Imperial College presented data from the UK Biobank cohort of 473 574 participants at risk for COVID-19 from January 2020. Age, male sex, Black race, low income, CVDs, hypertension, diabetes, autoimmune disease, history of steroid use, and cystatin C jointly predicted COVID-19 mortality.⁴⁴ In a population-based sample of COVID-19 cases and controls from the OneFlorida research consortium, Dr Osama Dasa from the University of Florida found there was a significantly higher prevalence of cardiovascular comorbidities in Black compared with White individuals with COVID-19 infection.⁴⁵

Ashwin Sunderaj from Northwestern University examined the associations of community-level factors, including social vulnerability (eg, crowded living conditions and limited food access) and socially protective factors (eg, having a primary care provider) with COVID-19 mortality across 77 community areas in Chicago.⁴⁶ Dr Alexander Ivanov from Wake Forest Baptist Medical Center presented findings from a serological substudy of 5000 randomly selected participants included in the COVID-19 Community Research Partnership cohort and highlighted the independent association of heart failure with SARS-CoV-2 seroconversion.⁴⁷ Eugenia Wong from the University of North Carolina used data from North Carolina disease event tracking and epidemiologic collection tool (NC DETECT), the state's syndromic surveillance system, to document an abrupt decrease in overall emergency department volume and acute myocardial infarction and stroke/transient ischemic attack emergency department visits following announcements of the state-wide stay-at-home order.⁴⁸ Dr Hanna Moon from Yonsei University Severance Hospital presented a systematic review on the characteristics and outcomes of in-hospital cardiac arrest among patients with COVID-19.⁴⁹ Finally, Dr Gregory Heath from the University of Tennessee, Chattanooga discussed the use of geospatial data and subsequent intersectoral collaboration to eliminate disparities in COVID-19 testing.⁵⁰

Maternal and Child Health

This session, moderated by Dr Marie-France Hivert from Harvard University featured several presentations

aimed at addressing disparities in maternal and child health.

Dr Michelle Ogunwole from Johns Hopkins University examined disparities in gestational diabetes among US- versus foreign-born women by analyzing data from the 2016 to 2017 National Health Interview Survey.⁵¹ Dr Samantha E. Parker from Boston University found 1 in 10 women in a diverse safety-net hospital population with normotensive pregnancies developed de novo hypertension within 12 months postpartum; risk factors included identifying as non-Hispanic Black, delivery via cesarean section, preterm delivery, or multiparous gestation.⁵² Dr Angela Malek from the Medical University of South Carolina investigated the associations of hypertensive disorders of pregnancy and prepregnancy hypertension with incident maternal embolism within 5 years of delivery overall and by race and ethnicity using data from a retrospective cohort study in South Carolina.⁵³

Using data from the Boston Birth Cohort, Dr Anum Minhas from Johns Hopkins University found greater adherence to a Mediterranean style diet was associated with lower odds of preeclampsia.⁵⁴ Dr Adebamike A. Oshunbade from the University of Mississippi Medical Center evaluated the relationship between hypertensive diseases in pregnancy and biomarkers of hemodynamic stress later in life in the Genetic Epidemiology Network of Arteriopathy study.⁵⁵

Michael Wang from Northwestern University used the 2014 to 2018 US National Center for Health Statistics Natality Files to examine the associations of maternal prepregnancy cardiovascular health factors (normal body mass index, nonsmoking, no diabetes, and no hypertension) with adverse maternal and fetal outcomes (maternal intensive care unit admission, preterm birth, low birthweight, and fetal death). Suboptimal prepregnancy cardiovascular health was more common among non-Hispanic Black and Hispanic women, and had strong, graded associations with adverse maternal and fetal outcomes.⁵⁶ Dr Kara Whitaker from the University of Iowa investigated variations in health behaviors among pregnant women during the COVID-19 pandemic using data from the COVID-19: Health in Pregnancy and Postpartum Study. Most participants reported no changes or improvement in diet, physical activity, or sleep, but women more likely to report adverse lifestyle behavioral changes were those who reported experiencing pregnancy complications, loss of income, and changes in social connections because of the pandemic.

Clinical Epidemiology

Dr Anna Kucharska-Newton from the University of Kentucky served as the moderator for the session on clinical epidemiology. Dr Rahul Aggarwal from

Beth Israel Deaconess Medical Center examined racial disparities in hypertension and diabetes mortality in urban and rural communities in the United States among Black and White adults from 1999 to 2018. Black adults had higher rates of mortality attributable to diabetes and hypertension than White adults in both urban and rural areas, but the gap narrowed only in urban areas. Dr Kiran Biddinger from the Broad Institute conducted a Mendelian randomization study in the UK Biobank to evaluate the causal relationship between alcohol and cardiovascular disease and found exponential increases in risk for both clinical and subclinical cardiovascular disease across all levels of alcohol consumption.⁵⁷

Dr Neil Kalwani from Stanford University presented research on the operational impact of telehealth in a preventive cardiovascular clinic. The study, conducted before the COVID-19 pandemic, found video visits for preventive care were more likely to start and end on time, and were more operationally efficient than in-person visits.⁵⁸ Using data from the ARIC study, Dr Mauro Felipe Felix Mediano from the Oswaldo Cruz Foundation found higher levels of prestroke physical activity, during both work and leisure, were associated with decreased mortality after stroke.⁵⁹ Radha Dhingra from the Pennsylvania State College of Medicine examined the burden of CVD in a psychiatric outpatient population by comparing electronic health record data from a psychiatric outpatient clinic with nationally representative data from the National Health and Nutrition Examination Survey.⁶⁰ Yuta Ishikawa from the University of Georgia College of Public Health evaluated diagnostic tests for diabetes among people with heart failure in the National Health and Nutrition Examination Survey.⁶¹

Hypertension

Dr Jared Magnani from the University of Pittsburgh moderated the session on hypertension. Dr Saate Shakil from the University of Washington presented results on the global patterns of mean systolic blood pressure between 1990 and 2019. Overall, the highest mean systolic blood pressures in 1990 were observed in high-income locations, but in 2019, the highest systolic blood pressures were observed in Sub-Saharan Africa.⁶² To assess whether there were racial and ethnic differences in blood pressure during the 2016 US general election, Dr Andrew Hwang from High Point University analyzed National Health and Nutrition Examination Survey data from periods before the election (May 2016–October 2016) and after the election (November 2017–April 2018). At the population level, racial and ethnic minorities had increased blood pressure following the US general election.⁶³ Dr Gabriel Tajeu from Temple University

presented findings from the Jackson Heart Study, which showed less than half of participants in the study on antihypertensive medication had persistent blood pressure control.⁶⁴

Presenting findings from the REGARDS (Reasons for Geographic and Racial Differences in Stroke) cohort, Dr Carol Oladele from Yale University examined the association between ultraprocessed food and hypertension incidence. Consumption of ultraprocessed food was higher among Black adults and associated with increased risk of hypertension among Black adults, but not among White adults.⁶⁵ So Mi Jemma Cho from Yonsei University presented research on nocturnal blood pressure dipping and chronic kidney disease among patients with controlled blood pressure and showed patients with reverse or nondipping blood pressure patterns had higher odds for albuminuria and reduced kidney function.⁶⁶ Using data from the International Childhood Cardiovascular Cohorts Consortium, Dr Elaine Urbina from Cincinnati Children's Hospital discussed findings that showed blood pressure trajectories across childhood might identify youth at risk for developing hypertension in adulthood.⁶⁷ Dr Jennifer McLeod from the Albert Einstein College of Medicine discussed results from the ECHO/SOL ancillary study on cardiac structure and function in relation to hypertension and the impact of blood pressure control.⁶⁸

Physical Activity

In the session on physical activity moderated by Dr Sarah Camhi from the University of San Francisco, observational and intervention studies were presented.

Christopher Moore from the University of North Carolina examined the association of daily steps accumulated outside of bouts of physical activity (sporadic steps) and all-cause mortality, before and after accounting for bouted steps, using data from the Women's Health Study.⁶⁹ Dr Katie Crist from University of California, San Diego presented findings from a cluster-randomized trial that compared the effects of a multilevel PEP4PA (Peer Empowerment Program 4 Physical Activity) versus usual senior center programming on moderate-to-vigorous physical activity, blood pressure, perceived quality of life, and depressive symptoms among a diverse population of predominantly low-income older adults over 24 months.⁷⁰ Using data from the CARDIA (Coronary Artery Risk Development in Young Adults) study, Minsuk Oh from the University of Iowa found a greater 10-year increase in television viewing was associated with a greater increase in pericardial adipose tissue, controlling for moderate-to-vigorous physical activity and other confounders.⁷¹ Dr Maira Tristao Parra from the University of California, San Diego examined the cross-sectional

association between mindfulness and physical activity among patients with stage B heart failure in the University of California, San Diego and Veteran Affairs San Diego Health Care Systems.⁷² Xiao Hu from Johns Hopkins University examined physical function and subsequent risk of cardiovascular events in older adults in ARIC, and found participants with low and intermediate physical function had significantly higher risk of the composite CVD outcome than those with high physical function.⁷³

Dr Angelique Brellenthin from Iowa State University examined the independent and joint associations of familial dementia (dementia in a first-degree relative) and healthy lifestyle behaviors with dementia risk in adults ≥ 60 years of age in the UK Biobank Study. A greater number of healthy behaviors was associated with a lower risk of dementia, whereas familial dementia was associated with a higher risk of dementia; among those with familial dementia, adopting 3 or more healthy behaviors was associated with lower dementia risk.⁷⁴ Alexis Jones from the University of South Carolina examined differences in body composition at baseline and in response to a 20-week endurance training program in the HERITAGE (Health, Risk Factors, Exercise Training, and Genetics) study by metabolic health and weight status.⁷⁵

