<table>
<thead>
<tr>
<th>Name</th>
<th>Department</th>
<th>Degree</th>
<th>Abstract Title</th>
<th>Group Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alexander Layden</td>
<td>EPIDEM</td>
<td>PhD</td>
<td>Black-White Differences in Gestational Weight Gain and Adverse Birth Outcomes: A Secondary Analysis of US Vital Statistics Natality Data</td>
<td>Wei-Hsin Hsiao, Jinghui Ju</td>
</tr>
<tr>
<td>Alexis Nasr</td>
<td>EPIDEM</td>
<td>PhD</td>
<td>Associations of visceral fat with high density lipoprotein metrics in midlife women: The SWAN HDL Study</td>
<td></td>
</tr>
<tr>
<td>Amanda Hinerman</td>
<td>EPIDEM</td>
<td>PhD</td>
<td>Change in Predicted 10-year and Lifetime Cardiovascular Disease Risk Following Roux-en-Y Gastric Bypass: Results from a 7-year Multicenter Prospective Cohort Study</td>
<td></td>
</tr>
<tr>
<td>Ayesha Godiwala</td>
<td>EPIDEM</td>
<td>MPH</td>
<td>Implementation of Obstetric Hemorrhage Protocols Across UPMC</td>
<td></td>
</tr>
<tr>
<td>Claire Thomas</td>
<td>EPIDEM</td>
<td>PhD</td>
<td>Association Between Dietary Tomato Intake and the Risk of Hepatocellular Carcinoma: The Singapore Chinese Health Study</td>
<td></td>
</tr>
<tr>
<td>Curtis Tilves</td>
<td>EPIDEM</td>
<td>PhD</td>
<td>Myosteatosis: Differences in Association with Type 2 Diabetes by Anatomical Location</td>
<td></td>
</tr>
<tr>
<td>Gabrielle Corona</td>
<td>EPIDEM</td>
<td>MPH</td>
<td>Where You Shop and Neighborhood Access to Fruit and Vegetables are Associated with Self-Rated and Cardiometabolic Health</td>
<td></td>
</tr>
<tr>
<td>Jenna Napoleone</td>
<td>EPIDEM</td>
<td>PhD</td>
<td>Metabolic Syndrome Trajectories and Objective Physical Performance in Mid-To-Early Late Life: SWAN</td>
<td></td>
</tr>
<tr>
<td>Jessica Graves</td>
<td>EPIDEM</td>
<td>PhD</td>
<td>Is Variability of Free-Living Activity Associated with Physical and Mental Fatigability in Older Adults?</td>
<td></td>
</tr>
<tr>
<td>Jinghui Ju</td>
<td>EPIDEM</td>
<td>PhD</td>
<td>Age at Menarche and its Association with the Metabolic Syndrome in Type 1 Diabetes</td>
<td></td>
</tr>
<tr>
<td>Julia Yudkovicz</td>
<td>EPIDEM</td>
<td>MPH</td>
<td>The Genetic Correlation Between Subclinical Cardiovascular Disease and Functional Status in Long-Lived Adults</td>
<td></td>
</tr>
<tr>
<td>Kailey Hughes</td>
<td>EPIDEM</td>
<td>PhD</td>
<td>Effectiveness of Influenza Vaccine for Preventing Laboratory-Confirmed Influenza Hospitalizations in Immunocompromised Adults, 2017-2018 Influenza Season</td>
<td></td>
</tr>
<tr>
<td>Margaret Carr</td>
<td>EPIDEM</td>
<td>MPH</td>
<td>Limited Hepatitis C Testing Available in Drug and Alcohol Treatment Facilities in Pennsylvania</td>
<td></td>
</tr>
<tr>
<td>Mary Schiff</td>
<td>EPIDEM</td>
<td>PhD</td>
<td>The Differential Impact of Neighborhood Economic Segregation on Gestational Hypertension Development among Minority Women</td>
<td></td>
</tr>
<tr>
<td>Nemin Chen</td>
<td>EPIDEM</td>
<td>PhD</td>
<td>Patterns of Prefrontal Activation and Performance During Walking Tasks among Older Adults</td>
<td></td>
</tr>
<tr>
<td>Rebecca Ehrenkranz</td>