Jeremiah and Rose Stamler Research Award for New Investigators Finalist Presentations

Dr Donald Lloyd-Jones from Northwestern University moderated the Stamler Award finalist presentations and presented this year's award to Mingyu Zhang from Johns Hopkins University. Zhang applied Bayesian kernel machine regression to data from the Boston Birth Cohort to examine the association of in utero coexposure to metals lead, cadmium, mercury, manganese, and selenium with offspring systolic blood pressure in children 3 to 15 years of age.⁷⁶

Dr Shreya Rao from the University of Texas Southwestern examined longitudinal trajectories and predictors of county-level cardiovascular mortality in the United States from 1980 to 2014.⁷⁷ Daniela Charry from the University of North Florida presented research on total brachial artery reactivity and incident heart failure in the MESA (Multi-Ethnic Study of Atherosclerosis).⁷⁸ Dr Daniel Huck from the University of Colorado presented a retrospective cohort study in the University of Colorado Health System comparing cardiovascular outcomes of patients with hypertension taking the vasodilatory β -blocker nebivolol with patients taking the nonvasodilatory β -blockers atenolol and metoprolol.⁷⁹ Finally, Dr Andrew Agbaje from the University of Eastern Finland examined whether lean mass and systolic blood pressure, independent of fat mass and cardiometabolic and lifestyle factors, are associated with changes in carotid-femoral

pulse wave velocity and carotid intima-media thickness from 17 to 24.5 years of age in the Avon Longitudinal Study of Parents and Children birth cohort.⁸⁰

NATIONAL HEART, LUNG, AND BLOOD INSTITUTE CARDIOVASCULAR EPIDEMIOLOGY, BIostatISTICS, AND PREVENTION TRAINEE SESSION

As in previous years, the National Heart, Lung, and Blood Institute (NHLBI) sponsored a concurrent session at AHA EPI|Lifestyle that highlighted the work of NHLBI-supported trainees. Fifteen trainees from 10 institutions presented their work across 2 sessions. The first, moderated by Drs James Lash (University

of Illinois) and Vanessa Xanthakis (Boston University), featured presentations on physical activity, diabetes, blood pressure, stress, and SARS-CoV-2. Several presentations closely aligned with the meeting theme of health equity and social justice. Dr Telisa Spikes from Emory University presented work focused on the associations between net worth, debt stress, and ambulatory blood pressure in Black women. Two studies focused on factors related to the build environment; Genevieve Davison from Washington University in St. Louis presented work on neighborhood concentrated disadvantage and its null association with behavioral obesity treatment response, and Mary Schiff from the University of Pittsburgh demonstrated the differential associations of residential segregation on gestational hypertension among minority women.

The second session was moderated by Drs Jan Hughes-Austin (University of California, San

Table 1. Council on Epidemiology and Prevention Conference Awards

Council on Epidemiology and Prevention Awards	
Awards	Presenter and Title
Roger R. Williams Award for Genetic Epidemiology and the Prevention and Treatment of Atherosclerosis	Kiran J. Biddinger <i>Alcohol Increases Risk of Cardiovascular Disease at All Levels of Intake</i> ⁵⁷
Trudy Bush Fellowships for Cardiovascular Disease Research in Women's Health	Dr Samantha E. Parker <i>De Novo Postpartum Hypertension in a Safety-Net Hospital: Incidence and Risk Factors</i> ⁵² Dr S. Michelle Ogunwole <i>Disparities in Gestational Diabetes Mellitus Among US- vs Foreign-Born Women: An Analysis of 2016–2017 National Health Interview Survey</i> ⁵¹ Dr Natalie M. Golaszewski <i>Social Isolation, Loneliness, and Cardiovascular Disease Among Older Women in the Women's Health Initiative</i> ⁸¹
Epidemiology and Prevention Mentoring Award	Dr Donald M. Lloyd-Jones
Sandra A. Daugherty Award for Excellence in Cardiovascular Disease or Hypertension Epidemiology and Prevention	Dr Stephen P. Juraschek <i>Effects of Sodium Reduction and the DASH Diet on Subclinical Cardiac Damage: Results From the DASH-Sodium Trial</i> ²⁷ Dr Marta Guasch-Ferré <i>A Healthy Lifestyle Score Including Sleep Duration and Risk of Cardiovascular Disease</i> ³⁸ Dr Ben King <i>Odds of Heart Disease and Arrhythmia Associated With Exposure Dose to Homelessness</i> ⁸² Dr Zakria Almuwaqqat <i>Post-Traumatic Stress Disorder, Mental Stress-Induced Myocardial Ischemia, and Cardiovascular Outcomes in Patients With CAD</i> ¹⁹ Dr Bernhard Haring <i>Blood Pressure Variability and Risk of Heart Failure in Postmenopausal Women. Results From the Women's Health Initiative</i> ⁸³
Jeremiah and Rose Stamler Research Award for New Investigators	Mingyu Zhang (Winner) <i>In Utero Exposure to Metal Mixtures and Offspring Blood Pressure: An Analysis of the Boston Birth Cohort Using Bayesian Kernel Machine Regression</i> ⁷⁶ Dr Shreya Rao <i>Longitudinal Trajectories and Predictors of County-Level Cardiovascular Mortality in the United States (1980–2014)</i> ⁷⁷ Daniella Charry <i>Total Brachial Artery Reactivity and Incident Heart Failure and Heart Failure Subtypes: Multi-Ethnic Study of Atherosclerosis</i> ⁷⁸ Dr Daniel Huck <i>Nebivolol Associated With Reduced Incident Cardiovascular Events in Hypertensive Patients Compared With Nonvasodilatory Beta Blockers</i> ⁷⁹ Dr Andrew O. Agbaje <i>A 15-year Cumulative High Exposure to Lean Mass and Blood Pressure but Not Fat Mass Predicts the 7-Year Change in Carotid-Femoral Pulse Wave Velocity and Carotid Intima-Media Thickness: The ALSPAC Study</i> ⁸⁰

Diego) and Shakia Hardy (University of Alabama at Birmingham) and featured presentations on pulmonary health, dental health, COVID-19, diet, and social isolation. Three studies leveraged data from the ARIC study. Dr Brian Steffen of the University of Missouri used large-scale proteomic data to show that those at greater genetic risk of COVID-19–related respiratory failure are susceptible to interleukin-15 suppression. Rebecca Molinsky of the University of Minnesota discussed the association between periodontal disease and incident heart failure, highlighting an understudied potential risk factor for cardiovascular disease in older adults. Dr Albert Liu discussed the associations between social isolation, social support, and cognitive decline in older adults. All 3 presentations highlighted risk factors that may be significantly affected by the ongoing global pandemic and COVID-19 precautionary practices such as social distancing. Although ongoing NHLBI-supported cohorts are well positioned to study these changes, new studies may also be necessary to assess these risk factors in populations not under study such as children, younger adults, and racial minorities.

As in previous years, the NHLBI trainee session highlighted timely and methodologically strong work presented by early career investigators in cardiovascular epidemiology. Longitudinal cohorts continue to play an important role in providing structured training opportunities for these investigators. New approaches, methods, and studies were also highlighted including geographic/spatial analyses, data from randomized controlled trials, and financial data. The NHLBI trainee session continues to be an important venue for the trainees to present their work.

EARLY CAREER COMMITTEE EVENTS

Epidemiology and Prevention Council: At the Heart of It All: Non-Cardiovascular-Based Cohorts to Address Cardiovascular Research Questions for Early-Stage Investigators

The session was moderated by Drs Sadiya Khan (Northwestern University) and Chris Longnecker (Case Western University), with Drs Ravi Kalhan (Northwestern University), Becky McNeil (RTI International), Philip Greenland (Northwestern University), and Heidi Crane (University of Washington) serving on the panel.

Dr Ravi Kalhan highlighted the need for a lung-health cohort to help with lung disease prediction, prevention, and management and discussed the establishment of a community-based cohort to help fill this gap in research. Dr Heidi Crane discussed opportunities that the Center for AIDS Research Network of Integrated Clinical Systems cohort offers for researchers to examine longitudinal data on people with HIV being treated with highly active antiretroviral therapy (HAART). She encouraged researchers to examine available data on resistance, patient-reported and validated outcomes, and biological specimens. Drs Greenland and McNeil talked about the nuMoM2b (Nulliparous Pregnancy Outcomes Study: Monitoring Mothers-to-Be) study among racially, ethnically, and geographically diverse pregnant women. The nuMoM2b is a prospective cohort study to evaluate the underlying, interrelated mechanisms of common adverse pregnancy outcomes, which can be unpredictable in women with little or no pregnancy history, to help guide their treatment. This

Table 2. Council on Lifestyle and Cardiometabolic Health Conference Awards

Council on Lifestyle and Cardiometabolic Health Awards	
Awards	Presenter and Title
Award for Excellence in Research Addressing Cardiovascular Health Equity	Dr Carol R. Oladele <i>Ultra-Processed Food and Hypertension Incidence in the REGARDS Cohort</i> ⁶⁵
Scott Grundy Award for Excellence in Metabolism Research	Dr Simon Higgins <i>Social Jetlag, Independent of Other Sleep Characteristics, Is Associated With Obesity-Related Outcomes in 9–11-Year-Old Girls</i> ⁶⁴ Dr Natalie A. Cameron <i>Geographic Variation in Prepregnancy Cardiometabolic Health in the United States, 2016–2018</i> ²⁰ Dr Liliane Aguayo <i>Adolescent Predictors of Changes in Weight Status From Adolescence to Adulthood: Evidence From the Addhealth Study</i> ⁸⁵
Steven N. Blair Award for Excellence in Physical Activity Research	Dr Kelley Pettee Gabriel <i>Sedentary Behavior in Mid-Life and Structural Brain Magnetic Resonance Imaging Markers of Cerebrovascular Disease and Neurodegeneration in Late-Life: The Atherosclerosis Risk in Communities Neurocognitive Study (ARIC-NCS)</i> ⁸⁶
Mark Bieber Award	Dr Faris M. Zuraikat <i>Night-to-Night Variability in Sleep Duration Is Associated With Higher Energy Intake and Poorer Diet Quality in the Multi-Ethnic Study of Atherosclerosis</i> ⁸⁷

initiative addresses a critical group of at-risk women who are understudied and represent 40% of US births each year. Study results will help inform health care providers and their patients who are pregnant or considering pregnancy and support future research to improve care and outcomes.