<td>EPIDEM</td>
<td>PhD</td>
<td>Functional Correlates of Self-Reported Energy Levels in the Health, Aging, and Body Composition Study</td>
<td></td>
</tr>
<tr>
<td>Samaneh Farsijani</td>
<td>EPIDEM</td>
<td>MS</td>
<td>Plasma Metabolites Associated with Muscle Fat Infiltration in Community-Dwelling Older Adults from the Health ABC Study</td>
<td></td>
</tr>
<tr>
<td>Sara Godina</td>
<td>EPIDEM</td>
<td>PhD</td>
<td>Racial Differences in Memory-Related Gray Matter Volume Regions of Interest among Cognitively Normal Older Adults</td>
<td></td>
</tr>
<tr>
<td>Sarah Royse (Kolibash)</td>
<td>EPIDEM</td>
<td>MPH</td>
<td>Accelerated Brain Aging and Gait Speed in a Middle-Aged Type 1 Diabetes Mellitus Cross-Sectional Cohort</td>
<td></td>
</tr>
<tr>
<td>Sarah Minion</td>
<td>EPIDEM</td>
<td>PhD</td>
<td>Does Increasing Driving Distance to the Hospital Of Delivery Increase the Risk of Adverse Perinatal Health Outcomes?: An Analysis of Pennsylvania Birth Records from 2011-2015</td>
<td></td>
</tr>
<tr>
<td>Shannon Mance</td>
<td>EPIDEM</td>
<td>MPH</td>
<td>Catechol-O-Methyltransferase Genotype, Frailty, and Gait Speed: The Cardiovascular Health Study</td>
<td></td>
</tr>
<tr>
<td>Shiyou Gao</td>
<td>EPIDEM</td>
<td>PhD</td>
<td>Accounting for Selection Biases in an Observational Study of Rehabilitation among Children with Severe Traumatic Brain Injury</td>
<td></td>
</tr>
<tr>
<td>Susan Devaraj</td>
<td>EPIDEM</td>
<td>PhD</td>
<td>The Impact of a Yearlong Diabetes Prevention Program-based Lifestyle Intervention on Cardiovascular Health Metric</td>
<td>Jenna Napoleone</td>
</tr>
<tr>
<td>Susan Devaraj</td>
<td>EPIDEM</td>
<td>PhD</td>
<td>Successful Attainment of the Primary Goals of a Diabetes Prevention Program Based Behavioral Lifestyle Intervention by Socioeconomic Factors and Race/Ethnicity</td>
<td>Jenna Napoleone</td>
</tr>
<tr>
<td>Theresa Gmelin</td>
<td>EPIDEM</td>
<td>PhD</td>
<td>Role of Coping Styles and Negative Life Events on Higher Perceived Mental Fatigability in Older Adults</td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>Department</td>
<td>Degree</td>
<td>Abstract Title</td>
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<td>--------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Yan Yi</td>
<td>EPIDEM</td>
<td>PhD</td>
<td>Women with Type 1 Diabetes (T1D) Experience a Shorter Reproductive Period Compared With Non-Diabetic Women: The Pittsburgh Epidemiology of Diabetes Complications (EDC) Study and the Study of Women’s Health Across The Nation (SWAN)</td>
<td></td>
</tr>
<tr>
<td>Yu-Hsuan Lai</td>
<td>EPIDEM</td>
<td>PhD</td>
<td>Added Sugar Intake as Measured by Ecological Momentary Assessment Versus 24-Hour Dietary Recall During Pregnancy</td>
<td></td>
</tr>
<tr>
<td>Yujia (Susanna) Qiao</td>
<td>EPIDEM</td>
<td>PhD</td>
<td>Physical Activity Attenuates Age Differences in Change in Perceived Physical Fatigability: The Long Life Family Study</td>
<td></td>
</tr>
</tbody>
</table>
Black-white differences in gestational weight gain and adverse birth outcomes: A secondary analysis of US Vital Statistics Natality data