Lifestyle and Cardiometabolic Health Council: Designing and Implementing Research Studies to Promote Health Equity and Inclusion

Drs Anika Hines and Danielle Crookes moderated this early career committee event with Drs LaPrincess Brewer, Sharon Taverno Ross, Yvonne Commodore-Mensah, and Clyde Yancy serving as panelists. To succeed in health equity research among persons in minoritized communities, the panelists stressed the importance of researchers (1) offering their authentic selves, skills, and resources before others request them, (2) providing resources before requiring information or collecting data from the community, and (3) not stopping at engaging the community but also investing in the community. The panelists also discussed the importance of not only having mentors but also sponsors to support and help early career investigators succeed.

NETWORKING ROUNDTABLES

On each day of the conference, attendees had the opportunity to network with colleagues with shared interests via virtual roundtable discussions (Table S1).

COUNCIL AWARDS

Council awards presented at this year's conference are highlighted in Tables 1^{19,27,38,51,52,57,76–83} and 2,^{20,65,84–87} according to the scientific council.

CONCLUSIONS

The 2021 AHA EPI|Lifestyle Scientific Sessions brought investigators together virtually to share cutting-edge science and advance understanding of the prevention and treatment of cardiovascular disease through a health equity lens. A continued focus on social justice and health equity is needed to equitably increase healthy life expectancy.⁸⁸ We look forward to this year's AHA EPI|Lifestyle Scientific Sessions to be held in March 2022 in Chicago, Illinois.

ARTICLE INFORMATION

Received November 17, 2021; accepted January 13, 2022.

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Sources of Funding

Dr Turkson-Ocran was supported by the Strategically Focused Research Network Award from the American Heart Association grant number 17SFRN33590069. Drs Foti, Minhas, Rooney, and Tilves, F. M. Wang, and A.S. Wallace were supported by grant number T32 HL007024 from the National Heart, Lung, and Blood Institute, National Institutes of Health. Dr Hines is supported by grant number 1K01HL152011-01A1 from the National Heart, Lung, and Blood Institute, National Institutes of Health. Dr Kamin Mukaz is supported by grant number U01 NS41588 cofunded by the National Institute of Neurological Disorders and Stroke and the National Institute on Aging; grant number R01 AG061186 from the National Institute on Aging, National Institutes of Health; American Heart Association Postdoctoral Fellowship (award number 897188); and the Cardiovascular Research Institute of Vermont. Dr Martin was supported by grant number T32 HL007457 from the National Heart, Lung, and Blood Institute, National Institutes of Health. Dr Scott is supported by training grant number 5T32HL007560 from the National Heart, Lung, and Blood Institute, National Institutes of Health. Mr. Thomas is supported by the National Institutes of Health grant numbers T32HL007055 and F99AG073565. Mr. Zhang is supported by the American Heart Association Predoctoral Fellowship (award number 827990). Dr Lutsey was supported by grant number K24 HL159246 from the National Heart, Lung, and Blood Institute, National Institutes of Health.

Disclosures

None.

Supplemental Material

Data S1
Table S1
References 89–142

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 61. Ishikawa Y, Laing EM, Anderson AK, Zhang D, Trivedi-Kapoor R, Sattler EL. Abstract 061: comparison of diagnostic methods for diabetes diagnosis in patients with heart failure: a National Health and Nutrition Examination Survey analysis. *Circulation*. 2021;143:A061. doi: 10.1161/CIRC.143.SUPPL_1.061
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 63. Hwang AY, Cardel MI, Smith SM. Abstract 063: racial/ethnic differences in blood pressure around the time of the 2016 United States general election. *Circulation*. 2021;143:A063. doi: 10.1161/CIRC.143.SUPPL_1.063
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 65. Oladele CR, Khandpur N, Plante TB, Yuan Y, Lovasi GS, Judd SE. Abstract 065: ultra-processed food and hypertension incidence in the REGARDS Cohort. *Circulation*. 2021;143:A065. doi: 10.1161/CIRC.143.SUPPL_1.065
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 67. Urbina EM, Khoury PR, Bazzano LA, Burns TL, Dwyer T, Jacobs DR, Juonala M, Prineas RJ, Raitakari OT, Sinaiko A, et al. Abstract 067: does BP trajectory across childhood predict adult HTN? The International Childhood CV Cohorts Consortium. *Circulation*. 2021;143:A067. doi: 10.1161/CIRC.143.SUPPL_1.067
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- Echocardiographic Study of Latinos (Echo-SOL) Ancillary Study. *Circulation*. 2021;143:A068. doi: 10.1161/CIRC.143.SUPPL_1.068
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 71. Oh M, Gabriel KP, Jacobs DR, Terry JG, Ding J, Carr JJ, Robinson JG, Bao W, Whitaker KM. Abstract 071: ten-year change in tv viewing is associated with concurrent change in pericardial adipose tissue in middle-aged adults: the Coronary Artery Risk Development In Young Adults (CARDIA) Study. *Circulation*. 2021;143:A071. doi: 10.1161/CIRC.143.SUPPL_1.071
 72. Tristao PM. Abstract 072: being mindful is associated with being more physically active: a study of stage B heart failure patients. *Circulation*. 2021;143:A072. doi: 10.1161/CIRC.143.SUPPL_1.072
 73. Hu X, Mok Y, Ding N, Sullivan K, Lutsey PL, Schrack J, Palta P, Matsushita K. Abstract 073: physical function and subsequent risk of cardiovascular events in older adults: the Atherosclerosis Risk in Communities (ARIC) Study. *Circulation*. 2021;143:A073. doi: 10.1161/CIRC.143.SUPPL_1.073
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 76. Zhang M, Liu T, Wang G, Buckley JP, Guallar E, Hong X, Wang MC, Wills-Karp M, Appel LJ, Wang X, et al. Abstract 077: in utero exposure to metal mixtures and offspring blood pressure: an analysis of the Boston Birth Cohort using Bayesian kernel machine regression. *Circulation*. 2021;143:A077. doi: 10.1161/CIRC.143.SUPPL_1.077
 77. Rao S, Hughes AE, Ayers C, Das SR, Halm EA, Pandey A. Abstract 076: longitudinal trajectories and predictors of county-level cardiovascular mortality in the United States (1980–2014). *Circulation*. 2021;143:A076. doi: 10.1161/CIRC.143.SUPPL_1.076
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 81. Golaszewski NM, Lacroix AZ, Lamonte MJ, Belletiere J. Abstract MP28: social isolation, loneliness, and cardiovascular disease among older women in the Women's Health Initiative. *Circulation*. 2021;143:AMP28. doi: 10.1161/CIRC.143.SUPPL_1.MP28
 82. King B. Abstract P065: odds of heart disease and arrhythmia associated with exposure dose to homelessness. *Circulation*. 2021;143:AP065. doi: 10.1161/CIRC.143.SUPPL_1.P065
 83. Haring B, Hunt R, Manson J, Lamonte MJ, Klein L, Allison MA, Wild RA, Wallace RB, Shadyab A, Brethett K, et al. Abstract MP60: blood pressure variability and risk of heart failure in postmenopausal women. Results from the Women's Health Initiative. *Circulation*. 2021;143:AMP60. doi: 10.1161/CIRC.143.SUPPL_1.MP60
 84. Higgins S, Stoner L, Black K, Wong JE, Meredith-Jones K, Quigg R, Skidmore P. Abstract MP45: social jetlag, independent of other sleep characteristics, is associated with obesity-related outcomes in 9–11-year-old girls. *Circulation*. 2021;143:AMP45. doi: 10.1161/CIRC.143.SUPPL_1.MP45
 85. Aguayo L, Cunningham SA. Abstract MP44: adolescent predictors of changes in weight status from adolescence to adulthood: evidence from the AddHealth Study. *Circulation*. 2021;143:AMP44. doi: 10.1161/CIRC.143.SUPPL_1.MP44
 86. Pettee Gabriel K, Diaz K, Kumar A, Sharrett AR, Evenson KR, Gottesman RF, Mosley T, Heiss GM, Palta P. Abstract MP24: sedentary behavior (SB) in mid-life and structural brain magnetic resonance imaging (MRI) markers of cerebrovascular disease and neurodegeneration in late-life: the Atherosclerosis Risk in Communities Neurocognitive Study (ARIC-NCS). *Circulation*. 2021;143:AMP24. doi: 10.1161/CIRC.143.SUPPL_1.MP24
 87. Zuraikat FM, Makarem N, Cheng B, Huang T, Aggarwal BA, Jelic S, Shea SJ, Redline S, St-Onge M-P. Abstract MP05: night-to-night variability in sleep duration is associated with higher energy intake and poorer diet quality in the Multi-Ethnic Study of Atherosclerosis. *Circulation*. 2021;143:AMP05. doi: 10.1161/CIRC.143.SUPPL_1.MP05
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 90. LeCroy MN, Mossavar-Rahmani Y, Xue X, Wang T, Gallo L, Perreira K, Garcia M, Clark TL, Daviglius ML, Van Horn L, et al. Abstract MP02: diet quality comparisons in Hispanic/Latino siblings and the role of social and environmental determinants: results from the Hispanic Community Children's Health Study/Study of Latino Youth (SOL Youth). *Circulation*. 2021;143:AMP02. doi: 10.1161/CIRC.143.SUPPL_1.MP02
 91. Lou Z, Eom H, Liu J, Yi SS, Russo R, Bellows BK, Zhang Y, Moran AE, Li Y, Kong N. Abstract MP03: the health and economic impact of using a sugar sweetened beverage tax to subsidize fruit and vegetable purchase in New York City: a modeling study. *Circulation*. 2021;143:AMP03. doi: 10.1161/CIRC.143.SUPPL_1.MP03
 92. Gervis JE, Chui K, Ma J, Coltell O, Fernández-Carrión R, Sorlí JV, Barragán R, González JI, Gimenez-Alba IM, Martínez-Lacruz R, et al. Abstract MP04: taste perception profiles are associated with patterns of adherence to a Mediterranean diet among older adults with metabolic syndrome. *Circulation*. 2021;143:AMP04. doi: 10.1161/CIRC.143.SUPPL_1.MP04
 93. Liu G, Nguyen Q, Agarwal SK, Aguilar D, Boerwinkle E, Chang P, Claggett B, Loehr LR, Matsushita K, Rodriguez C, et al. Abstract MP07: metabolic signature improves heart failure risk prediction in older adults. *Circulation*. 2021;143:AMP07. doi: 10.1161/CIRC.143.SUPPL_1.MP07
 94. Li C, Francis M, Westbrook A, Zhang R, Shen Y, Ye K, Chen J, He J, Kelly TN. Abstract MP08: whole exome sequencing study identified a novel variant for kidney function and progression of chronic kidney disease. *Circulation*. 2021;143:AMP08. doi: 10.1161/CIRC.143.SUPPL_1.MP08
 95. Wood AC, Saylor G, Tzoulaki I, Greenland P, Tracy RP, Post WS, Lindon J, Wassel CL, Phan M, Momin S, et al. Abstract MP09: untargeted 1 h nmr metabolomics metabolomic analysis reveals pathways of protection between mediterranean-style diet and incident cardiovascular disease in the Multi-Ethnic Study of Atherosclerosis. *Circulation*. 2021;143:AMP09. doi: 10.1161/CIRC.143.SUPPL_1.MP09
 96. Almuwaqqat Z, Liu C, Kim JH, Lima BB, Hammadah M, Alkhoder A, Shah AJ, Bremner JD, Vaccarino V, Sun Y, et al. Abstract MP10: a novel genetic locus influences microvascular reactivity to acute psychological stress. *Circulation*. 2021;143:AMP10. doi: 10.1161/CIRC.143.SUPPL_1.MP10
 97. Westerman KE. Abstract MP11: systematic discovery of thousands of gene-environment interactions for cardiometabolic serum biomarkers. *Circulation*. 2021;143:AMP11. doi: 10.1161/CIRC.143.SUPPL_1.MP11
 98. Barber JL, Cai G, Robbins JM, Gerszten RE, Rao P, Bouchard C, Sarzynski MA. Abstract MP12: proteomic predictors of high-density lipoprotein cholesterol response to regular exercise. *Circulation*. 2021;143:AMP12. doi: 10.1161/CIRC.143.SUPPL_1.MP12
 99. Pena A, Vander Wyst KB, Soltero E, Olson M, Pimentel J, Ayers S, Knowler W, Konopken Y, Patrick D, Hu H, et al. Abstract MP13: lipid peroxidation and inflammatory response differentiate with changes in liver fat among obese Latino youth following lifestyle intervention. *Circulation*. 2021;143:AMP13. doi: 10.1161/CIRC.143.SUPPL_1.MP13
 100. Turkson-Ocran R-AN, Miller ER, Zhao D, Pilla S, Duan D, Jaeger B, Muntner P, Clark J, Maruthur N. Abstract MP14: the effect of time-restricted feeding on 24-hour ambulatory blood pressure: results