Background: Suboptimal gestational weight gain (GWG), or the amount of weight a woman gains during pregnancy, is a risk factor for birth complications. Despite metabolic differences and higher rates of adverse birth outcomes in black women, the 2009 Institute of Medicine (IOM) GWG guidelines are not specific to racial groups.


Methods: We used the 2009 IOM guidelines to classify GWG as inadequate, adequate, or excessive. Primary outcomes include preterm birth, large-for-gestational age (LGA) and small-for gestational age (SGA). We used multivariable logistic regression to measure the odds of outcomes by GWG group in black and white women.

Results: There were 3,097,258 birth records. 26.0% of black and 21.0% of white women had inadequate GWG, and 45.8% of black and 47.1% of white women had excessive GWG. Inadequate compared to adequate GWG was associated with increased odds of preterm birth and SGA more in white women (preterm: OR=1.66, 95% CI: 1.64-1.68; SGA: OR=1.52, 95% CI: 1.50-1.53) than in black women (preterm: OR=1.57, 95%CI: 1.55-1.62; SGA: OR=1.34, 95% CI: 1.31-1.37). Excessive compared to adequate GWG was associated with higher odds of LGA more among white women (OR=1.89, 95%CI: 1.87-1.91) than among black women (1.78, 95% CI: 1.74-1.84).

Conclusions: The effect of GWG on birth complications was more pronounced in white women than in black women. GWG guidelines tailored to racial groups may inform more targeted interventions for birth complications.
Alexis Nasr, Karen Matthews, Maria Brooks, Trevor Orchard, Imke Janssen, Dan McConnell, Jeff Billheimer, Samar R. El Khoudary

**Background:** Accumulation of visceral adiposity is linked to increased cardiovascular disease (CVD) risk. Studies have reported inverse associations between visceral adiposity and HDL-C in midlife women. Since HDL may be dysfunctional in menopausal women, HDL subclasses (HDL particles [HDL-P]), HDL contents of triglycerides (HDL-Tg) and phospholipids (HDL-PL) may be more strongly linked to CVD risk than HDL-C in midlife women.

**Hypothesis:** We hypothesized that higher visceral fat is associated with a worse HDL metrics profile (higher concentrations of small HDL-P and HDL-Tg, and smaller HDL size) in women transitioning through menopause.

**Methods:** Participants from the Study of Women’s Health Across the Nation (SWAN) HDL ancillary study who had HDL metrics and visceral fat area measured twice (mean time difference= 2.2±0.4 years) over the menopause transition were included. HDL-P concentrations (total, large, medium and small) and HDL size were measured by Nuclear Magnetic Resonance Spectroscopy (NMR), and HDL contents were measured by phosphotungic acid precipitation. Visceral fat area was assessed by computed tomography (CT) scans. A series of unadjusted and multivariable adjusted linear mixed effects models were used to model each HDL metric as a function of visceral fat area over time.

**Results:** The analysis included 301 women (baseline mean age 51.1 (±2.8) years, 63.5% premenopausal; 67% White, 33% Black). In the final multivariable model, higher log-transformed visceral fat area was associated with lower levels of HDL-C, large HDL-P and HDL-PL, higher levels of small HDL-P and smaller HDL size (Table, Model 3).

**Conclusion:** The associations between visceral fat and HDL subclasses and contents provide important information about the relationship between visceral fat and CVD risk, beyond the traditional HDL-C. An increase in small HDL particles and a decrease in HDL size, in particular, had been linked to a worse CVD risk. Further studies that link HDL function to visceral fat are necessary to better elucidate this relationship.
Table: Multivariable linear mixed effect models of associations of log-transformed visceral fat and each HDL metrics

<table>
<thead>
<tr>
<th></th>
<th>HDL-C (mg/dL) β (SE)</th>
<th>HDL-P (µmol/L) β (SE)</th>
<th>HDL size (nm) β (SE)</th>
<th>HDL-PL (mg/dL) β (SE)</th>
<th>HDL-Tg (mg/dL) β (SE)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>Large</td>
<td>Medium</td>
<td>Small</td>
</tr>
<tr>
<td>Model 1b</td>
<td>-3.79 (0.55)</td>
<td>-0.43 (0.31)</td>
<td>-1.15 (0.14)</td>
<td>-0.48 (0.30)</td>
<td>1.25 (0.32)</td>
</tr>
<tr>
<td>Model 2c</td>
<td>-3.52 (0.66)</td>
<td>-0.64 (0.36)</td>
<td>-1.13 (0.17)</td>
<td>-0.52 (0.36)</td>
<td>1.16 (0.37)</td>
</tr>
<tr>
<td>Model 3d</td>
<td>-3.48 (0.68)</td>
<td>-0.53 (0.37)</td>
<td>-1.11 (0.18)</td>
<td>-0.71 (0.37)</td>
<td>1.38 (0.38)</td>
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</tbody>
</table>

Data presented per 1-SD of visceral fat
Model 1: Unadjusted model
Model 2: Adjusted for age, site, race/ethnicity, education level, obesity, alcohol consumption and menopausal status
Model 3: Model 2 + log-transformed estradiol, cycle day of blood draw and log-transformed CRP
P-value<0.05
ABSTRACT

Objective: To report sex-specific changes in CVD risk following Roux-en-Y gastric bypass surgery (RYGB).

Background: Long-term changes in cardiovascular disease (CVD) risk following bariatric surgery are not well characterized.

Methods: Between 2006-2009 1770 adults enrolled in a prospective cohort study underwent Roux-en-Y gastric bypass (RYGB) at 1 of 10 U.S. hospitals. Research assessments were conducted pre-surgery and annually post-surgery over 7 years. Sex-specific predicted 10-year and lifetime CVD risk were calculated using the Framingham-lipid, Framingham-body mass index (BMI) and Atherosclerotic (ASCVD) scoring algorithms among participants with no history of CVD. Of 1566 eligible participants, 1234 (75.9%) with CVD risk determination pre- and post-surgery were included (1013 females, 221 males).

Results: Based on the Framingham-lipid, the percentage of females with predicted high (>20%) 10-year CVD risk declined from pre-surgery (6.5% [95% CI:6.7-7.5]) to 1 year post-surgery (1.0% [95% CI:0.8-1.2]; p<0.001), then increased 1 to 7 years post-surgery (to 2.8% [95% CI:1.6-3.3]; p=0.003), but was lower 7 years post-surgery versus pre-surgery (p<0.001). Time trends for percentage of high-risk participants and mean CVD risk scores were similar for both sexes and other evaluated CVD risk scores. For example, among males mean lifetime ASCVD score declined from pre-surgery to 1 year post-surgery, then increased 1 to 7 years post-surgery. However, there was a net decline from pre-surgery (p<0.001).

Conclusion: Among both females and males, predicted 10-year and lifetime CVD risk was substantially lower 7 years post-RYGB than pre-surgery, suggesting RYGB surgery can lead to sustained improvements in short- and long-term CVD risk.
DEAN’S DAY ABSTRACT


In the past three decades, the United States has experienced a rising incidence of maternal deaths, including those attributable to Obstetric Hemorrhage (OBH). In response, the National Partnership for Maternal Safety developed a standardized OBH Consensus Bundle with the goal of universal adoption. Gap analysis from January to June 2016 was used to identify the differences between existing OBH protocols and the OBH Consensus Bundle in the UPMC health system. Eight hospitals, ranging from small and rural to a regional referral center, were categorized by annual birth volume as high (≥2000 births), medium (500-1999 births), and low (<500 births). A consensus team analyzed current protocols and used their findings to implement a system-wide OBH improvement initiative.

The most common gaps identified were lack of access to OBH kits, OBH drills, active third stage management, team huddles, and debriefing procedures. No hospitals performed ongoing OBH risk assessment or cumulative blood loss assessment. All hospitals had an OBH response team and the majority had a hemorrhage cart, although content was not standardized. The single low volume hospital achieved the fewest elements, while medium volume hospitals demonstrated wide variation in achievement of elements. The most robust systems were found at high volume hospitals, though significant gaps were still identified. The highest incidence of OBH occurred at the hospitals with the highest and lowest annual birth volume, which resulted in a ‘U-shaped’ relationship. This gap analysis of OBH management identified areas for improvement among all hospitals in the health system regardless of annual birth volume, and allowed for identification of improvement targets and implementation strategies that may improve maternity outcomes.