- from the Time-restricted Intake of Meals (TRIM) Study. *Circulation*. 2021;143:AMP14. doi: 10.1161/CIRC.143.SUPPL_1.MP14
101. Burke LE, Sereika SM, Bizhanova Z, Parrmanto B, Kariuki J, Beatrice B, Loar I, Cheng J, Pulantara IW, Wang Y, et al. Abstract MP15: promoting lifestyle change via real-time feedback: short-term weight loss outcomes in the SMARTER Trial. *Circulation*. 2021;143:AMP15. doi: 10.1161/CIRC.143.SUPPL_1.MP15
 102. Tilves C, Yeh H-C, Maruthur N, Juraschek S, Miller ER, Appel LJ, Mueller NT. Abstract MP16: a behavioral weight-loss intervention, but not metformin, decreases a marker of gut barrier permeability in adult cancer survivors with overweight or obesity. *Circulation*. 2021;143:AMP16. doi: 10.1161/CIRC.143.SUPPL_1.MP16
 103. Jenkins ND, Rogers EM, Banks NF, Sciarillo CM, Emerson S, Taylor A, Teague K. Abstract MP17: circulating Sirt1 and endothelial function are lower, but are not improved by 8-weeks of exercise training, in young adult females with a history of adverse childhood experiences. *Circulation*. 2021;143:AMP17. doi: 10.1161/CIRC.143.SUPPL_1.MP17
 104. Zimmerman LP, Kershaw KN, Rehkopf DH, Luo Y, Lloyd-Jones DM. Abstract MP18: association of longitudinal social determinants through young adulthood with mid-life cardiovascular health: the Coronary Artery Risk Development in Young Adults (CARDIA) Study. *Circulation*. 2021;143:AMP18. doi: 10.1161/CIRC.143.SUPPL_1.MP18
 105. Jia J, Caty R, Fiechtner L, Zack R, Thorndike AN. Abstract MP19: academic-community partnership to evaluate the effectiveness of the Greater Boston Food Bank's Healthy Pantry Program. *Circulation*. 2021;143:AMP19. doi: 10.1161/CIRC.143.SUPPL_1.MP19
 106. McCurley J, Browne J, Fung V, Levy D, Clark C, Thorndike AN. Abstract MP20: implementation of social determinants of health screening and referrals in a Medicaid Accountable Care Organization: a qualitative study. *Circulation*. 2021;143:AMP20. doi: 10.1161/CIRC.143.SUPPL_1.MP20
 107. Liu A, Koton S, Lutsey PL, Walker K, Palta P, Sharrett AR, Gottesman RF, Gross AL. Abstract MP22: social isolation, social support, and cognitive decline: the Atherosclerosis Risk in Communities Study. *Circulation*. 2021;143:AMP22. doi: 10.1161/CIRC.143.SUPPL_1.MP22
 108. McDermott AM, Kim N, Mor M, Fine MJ, Essien U. Abstract MP23: neighborhood disadvantage and oral anticoagulant use in patients with atrial fibrillation. *Circulation*. 2021;143:AMP23. doi: 10.1161/CIRC.143.SUPPL_1.MP23
 109. Austin TR, Heckbert SR, Nasrallah IM, Erus G, Desiderio LM, Harding BN, Greenland P, Hughes TM, Chen LY, Post WS, et al. Abstract MP25: brain atrophy and white matter injury in relation to cardiovascular risk factors and race/ethnicity: the Multi-Ethnic Study of Atherosclerosis. *Circulation*. 2021;143:AMP25. doi: 10.1161/CIRC.143.SUPPL_1.MP25
 110. Johansen MC, Nyquist PA, Sullivan K, Fornage M, Gottesman RF, Becker D. Abstract MP26: silent small-vessel cerebrovascular disease in individuals with a family history of coronary heart disease: the Atherosclerosis Risk in Communities (ARIC) Study. *Circulation*. 2021;143:AMP26. doi: 10.1161/CIRC.143.SUPPL_1.MP26
 111. Rouch L, Hoang T, Xia F, Sidney S, Lima J, Yaffe K. Abstract MP27: changes in cardiac structure and function over 25 years are associated with lower midlife cognition: the CARDIA Study. *Circulation*. 2021;143:AMP27. doi: 10.1161/CIRC.143.SUPPL_1.MP27
 112. Imai Y, Sakurai M, Hideaki N, Hirata A, Murakami Y, Tanaka S, Kiyohara Y, Ninomiya T, Ishikawa S, Saitoh S, et al. Abstract MP29: combined impact of chronic kidney disease and hypertension on lifetime risk of cardiovascular disease death: a pooled analysis of data from the Evidence for Cardiovascular Prevention from Observational Cohorts in Japan Study. *Circulation*. 2021;143:AMP29. doi: 10.1161/CIRC.143.SUPPL_1.MP29
 113. Pike M, Akwo EA, Robinson-Cohen C, Blot WJ, Ikizler TA, Lipworth L. Abstract MP31: early age at menopause and the association with incident heart failure in the Southern Community Cohort Study. *Circulation*. 2021;143:AMP31. doi: 10.1161/CIRC.143.SUPPL_1.MP31
 114. Ishikawa Y, Laing EM, Anderson AK, Zhang D, Trivedi-Kapoor R, Sattler EL. Abstract MP32: the level of adherence to the Dietary Approaches to Stop Hypertension Diet is associated with the severity of insulin resistance among community-dwelling heart failure patients: a National Health and Nutrition Examination Survey analysis. *Circulation*. 2021;143:AMP32. doi: 10.1161/CIRC.143.SUPPL_1.MP32
 115. Hammond MM, Krefman A, Ning H, Allen NB, Shah SJ, Yeboah J, Lloyd-Jones DM, Khan S, Lima J, Reyfman P. Abstract MP33: cardiac structure and function phenogroups and risk of incident heart failure: Multi-Ethnic Study of Atherosclerosis. *Circulation*. 2021;143:AMP33. doi: 10.1161/CIRC.143.SUPPL_1.MP33
 116. Molinsky RL, Norby FL, Yu B, Shah AM, Lutsey PL, Pankow J, Ndumele CE, Papapanou PN, Colombo PC, Yuzefpolskaya M, et al. Abstract MP34: the association between periodontal disease and incident heart failure: the Atherosclerosis Risk in Communities Study. *Circulation*. 2021;143:AMP34. doi: 10.1161/CIRC.143.SUPPL_1.MP34
 117. Ogungbe O, Miller H, Peeler A, Cassie L-L, Carey S, Lacanienta C, Martinez E, Singleton M, Gleason KT, Keruly J, et al. Abstract MP36: the development of a centralized recruitment process for Covid-19 research: Hopkins Opportunity for Participant Engagement Registry. *Circulation*. 2021;143:AMP36. doi: 10.1161/CIRC.143.SUPPL_1.MP36
 118. Rezaei N, Grandner MA. Abstract MP38: longitudinal population-level changes in resting heart rate during the COVID-19 pandemic: impact of changes in sleep, circadian, and physical activity variables. *Circulation*. 2021;143:AMP38. doi: 10.1161/CIRC.143.SUPPL_1.MP38
 119. Adeniran E, Ahuja M, Awasthi M, Dowling K, Maisonet M, Weierbach F, Stewart D, Paul TK, Mamudu HM. Abstract MP39: factors associated with adherence to evidence-based recommendations for COVID-19 prevention among people with cardiovascular disease. *Circulation*. 2021;143:AMP39. doi: 10.1161/CIRC.143.SUPPL_1.MP39
 120. Mefford MT, Liu R, Qian L, Harrison TN, Jacobsen SJ, An J, Lee M, Gupta N, Price CN, Muntner P, et al. Abstract MP41: rates of acute myocardial infarction around the Covid-19 pandemic and comparable time periods in 2019 in an integrated healthcare delivery system. *Circulation*. 2021;143:AMP41. doi: 10.1161/CIRC.143.SUPPL_1.MP41
 121. Differding MK, Madan J, Gilbert-Diamond D, Baker E, Karagas MR, Mueller NT. Abstract MP43: breast milk-dependent associations of infant gut microbiota with childhood BMI Z score. *Circulation*. 2021;143:AMP43. doi: 10.1161/CIRC.143.SUPPL_1.MP43
 122. Minhas A, Ogunwole M, Miller M, Vaught AJ, Wu P, Mamas MA, Gulati M, Zhao D, Hays A, Michos E. Abstract MP46: the associations between adverse pregnancy outcomes and cardiovascular delivery complications: the National Inpatient Sample. *Circulation*. 2021;143:AMP46. doi: 10.1161/CIRC.143.SUPPL_1.MP46
 123. McArthur KL, Zhang M, Hong X, Wang G, Wang X, Mueller NT. Abstract MP47: maternal trimethylamine-n-oxide is associated with risk of gestational diabetes mellitus in a low-income, urban, multi-ethnic population. *Circulation*. 2021;143:AMP47. doi: 10.1161/CIRC.143.SUPPL_1.MP47
 124. Rowen NP, Kim D, Rayala HP, Reiter AH, Rosamond WD. Abstract MP49: application of a novel assessment of county-level cardiovascular health profile and its association with county-level disease rates. *Circulation*. 2021;143:AMP49. doi: 10.1161/CIRC.143.SUPPL_1.MP49
 125. Malla G, Cherrington A, Safford MM, Goyal P, Cummings DM, McAlexander T, De SS, Judd SE, Hidalgo B, Levitan EB, et al. Abstract MP50: neighborhood social and economic environment and heart failure risk among adults with & without diabetes: the Reasons for Geographic and Racial Differences in Stroke (REGARDS) Study. *Circulation*. 2021;143:AMP50. doi: 10.1161/CIRC.143.SUPPL_1.MP50
 126. Sullivan S, Young AN, Garcia M, Almuwaqqat Z, Moazzami K, Hammadah M, Kim JH, Lima BB, Driggers EG, Levantsevych O, et al. Abstract MP52: sex differences in the association between neighborhood social vulnerability and psychological distress among patients with heart disease. *Circulation*. 2021;143:AMP52. doi: 10.1161/CIRC.143.SUPPL_1.MP52
 127. Du S, Kim H, Coresh J, Rebholz CM. Abstract MP53: consumption of ultra-processed food is associated with risk of coronary heart disease in the Atherosclerosis Risk in Communities Study. *Circulation*. 2021;143:AMP53. doi: 10.1161/CIRC.143.SUPPL_1.MP53
 128. Schwartz MB, Schneider GE, Xu R, Choi Y-Y, Atoloye A, Vernick NH, Appel LJ. Abstract MP54: retail soda purchases decrease and water purchases increase after six years of a healthy beverage campaign. *Circulation*. 2021;143:AMP54. doi: 10.1161/CIRC.143.SUPPL_1.MP54
 129. Al-Shaar L, Wang M, Willett W, Smith-Warner S. Abstract MP55: red and processed meat and alternative protein sources in relation to risk of fatal coronary heart disease: a pooled analysis of 16 prospective cohort studies. *Circulation*. 2021;143:AMP55. doi: 10.1161/CIRC.143.SUPPL_1.MP55
 130. Beck L, Woo JG. Abstract MP56: specific nutrients associate better than Dietary Approaches to Stop Hypertension score with adult cardiovascular risk factors over 25 years: the Princeton Lipid Study. *Circulation*. 2021;143:AMP56. doi: 10.1161/CIRC.143.SUPPL_1.MP56