**KEY WORDS:** health systems research, obstetric hemorrhage, obstetric labor complication, patient care bundle, patient safety
Association between dietary tomato intake and the risk of hepatocellular carcinoma: the Singapore Chinese Health Study

Claire E. Thomas¹,², Hung N. Luu¹,²*, Renwei Wang², Jennifer Adams-Haduch², Aizhen Jin³, Woon-Puay Koh³,⁴, Jian-Min Yuan¹,²

Authors’ Affiliations:
¹Department of Epidemiology, Graduate School of Public Health, University of Pittsburgh, Pittsburgh, PA, USA
²Division of Cancer Control and Population Sciences, UPMC Hillman Cancer Center, University of Pittsburgh, Pittsburgh, PA, USA
³Health Services and Systems Research, Duke-NUS Medical School Singapore, Singapore
⁴Saw Swee Hock School of Public Health, National University of Singapore, Singapore

ABSTRACT

Background: Intake of tomato and/or lycopene has been found to be associated with reduced risk of several cancer types, but there is no report on the association with risk of hepatocellular carcinoma (HCC).

Methods: The associations of tomato and lycopene consumption with risk of HCC were examined in the Singapore Chinese Health Study, a prospective cohort of 63,257 Chinese aged 45-74 years at enrollment from 1993 to 1998. Usual diet was assessed using a validated semi-quantitative food frequency questionnaire. Incident HCC cases were ascertained through linkage with the nationwide Singapore Cancer Registry. Cox proportional hazard regression models were used to estimate hazard ratio (HR) and its 95% confidence interval (CI) of HCC with the consumption of tomato and lycopene among all cohort participants, and unconditional logistic regression was used to assess the association by hepatitis B surface antigen (HBsAg) positivity in a case-control study nested in this cohort.

Results: After a mean follow-up of 17.6 years, 561 incident HCC cases were identified. Higher tomato intake was associated with lower risk of HCC after adjustment for multiple potential confounders ($P_{trend}<0.001$). Compared to the lowest quartile, HRs (95% CIs) of HCC for the 2nd, 3rd, and 4th quartile of tomato intake were 0.70 (0.56-0.88), 0.73 (0.58-0.92), and 0.63 (0.49-0.81). Among HBsAg-negative individuals, the inverse association remained ($P_{trend}=0.03$). There was no association between lycopene intake and HCC risk ($P_{trend}=0.54$).

Conclusion: Tomato intake may offer protection against the development of HCC, particularly among individuals without chronic infection with hepatitis B virus.
Myosteatosis: Differences in Association with Type 2 Diabetes by Anatomical Location

Authors: Curtis Tilves, MS1; Allison L Kuipers, PhD1; Joseph M Zmuda, PhD1; J Jeffrey Carr, MD2; James G Terry, MS2; Sangeeta Nair, DVM, MS2; Bharat Thyagarajan, MD, PhD, MPH3; Victor Wheeler, MD4; and Iva Miljkovic, MD, PhD, FAHA1

Affiliations: 1Department of Epidemiology, University of Pittsburgh, Pittsburgh, PA, USA; 2Department of Radiology, Vanderbilt University Medical Center, Nashville, TN, USA; 3Department of Laboratory Medicine and Pathology, University of Minnesota Medical School, Minneapolis, MN; 4Tobago Health Studies Office, Scarborough, Tobago, Trinidad & Tobago

Character Count: 1746 (+ 750 for table) = 2496/2500

Background: CT-derived muscle density (MD) reflects the degree of adiposity in muscle (i.e., myosteatosis) with lower MD indicating greater adiposity. Previous research indicates lower MD is associated with increased risk of type 2 diabetes (T2D). However, few studies have compared the association of simultaneously measured MD by anatomic location. The relationship between myosteatosis and cardiometabolic health may differ by body site and influence which location(s) is most useful for risk assessment. We investigated potential differential relationships between T2D and MD of the locomotor muscles of the abdomen (psoas), thigh, and calf among 539 African Caribbean men from Tobago.

Methods: Men were aged 50-91 years (mean 64.4 years, mean BMI 27.5 kg/m²). Calf MD was measured at 66% of calf length using peripheral quantitative CT; calf MD was defined as the ratio of muscle mass to cross-sectional muscle area. Psoas MD was measured in the abdomen (between L3/L4) and thigh MD was measured in the mid-thigh using CT; for these, MD was defined as the average muscle attenuation across each site. MDs were converted to per-SD units for comparability. T2D was defined as a fasting serum glucose level of ≥126 mg/dL or currently taking antidiabetic medication.