131. Rai SK, Kanaya AM, Kandula N, Sun Q, Bhupathiraju SN. Abstract MP57: a South Asian Mediterranean-style diet pattern is associated with favorable measures of adiposity and a lower risk of incident diabetes: findings from the MASALA Study. *Circulation*. 2021;143:AMP57. doi: 10.1161/CIRC.143.SUPPL_1.MP57
132. Harding BN, Norby FL, Heckbert SR, McKnight B, Psaty BM, Soliman EZ, Floyd J, Chen LY. Abstract MP62: longitudinal measures of blood pressure and subclinical atrial arrhythmias: the Multi-Ethnic Study of Atherosclerosis and the Atherosclerosis Risk in Communities Study. *Circulation*. 2021;143:AMP62. doi: 10.1161/CIRC.143.SUPPL_1.MP62
133. Fernandez-Mendoza J, He F, Calhoun S, Vgontzas A, Liao D, Bixler EO. Abstract MP63: childhood-onset obstructive sleep apnea is associated with increased risk of adolescent hypertension. *Circulation*. 2021;143:AMP63. doi: 10.1161/CIRC.143.SUPPL_1.MP63
134. Zhang M, Appel LJ, Wang X, Mueller NT. Abstract MP64: higher visit-to-visit blood pressure variability in early and middle childhood is associated with higher blood pressure in adolescence. *Circulation*. 2021;143:AMP64. doi: 10.1161/CIRC.143.SUPPL_1.MP64
135. Skow L, Coresh J, Deal J, Gottesman RF, Schrack J, Sharrett AR, Palta P, Ghelani KP, Griswold M, Sullivan K, et al. Abstract MP61: greater late-life physical function declines among older adults with higher blood pressure in mid-life: the Atherosclerosis Risk in Communities (ARIC) Study. *Circulation*. 2021;143:AMP61. doi: 10.1161/CIRC.143.SUPPL_1.MP61
136. Juraschek SP, Cluett J, Anderson T, Ishak A, Sahni S, Millar C, Appel LJ, Miller ER, Lipsitz L, Mukamal KJ. Abstract MP59: effects of sodium reduction and weight loss on lightheadedness and falls in older adults: results from TONE. *Circulation*. 2021;143:AMP59. doi: 10.1161/CIRC.143.SUPPL_1.MP59
137. Staab AM, Cizik AM, Mihalopoulos NL. Abstract MP65: transgender adolescents have high prevalence of atherosclerotic cardiovascular disease risk factors before and after taking hormone therapy for 1 year. *Circulation*. 2021;143:AMP65. doi: 10.1161/CIRC.143.SUPPL_1.MP65
138. Bondonno NP, Dalgaard F, Murray K, Davey RJ, Bondonno CP, Cassidy AM, Lewis JR, Kyrø C, Gislason GH, Scalbert A, et al. Abstract MP66: higher habitual flavonoid intakes are associated with a lower incidence of diabetes. *Circulation*. 2021;143:AMP66. doi: 10.1161/CIRC.143.SUPPL_1.MP66
139. Dougherty RJ, Hoang T, Launer LJ, Jacobs DR, Sidney S, Yaffe K. Abstract MP67: long-term tv viewing is associated with grey matter brain volume in midlife: the Coronary Artery Risk Development in Young Adults (CARDIA) Study. *Circulation*. 2021;143:AMP67. doi: 10.1161/CIRC.143.SUPPL_1.MP67
140. Austin TR, Sitlani C, Lindström S, Psaty BM, Lima J, Kaufman JD, Heckbert SR. Abstract MP68: the association of long-term air pollution exposure with left ventricular structure and function in the Multi-Ethnic Study of Atherosclerosis. *Circulation*. 2021;143:AMP68. doi: 10.1161/CIRC.143.SUPPL_1.MP68
141. Bohn B, Lutsey PL, Tang W, Pankow JS, Norby FL, Ballantyne CM, Whitsel EA, Matsushita K, Demmer R. Abstract MP69: a proteomic approach for investigating the pleiotropic effects of statins in the Atherosclerosis Risk in Communities (ARIC) Study. *Circulation*. 2021;143:AMP69. doi: 10.1161/CIRC.143.SUPPL_1.MP69
142. He F, Fernandez-Mendoza J, Yanosky JD, Chinchilli VM, Al-shaar L, Liao D. Abstract MP70: short-term fine particulate air pollution is associated with shorter sleep duration and higher sleep variability in adolescents. *Circulation*. 2021;143:AMP70. doi: 10.1161/CIRC.143.SUPPL_1.MP70

Supplemental Material

Data S1.