Results: Psoas and thigh MDs were more highly correlated (r = 0.70) than psoas and calf (r = 0.33) or thigh and calf (r = 0.53) MDs, and calf MD was moderately correlated with BMI (r = -0.38) compared to lower BMI correlations for thigh (r = -0.18) or psoas (r = -0.16) MDs (all significant p < 0.05). After age and lifestyle factor adjustment (Table), a 1-SD lower MD of the thigh or calf was significantly associated with higher odds of T2D. Additional adjustment for BMI completely attenuated the association with T2D for thigh MD, but not calf MD.

Conclusion: In our study of African Ancestry men, only calf MD was associated with higher odds of T2D independent of BMI and other muscle groups. Longitudinal studies are needed to better characterize specific muscle myosteatosis and metabolic abnormalities.
<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psoas MD</td>
<td>1.18 (0.94, 1.47)</td>
<td>1.02 (0.81, 1.30)</td>
<td>0.84 (0.61, 1.16)</td>
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<td>(SD = 4.69 HU)</td>
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<tr>
<td>Thigh MD</td>
<td><strong>1.32 (1.05, 1.66)</strong></td>
<td>1.13 (0.89, 1.44)</td>
<td>1.12 (0.80, 1.59)</td>
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<tr>
<td>(SD = 4.08 HU)</td>
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<tr>
<td>Calf MD</td>
<td><strong>1.44 (1.17, 1.77)</strong></td>
<td><strong>1.31 (1.04, 1.63)</strong></td>
<td><strong>1.32 (1.02, 1.71)</strong></td>
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<tr>
<td>(SD = 4.63 mg/cm³)</td>
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**Model 1:** T2D = Age + Hours walked/week for exercise + Watching television ≥ 14 hours/week [yes/no] + Current Smoker [yes/no] + Drinks ≥ 4 alcoholic drinks/week [yes/no] + Specific Anatomical Location (Muscle Volume/Area and MD)

**Model 2:** Model 1 + BMI

**Model 3:** Model 2 + Remaining Anatomical Locations’ Muscle Volumes/Area and Densities

**Abbreviations:** MD = muscle density, T2D = type 2 diabetes, SD = standard deviation, HU = Hounsfield Units
Title: Where you shop and neighborhood access to fruit and vegetables are associated with self-rated and cardiometabolic health.

Introduction: The retail food environment may partially explain racial and ethnic disparities in diet and cardiometabolic health. However, there is limited understanding of how specific aspects of the food retail environment and food shopping locations may impact cardiometabolic (blood pressure, HbA1c, cholesterol, BMI) and self-rated health in low-income minority populations.

Methods: We report on 459 individuals who participated in a household interview and blood draw in 2018 as part of the Pittsburgh Hill/Homewood Research on Neighborhoods and Health (PHRESH) study. We used logistic regression to examine associations between 1) perceived fruit and vegetable availability, quality, and price, and 2) primary food shopping store type, and reason for shopping there and 3) frequency of shopping at stores with low and high access to healthy foods, with cardiometabolic and self-rated health outcomes.

Results: Participants were, on average, 60.7 years old (SD=13.9); 81.7% female; 80.4% overweight/obese. After covariate adjustment, both more perceived accessibility and affordability of fruits and vegetables within one’s neighborhood were associated with lower odds of high blood pressure (OR:0.47, 95%CI:0.28-0.79; OR:0.59, 95%CI:0.36-0.96, respectively). Additionally, more perceived accessibility and affordability of fruits and vegetables were associated with lower odds of poor self-rated health (OR:0.59, 95% CI:0.39-0.90; OR:0.62, 95%CI: 0.41-0.94, respectively). Doing one’s primary food shopping at a discount grocery store compared to a full-service supermarket was associated with lower odds of being overweight (OR:0.51, 95%CI:0.26-0.99). Shopping often versus rarely at stores with low access to healthy foods was associated with increased odds of high cholesterol (OR:3.52, 95%CI:1.09-11.40). Shopping sometimes and often at stores with high access to healthy food versus rarely were both associated with lower odds of poor self-rated health (OR:0.58, 95%CI:0.36-0.92; OR:0.36, 95%CI:0.15-0.85, respectively).