Moderated Poster Sessions.

The moderated poster sessions at the American Heart Association EPI|Lifestyle 2021 Scientific Sessions are described below, in order of appearance in the conference program.

Nutrition and Diet

Dr. Deirdre Tobias from Harvard University moderated this session on nutrition and diet.

Dr. Valerie Sullivan from Johns Hopkins University examined the effect of the Dietary Approaches to Stop Hypertension (DASH) diet on serum biomarkers of inflammation and mineral metabolism using stored blood samples from the DASH-Sodium trial.⁸⁹ Contrary to the study hypothesis, soluble urokinase activator receptor (suPAR), fibroblast growth factor-23 (FGF23), and phosphorus, but not C-reactive protein (CRP), were higher after DASH diet consumption compared to the high-sodium control diet.

Dr. Madison LeCroy from the Albert Einstein College of Medicine discussed diet quality comparisons in Hispanic/Latino siblings and the role of social and environmental determinants, using data from the Hispanic Community Children's Health Study/Study of Latino Youth.⁹⁰ Those closer in age and of the same sex had strongest correlations in diet quality, while intake of empty calories and sodium had the highest correlation in separate examinations of Healthy Eating Index-2010 components.

Zhouyang Lou from Purdue University discussed a modeling study that explored the health and economic impact of using a sugar sweetened beverage (SSB) tax to subsidize fruit and vegetable purchases in New York City (NYC).⁹¹ Converting SSB tax revenues into fruit and

vegetable subsidies could result in substantial medical cost savings and prevent coronary heart disease events in the NYC population.

Julie Gervis from Tufts University used cluster analysis to examine taste perception profiles and their association with patterns of adherence to a Mediterranean diet among older adults with metabolic syndrome, using data from the PREDIMED-Plus.⁹² Taste perception profiles among older adults with metabolic syndrome were associated with differential intake patterns but not with the total degree of adherence to a Mediterranean diet.

Closing the session, Dr. Faris Zuraikat from Columbia University presented findings from a study examining associations between night-to-night variability in sleep duration and quantity and quality of food intake, using data from the Multi-Ethnic Study of Atherosclerosis (MESA).⁸⁷ Results indicated that individuals with the highest variability in sleep duration on weekdays and weekend days had the lowest adherence to an alternative Mediterranean diet pattern, characterized by low intakes of whole grains, nuts, and seeds.

Omics

Dr. Ravi Shah from Harvard University and Massachusetts General Hospital moderated the session on Omics.

Ms. Guning Liu from the University of Texas Health Science Center reported on a metabolic signature associated with incident heart failure in older adults in the Atherosclerosis Risk in Communities (ARIC) Study.⁹³ The metabolite risk score that they derived led to improvements in 5-year risk prediction of heart failure beyond risk factors, kidney function, and NT-proBNP.

Dr. Changwei Li from Tulane University reported on a whole exome sequencing study, which identified a novel variant for kidney function and progression of chronic kidney disease in the Chronic Renal Insufficiency Cohort (CRIC) Study.⁹⁴ Dr. Li reported on a common missense

variant CST9 rs2983640 where the minor G allele was associated with lower serum cystatin C concentrations and lower estimated glomerular filtration rate.

Dr. Alexis Wood from Baylor College of Medicine presented findings on metabolomic links between a Mediterranean-style diet and incident cardiovascular disease over a 10-year period in the MESA Study.⁹⁵ Their findings indicated that the Mediterranean-style diet may have a metabolic signature and suggested that the association between a Mediterranean-style diet and lower cardiovascular risk may be mediated, in part, by certain metabolites related to this dietary pattern.

Dr. Zakaria Almuwaqqat from Emory University shared findings on a novel genetic locus that influences microvascular reactivity to acute stress in 580 patients with coronary artery disease (CAD).⁹⁶ Dr. Almuwaqqat reported that greater vasoconstriction measured using EndoPat during acute mental stress was associated with worse 5-year outcomes (revascularization, MI, heart failure hospitalization and death) in CAD patients.

Dr. Kenneth Westerman from Massachusetts General Hospital presented on the discovery of gene-environment interactions for cardiometabolic serum biomarkers in the UK Biobank.⁹⁷ They found 182 significant pairs of variance-quantitative trait loci (vQTLs) and biomarkers, and identified 888 significant gene-environment interactions.

Jacob Barber from the University of South Carolina described proteomic predictors of HDL cholesterol response to regular exercise in 667 healthy but sedentary adult participants of the Heritage Family Study.⁹⁸ After completing 20 weeks of endurance exercise training, HDL cholesterol increased by an average of 1.5 mg/dL, but there was a wide range in the response to the intervention (range: -19.5 to +17.4 mg/dL).

Clinical Trials and Interventions

Dr. Wayne Rosamond from the University of North Carolina moderated the session on clinical trials and interventions. Armando Pena from Arizona State University, presented findings from a 6-month lifestyle intervention study conducted among 26 Latino youth with obesity and pre-diabetes aimed at understanding the mechanisms by which lifestyle intervention may reduce liver fat in youth.⁹⁹ Hepatic fat fraction (HFF) decreased, though there was heterogeneity in the response; HFF responders experienced a greater decrease in malondialdehyde (MDA)-protein adducts, a marker of lipid peroxidation, compared to non-responders, while there was no difference in the decrease in tumor necrosis alpha (TNF)- α , a marker of inflammation, between responders and non-responders.

Dr. Ruth-Alma Turkson-Ocran from Johns Hopkins University presented results from the Time-restricted Intake of Meals (TRIM) Study which examined the effect of an isocaloric early time-restricted feeding pattern, defined as consuming 80% of daily calories before 1 pm, compared to a usual feeding pattern on 24-hour ambulatory blood pressure.¹⁰⁰ The study showed that the usual feeding group had greater reductions in their systolic and diastolic blood pressures for 24-hour, daytime, and nighttime periods compared to the intervention group.

Dr. Lora Burke from the University of Pittsburgh presented interim findings on short-term weight loss outcomes in the SMARTER Trial, comparing the efficacy of adding automated feedback to smartphone self-management compared to smartphone self-management alone on weight loss.¹⁰¹ At 6 months, there was no difference in between study arms in the percent weight loss from baseline and the percentage of participants having at least a 5% weight loss.

Dr. Curtis Tilves from Johns Hopkins University presented a study based on the Survivorship Promotion in Reducing IGF-1 Trial (SPIRIT), which included adult cancer survivors with overweight or obesity, examining the effects of a self-directed weight loss (control), metformin, or coach-directed weight loss on serum lipopolysaccharide-binding protein (LBP), a surrogate biomarker for gut barrier permeability which may trigger inflammation.¹⁰² At 12 months,

participants in the metformin and coach-directed intervention arms lost weight, but in the setting of similar weight loss, only the coach-directed intervention and not metformin lowered plasma LBP.

Dr. Nathaniel Jenkins from the University of Iowa examined the effects of an 8-week exercise training program on Sirtuin 1 (SIRT1) and endothelial function in young adult females exposed to adverse childhood experiences (ACEs) compared to age-matched controls.¹⁰³ Circulating SIRT1 and endothelial function were lower in young adult females exposed to ACEs compared to controls at baseline and the exercise training program did not improve either outcome for those with a history of ACEs; Dr. Jenkins suggested further research modifying the intensity and duration of the intervention.

Social Determinants and Health Disparities

Dr. Tiffany Powell-Wiley, Stadtman Investigator at the Division of Intramural Research at the National Heart, Lung, and Blood Institute and the Intramural Research Program of the National Institute on Minority Health and Health Disparities, moderated this session.

Lindsay Zimmerman from Northwestern University used data from the Coronary Artery Risk Development in Young Adults (CARDIA) Study to identify trends in 48 measures of social determinants of health (SDOH) grouped into time-dependent clusters and evaluate the association between SDOH clusters and mid-life cardiovascular health.¹⁰⁴ They found specific SDOH clusters in young adulthood were associated with poor cardiovascular health at mid-life and present the use of a novel method to evaluate the complex associations between SDOH and cardiovascular outcomes.

Dr. Jenny Jia from Massachusetts General Hospital studied the effectiveness of the online nutritional health promotion training Healthy Pantry Program on promoting healthier food choices in The Greater Boston Food Bank.¹⁰⁵ There was no significant association between the

Healthy Pantry Program and improvement in healthy food pantry orders, but the study provides a model for academic-community organization partnerships to guide program development and evaluation.