Conclusion: These results suggest that perceived accessibility and affordability of healthy foods are important correlates of cardiometabolic risk factors in low-income minority populations. Additionally, discount grocery stores may be an important option for accessing healthy food among this population.
Title: Metabolic Syndrome Trajectories and Objective Physical Performance in Mid-To-Early Late Life: SWAN

Authors: Jenna Napoleone, Robert Boudreau, Brittney Lange-Maia, Samar El Khoudary, Kelly Ylitalo, Andrea Kriska, Carrie Karvonen-Gutierrez, Elsa Strotmeyer

Abstract:
Introduction: Metabolic syndrome (MetS) is a cluster of cardiometabolic risk factors (hypertension, abdominal obesity, impaired fasting glucose, low high-density lipoprotein and hypertriglyceridemia) associated with several chronic conditions. Yet, how MetS changes during midlife impact early-late life physical performance remains unknown. The objective was to longitudinally assess if the number of components of MetS in midlife were associated with objective physical performance among mid-to-early late life women.

Methods: Data are from Study of Women’s Health Across the Nation (SWAN) participants (n=1722), age 46.4±2.7 years at baseline (1996-1997), who had at least two time-points of MetS from baseline to Visit 12 (2009-2011) and physical performance measures at Visit 15 (age 65.4±2.7 years; 2015-2016). Poisson latent class growth modeling was used to identify MetS trajectory classes. The objective physical performance measures included 40-foot walk (m/s), 4-meter walk (m/s), short physical performance battery total score (SPPB; 0-12), 5 repeated chair stands time (sec), and total stair climb time performance (sec). Separate multiple linear regression models were used to model each continuous physical performance measure as a function of the MetS trajectory class. Models were adjusted for age (years), BMI (kg/m²), bodily pain (SF-36 Pain: 0-100), fatigue (SF-36 Vitality: 0-100), difficulty paying for basics (Somewhat/very hard vs. not hard), and self-reported health (very good/excellent health vs. good/fair/poor health).

Results: In mid-to-early late life women, four MetS trajectory classes emerged: no (23.9%), 1=lowest (28.7%), 2=middle (30.9%) and ≥3=highest (16.5%) MetS components. The highest versus no MetS groups had higher BMI, bodily pain, fatigue, more difficulty paying for basics and lower self-reported health in 2015/16. Adjusting for age, race/ethnicity, site, difficulty paying for basics, self-reported health and BMI, highest versus no MetS groups demonstrated significantly worse 40-foot walk (β: -0.09; 95% CI: -0.15, -0.04), 4-meter walk (β: -0.11; 95% CI: -0.18, -0.05), SPPB (β: -0.95; 95% CI: -1.30, -0.59), repeated chair stand (β: 1.00; 95% CI: 0.40, 1.60) and stair climb performance (β: 1.57; 95% CI: 0.43, 2.72). Women in middle versus no MetS groups also had significantly lower SPPB scores (β: -0.39; 95% CI: -0.68, -0.10).

Conclusions: MetS relationships with physical performance suggest disability prevention should be addressed for mid-to-early late life women with multiple MetS components. Determining which interventions are effective at improving physical performance in midlife women may preserve late-life physical function and independence with aging.

ACKNOWLEDGMENTS
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Jenna Napoleone is supported by the Epidemiology of Aging training grant at the University of Pittsburgh (NIA T32- AG000181-28)
Title: Is Variability of Free-Living Activity Associated with Physical and Mental Fatigability in Older Adults?

Authors: Jessica L. Graves¹, MS; Robert T. Krafty², PhD; Jaroslaw Harezlak³, PhD; Eric J. Shiroma⁴, PhD; Nancy W. Glynn, PhD¹

Affiliations: 1. Department of Epidemiology, Graduate School of Public Health, University of Pittsburgh; 2. Department of Biostatistics, Graduate School of Public Health, University of Pittsburgh; 3. Department of Epidemiology and Biostatistics, School of Public Health, Indiana University; 4. Laboratory of Epidemiology and Population Science, National Institute on Aging