Dr. Jessica McCurley, also from Massachusetts General Hospital, conducted semi-structured qualitative interviews with staff in a large health care system in Massachusetts to understand the process of SDOH screening and referrals in a Medicaid Accountable Care Organization (ACO).¹⁰⁶ They identified facilitators (such as close collaborations with community organizations and trusting relationships with patients), barriers (such as workflow inefficiencies and lack of resources), and experiences (such as distress from not being able to meet the needs of patients) in SDOH screening and referrals.

Dr. Albert Liu from the University of North Carolina used data from the ARIC Study to evaluate the association between mid-life social isolation and social support with cognitive decline.¹⁰⁷ Greater social isolation and higher social support were associated with worse baseline cognitive function, and participants with different levels of social isolation and support had differing rates of cognitive decline after 6 years, with social isolation having a more evident impact on cognitive decline.

Anne McDermott from the University of Pittsburgh used data from the Veterans Health Administration to determine the association between neighborhood deprivation with initiation of any anticoagulation and initiation of direct-acting oral anticoagulants (DOACs) versus warfarin for medical management of patients with atrial fibrillation.¹⁰⁸ The study showed patients in less disadvantaged neighborhoods were more likely to be prescribed DOACs compared to those in the most disadvantaged neighborhoods and no association between neighborhood deprivation and initiation of any anticoagulation, suggesting neighborhood deprivation can be a source of inequity in the medical management of atrial fibrillation.

Brain Health and Aging

Dr. Priya Palta from Columbia University moderated the session on brain health and aging.

Dr. Kelley Pettee Gabriel from the University of Alabama at Birmingham examined the associations between TV viewing (a cognitively passive sedentary behavior) in mid-life and structural brain Magnetic Resonance Imaging (MRI) markers of cerebrovascular disease and neurodegeneration in late-life in the Atherosclerosis Risk in Communities Neurocognitive Study (ARIC-NCS) study.⁸⁶ Compared to those reporting low TV viewing in mid-life, those reporting moderate or high levels of TV viewing had smaller deep gray matter volumes in late-life and this association did not differ by meeting (or not meeting) physical activity guidelines.

Dr. Thomas Austin from the University of Washington examined the associations of brain volumes and white matter injury with race/ethnicity and cardiovascular risk factors using data from the MESA Study.¹⁰⁹ There was no statistically significant difference in measures of white matter injury by race/ethnicity after adjustment for cardiovascular risk factors and socioeconomic status. In all race/ethnic groups, older age, current smoking, hypertension, and diabetes were strongly associated with white matter injury.

Dr. Michelle Johansen from Johns Hopkins University used data from the ARIC study to investigate the association of a family history of coronary heart disease with silent cerebrovascular disease (cSVD).¹¹⁰ Among older adults without prevalent coronary heart disease, a family history of coronary heart disease, and the number of affected relatives, was associated with cerebral MRI markers of cSVD. Their findings suggest the importance of family history of coronary heart disease in the risk of developing cSVD.

Dr. Laure Rouch from the University of California, San Francisco examined midlife cardiac structure and function and their 25-year change with mid-life cognition in the Coronary Artery Risk Development in Young Adults (CARDIA) study.¹¹¹ Mid-life cardiac structure and diastolic

function (but not systolic function) and their changes from early to middle adulthood were associated with lower mid-life cognition. These results suggest that preventive strategies should be implemented as early as in young adulthood.

Dr. Natalie Golaszewski from the University of California, San Diego examined the experiences of social isolation and loneliness on incidence of cardiovascular disease events and whether levels of social support modified these associations using data from the Women's Health Initiative (WHI).⁸¹ Higher social isolation and loneliness were each independently associated with higher risk for incident cardiovascular disease events among older women, and associations were not significantly different among those with high and low social support. These findings highlighted the importance of social connection on heart health.

Yukiko Imai from Keio University used the Evidence for Cardiovascular Prevention From Observational Cohorts in Japan (EPOCH-JAPAN) data to estimate lifetime risk of cardiovascular disease death stratified by the status of chronic kidney disease (CKD) and hypertension.¹¹² They found that co-existence of CKD and hypertension increased lifetime risk due to cardiovascular disease deaths, suggesting that lifestyle modification in preventing CKD and adequate management of hypertension from young age is necessary to reduce cardiovascular disease mortality.

Heart Failure

Dr. Alanna Chamberlain from the Mayo Clinic moderated the session on heart failure.

Mindy Pike from Vanderbilt University examined the association of early age at menopause with incident heart failure in the Southern Community Cohort Study.¹¹³ Compared to women with later onset of menopause, those with earlier menopause onset had increased heart failure risk. In stratified analyses, white adults, but not Black adults, who experienced early menopause had an increased risk for heart failure.

Yuta Ishikawa from the University of Georgia examined the association between the level of adherence to the Dietary Approaches to Stop Hypertension (DASH) diet with the severity of insulin resistance among a nationally representative sample of community-dwelling heart failure patients, using NHANES data from 1999-2016.¹¹⁴ In multivariable logistic regression models, heart failure patients with the highest, compared to the lowest, level of DASH adherence showed significantly improved insulin resistance.

Dr. Michael Hammond from Northwestern University used data from the MESA Study to identify phenogroups with distinct cardiac structure and function characteristics based on cardiovascular magnetic resonance imaging (cMRI), and examine the risk of incident heart failure among the identified phenogroups.¹¹⁵ In adjusted analyses, 3 of 4 phenogroups were associated with increased risk of heart failure in men only.

Lastly, Rebecca Molinsky from the University of Minnesota examined whether periodontal disease was associated with increased risk of heart failure subtypes and increased CRP and NT-proBNP using data from the ARIC Study.¹¹⁶ The results showed that periodontal disease in mid-life is associated with incident HFpEF and HFrEF, and prospectively associated with elevated CRP and NT-proBNP levels.

COVID-19

Dr. Ryan Demmer from the University of Minnesota moderated the session on COVID-19.

Oluwabunmi Ogungbe from Johns Hopkins University worked with the recruitment innovation team of the Johns Hopkins Institute of Clinical and Translational Research (ICTR) to build a centralized digital database, the Hopkins Opportunity for Participant Engagement (HOPE) Registry, which has enrolled over 9,000 adult volunteers and has been used in 15 research teams for COVID-19 study recruitment.¹¹⁷ The HOPE Registry workflow is a promising for connecting volunteers to COVID-19 research studies and can be a model for recruitment,

including for cardiovascular disease research, especially in the context of the COVID-19 pandemic.

Dr. Brian Steffen from the University of Minnesota used data from the ARIC Study to identify proteins and proteomic pathways associated with two genomic variants that are independently associated with COVID-19 respiratory failure. The results suggest that ABO risk variant carriers may have suppressed IL-15 production and impaired STAT3 and NF- κ B signaling that may play a part in the development of severe COVID-19 respiratory failure.

Dr. Michael Grandner from the University of Arizona used Fitbit data from 197,988 individuals to assess changes in resting heart rate (RHR) over the COVID-19 pandemic and its association with changes in sleep and activity measures.¹¹⁸ RHR decreased from January 2020 (pre-pandemic) to April 2020 (height of stay-at-home orders) and these reductions were associated with increased sleep duration, later bedtimes, decreased sleep variability, and increased activity.

Esther Adeniran from East Tennessee State University explored factors associated with adherence to COVID-19 prevention recommendations, such as mask wearing, physical distancing, and handwashing, in cardiovascular disease patients and their caregivers in rural Central Appalachia.¹¹⁹ Based on their survey, getting information about COVID-19 from the government/Centers for Disease Control and Prevention (CDC) website and higher perception of COVID-19 threat were associated with higher adherence with public health recommendations for COVID-19 prevention.

Dr. Katherine Mills from Tulane University used telephone survey data from the Implementation of Multifaceted Patient Centered Treatment Strategies for Treatment Strategies for Intensive Blood Pressure Control (IMPACTS-BP) study to evaluate experiences and access to healthcare of low-income and minority patients with hypertension during the COVID-19 pandemic. They

found that most participants complied with public health recommendations for COVID-19 prevention (including mask wearing, social distancing, and stay-at-home orders) and reported having access to healthcare services during the pandemic and willingness to return to their primary care clinic for hypertension management.

Dr. Matthew Mefford from Kaiser Permanente Southern California assessed changes in rates of hospitalization for acute myocardial infarction (AMI) during the COVID-19 pandemic in the Kaiser Permanente Southern California system.¹²⁰ During the COVID-19 pandemic, AMI hospitalization rates were lower and 30-day mortality among these AMI cases were higher compared to the same period one year prior, suggesting public health campaigns should encourage those with medical emergencies to seek healthcare even during stay-at-home orders.

Maternal and Child CVD Health

Dr. Nisha Parikh from the University of San Francisco, California moderated the session on maternal and child CVD health.

Moira Differding from Johns Hopkins University presented on the breastfeeding-dependent associations of infant gut microbiota and childhood body mass index (BMI) z-score.¹²¹ Higher abundance of opportunistic pathogens at 6 weeks of age are associated with rapid increases in BMI z-score. Higher abundance of adult genera is also associated with higher BMI z-score by breastfeeding duration may modify this.

Dr. Liliana Aguayo-Markes from Emory University shared findings on the adolescent predictors of changes in weight status from the AddHealth Study.⁸⁵ Adolescents who reported weight loss attempts were at higher risk of obesity as adults. Additionally, the likelihood of obesity reversal and weight loss from adolescence to adulthood was very low.

Dr. Simon Higgins from Elon University presented on the association of social jetlag with obesity-related outcomes in 9–11 year-old children.⁸⁴ Social jetlag was independently associated with obesity, after accounting for sleep characteristics and known behavioral correlates, and that these results may be more prominent in girls.

Dr. Anum Minhas from Johns Hopkins University presented on racial disparities in cardiovascular complications with pregnancy-induced hypertension.¹²² Using data from the National Inpatient Sample, Black women in the United States had higher odds for preeclampsia and higher rates of several associated cardiovascular complications. However, the risk of cardiovascular events among women with preeclampsia was elevated among all racial/ethnic groups, and perhaps greatest among Asian/Pacific Islander women.

Kristen McArthur from Johns Hopkins University presented on the association of maternal trimethylamine N-oxide (TMAO) with gestational diabetes in the Boston Birth Cohort.¹²³ The group found that TMAO measured in maternal blood, but not cord blood, was associated with higher odds of gestational diabetes. These results can potentially help with development of future targeted therapeutics for prevention of gestational diabetes.

Neighborhood and Geographic Factors in CVD

Dr. Anika Hines from Virginia Commonwealth University moderated the session on neighborhood and geographic factors in CVD. The first presentation was led by a team of trainees from the University of North Carolina at Chapel Hill, Neil Rowen, Daniel Kim, and Hannah Rayala.¹²⁴ Their objective was to create a modified version of the American Heart Association's "Life's Simple 7" metric to estimate county-level risk and its association with CVD in 100 counties in North Carolina. This novel approach revealed coastal regions, compared to Piedmont and mountain regions, had higher cardiovascular risk, as well as poorer cardiovascular outcomes.

Dr. Gargya Malla from the University of Alabama at Birmingham investigated the association of neighborhood social and economic environment with incident heart failure in adults with and without diabetes in the REasons for Geographic and Racial Differences in Stroke (REGARDS) Study.¹²⁵ Neighborhood disadvantage was associated with increased risk of heart failure, especially in those without diabetes.

Dr. Samaah Sullivan from Emory University examined whether social vulnerability played a role in sex differences in psychological distress in a sample of patients with ischemic heart disease in the Myocardial Infarction and Mental Stress 2 Study.¹²⁶ Neighborhood social vulnerability was associated with psychological distress, independent of individual-level income and education, among women with heart disease, but this association was not observed for men.

Nutrition and Diet (Session 2)

Dr. Casey Rebholz from Johns Hopkins University moderated the second session on nutrition and diet.

Shutong Du from Johns Hopkins University used data from the ARIC Study to evaluate the association between ultra-processed food intake and incident coronary heart disease.¹²⁷ They found that the majority of ultra-processed foods were dairy products, beverages, and bakery goods, and higher intake of ultra-processed foods was associated with higher risk of incident coronary heart disease.

Dr. Marlene Schwartz from the University of Connecticut shared findings on changes in sales of sugary and non-sugary drinks during a 6-year community-wide multi-component campaign targeting sugary drinks in Howard County, Maryland.¹²⁸ Over 6 years, soda, fruit drinks, and 100% juice purchases decreased, and water purchases increased.

Dr. Laila Al-Shaar from The Pennsylvania State University conducted a pooled analysis of 16 prospective cohort studies to investigate the association between red and processed meat and

alternative protein sources in relation to fatal coronary heart disease.¹²⁹ This analysis showed that substitution of 200 kcal/d from nuts, poultry, low- and high-fat dairy products for 200 kcal/d from total red meat was associated with 6-14% lower risk of fatal coronary heart disease.

Leah Beck from the University of Cincinnati presented findings from the Princeton Lipid Study on the association between specific nutrients, DASH diet, and cardiovascular risk factors.¹³⁰ In this study which included parents and children, the DASH diet score was not associated with hypertension, hyperlipidemia, obesity, or diabetes in both groups.

Sharan Rai from Harvard University shared findings on how a novel South Asian Mediterranean-style diet pattern was associated with measures of adiposity and incident diabetes in a cohort of South Asians in the US.¹³¹ They found that this diet score was associated with lower likelihood of obesity and fatty liver at baseline, and lower odds of incident type 2 diabetes at follow-up.

Hypertension

Dr. Kathryn Foti from Johns Hopkins University moderated the hypertension session.

Dr. Barbara Harding from the University of Washington examined the association of cross-sectional and longitudinal measures of blood pressure with subclinical arrhythmias in the MESA and ARIC cohorts.¹³² Among participants who had undergone extended ambulatory ECG monitoring who did not have clinical CVD, cross-sectionally, increased systolic blood pressure and pulse pressure was associated with less atrial fibrillation. Longitudinally, higher visit-to-visit blood pressure variability was associated with a greater prevalence of subclinical atrial fibrillation. Longitudinal measures of blood pressure may be more useful in identifying older adults who may be at a higher risk of developing atrial fibrillation.

Dr. Julio Fernandez-Mendoza from The Pennsylvania State University examined the association between childhood-onset obstructive sleep apnea (OSA) and hypertension in adolescents.¹³³

Childhood-onset OSA that persisted through adolescence was associated with approximately 3-fold higher odds of hypertension in adolescence, while childhood-onset OSA that remitted was not associated with hypertension in adolescence. OSA onset in adolescence was associated with approximately 2-fold increased odds of hypertension in adolescence.

Mingyu Zhang from Johns Hopkins University examined blood pressure and visit-to-visit blood pressure variability in early and middle childhood using data from the Boston Birth Cohort.¹³⁴ Higher systolic and diastolic blood pressure in early and middle childhood, and greater systolic blood pressure variability in early and middle childhood were independently associated with higher adolescent blood pressure.

Laura Skow from Johns Hopkins University presented on the association of midlife blood pressure with change in physical function in late life using data from the ARIC cohort.¹³⁵ Late life physical function decreased with increased age among adults with normotension in midlife, while there was a greater decrease in late life physical function with age among participants with hypertension in midlife.

Dr. Stephen Juraschek from Beth Israel Deaconess Medical Center discussed the effects of sodium reduction and weight loss on lightheadedness and falls in older adults in the Trial of Nonpharmacologic Interventions in the Elderly (TONE).¹³⁶ Compared to usual care, sodium reduction was associated with a higher risk of fall-related adverse events, primarily symptoms, and weight loss was not associated with adverse events.

Dr. Bernhard Haring from the University of Wuerzburg examined visit-to-visit blood pressure variability (BPV) and heart failure risk in postmenopausal women in the Women's Health Initiative (WHI).⁸³ Greater BPV was associated with a higher risk of heart failure with preserved ejection fraction (HFpEF), independent of mean BP and history of coronary events.

Novel CVD Risk Factors

Dr. Joshua Bundy from Tulane University served as the moderator for the session on novel CVD risk factors.

Dr. Nicole Mihalopoulos (senior author, University of Utah) presented work (on behalf of Ambur Staab) documented a high prevalence of metabolic syndrome components among 100 adolescent transgender males and transgender females prior to taking hormone therapy.¹³⁷ Hormone therapy of 1-year duration was associated with greater prevalence of low HDL and high triglycerides among transgender males, but no difference was found for transgender females in the prevalence of metabolic syndrome components after 1-year of hormone therapy.

Dr. Nicola Bondonno, Edith Cowan University, showed that a flavonoid-rich diet was associated with lower risk of diabetes over 23 years of follow-up in the >50,000 participants of the Danish Diet, Cancer, and Health Study.¹³⁸ Dr. Bondonno also showed that total flavonoid intake was inversely and linearly associated with body fat.

Dr. Ryan Dougherty from Johns Hopkins University reported that greater television use in early to mid-adulthood (mean age ~30) was associated with lower gray matter volume in mid-life (mean age ~50), even after adjustment for physical activity among nearly 600 participants from the Coronary Artery Risk Development in Young Adults (CARDIA) Study.¹³⁹

Dr. Thomas Austin from the University of Washington, reported on the association of long-term air pollution exposure with left ventricular structure and function in the MESA Study.¹⁴⁰ There were inconsistent cross-sectional associations between ambient air pollution with left ventricular structure and function measured using cardiac MRI, but no associations were found for pollutants with change in left ventricular structure and function.

Bruno Bohn from the University of Minnesota shared results from the ARIC Study on a proteomic approach for understanding the pleiotropic effects of statins.¹⁴¹ Several protein levels differed between statin users and propensity score matched controls (non-users), including

some proteins that been associated with neurological diseases, diabetes, and cancer in previous studies.

Fan He from The Pennsylvania State University showed results suggesting that short-term fine particulate air pollution is associated with shorter sleep duration and higher sleep variability in 700 children representative of those aged 9-12 in the metropolitan Harrisburg, Pennsylvania area.¹⁴²

Table S1. Networking Roundtables.

Topic	Moderators
Rural health	Drs. Suzanne Judd and Vasan Ramachandran
Microbiome	Drs. Ryan Demmer and Noel Mueller
Electronic health records	Drs. Nrupen Bhavsar and Laura Rasmussen-Torvik
Sleep	Drs. Chandra Jackson and Kelsie Full
Ultra-processed food	Drs. Maya Vadiveloo and Niyati Parekh
Achieving equity in cardiovascular disease epidemiology	Drs. Mahasin Mujahid and Chiadi Ndumele
Pharmacoepidemiology	Drs. Kris Fillion
Wearables	Dr. Amit Shah
Types of saturated fat and cardiovascular health	Dr. Penny Kris-Etherton
Epigenetics	Dr. Jim Pankow