Abstract: Greater fatigability in older adults may be moderated by physical activity (PA). However, what features of PA timing are most strongly related to fatigability remains unknown. We examined the relationship between variability of free-living activity patterns and perceived physical and mental fatigability using the Pittsburgh Fatigability Scale (PFS, 0-50pts, higher=greater fatigability) in older adults from the Developmental Epidemiologic Cohort Study (DECOS, n=57, age=70-91yrs, 61% female). We assessed PA using ActiGraph GT3X+ over 7 days. Mean activity, standard deviation (SD) of mean activity across days, and relative activity [(mean at each bin)/(total mean)] were calculated across 24-hours in 4-hour bins, adjusting for estimated rise-time. Lower SD of PA from 0-4 hours after rising was associated with greater PFS physical scores (r=-0.27, p=0.05). No measures of PA correlated with PFS mental scores. In older adults with lower physical fatigability, associations with greater variability in activity may indicate larger energy reserves.

Word count = 149/150
Title: Review of Current Parameter Estimates from Ongoing Novel Coronavirus (COVID-19) Outbreak

Authors: Jessica Salerno, Lucie Contamin, Alice Arcury-Quandt, Anne Cross, Wilbert van Panhuis

Abstract: Data sharing during disease outbreaks is crucial to outbreak monitoring and development of appropriate treatment and prevention protocol. As of December 2019, the world has been grappling with the emergence of a novel coronavirus (COVID-19). Infectious disease modelers are using case data, genomic data, and other publicly available data to predict the spread and severity of COVID-19 both within China and globally. The Models of Infectious Disease Agent Study (MIDAS) Coordination Center has created a central data repository in GitHub for scientists to use in their modeling efforts, both to find information on the current outbreak and to post results. One central component of this repository is the parameter estimate page, which is a collection of estimates by various infectious disease modelers and public health scientists across the world. As of March 2, 172 parameter estimates have been collected in the repository, including basic reproduction number (R0), cumulative case count, incubation period, case fatality rate, and other important estimates that are used by scientists and policy makers to determine the best response to the ongoing outbreak.
Jinghui Ju - EPIDEM

Age at menarche and its association with the metabolic syndrome in type 1 diabetes

Jinghui Ju, Debra N. Rubinstein, Samar R. El Khoudary, Trevor J. Orchard, Tina Costacou

Early menarche has been associated with a higher risk of metabolic syndrome (MetS), CVD and its risk factors in the general population. However, limited data exists regarding the association between age at menarche and MetS in women with type 1 diabetes (T1D), a population in which menarche may be delayed. We thus assessed the ability of age at menarche to predict incident MetS in female participants (n=235) of the EDC study, a cohort of childhood onset T1D. MetS was defined using modified AHA NCEP ATP III criteria: waist circumference ≥ 89 cm; triglycerides ≥ 150 mg/dL or treatment for elevated triglycerides; HDL cholesterol < 50 mg/dL; systolic/diastolic blood pressure ≥130/85 mmHg or on antihypertensive medications. Since all participants met the criteria of hyperglycemia, any two of the remaining four criteria were required for diagnosis of MetS. Participants were divided into 3 menarche timing groups: early (≤11 years, n=22), normal (12~14 years, n=163) and delayed menarche (≥15 years, n=50). At baseline, women with delayed menarche were with longer diabetes duration and more likely to have lower estimated glomerular filtration rate (eGFR) compared with the other groups (all p-values<0.05). However, univariately, the incidence of MetS during the 25-year follow-up did not differ by menarche timing group (63.6% vs. 49.1% vs. 46.0%, respectively, p=0.37). In multivariable Cox models, compared with the normal menarche group, women with early and delayed menarche had non-significantly higher (HR =1.42, p=0.26) and lower (HR =0.89, p=0.64) hazards of developing MetS, respectively. Duration of T1D, HbA1c, BMI and smoking history were significantly associated with a greater risk of MetS, whereas eGFR was significantly associated with a lower hazard of MetS. In conclusion, unlike findings in the general population where early menarche increased the risk of MetS, in this cohort of women with T1D the incidence of MetS did not differ significantly by menarche timing group.

Characters: 1764
Title: The genetic correlation between subclinical cardiovascular disease and functional status in long-lived adults

Background: Although measures can be taken to prevent or improve the outcomes of cardiovascular disease (CVD), millions of Americans remain affected by CVD and its subsequent complications. Over the past decade, medical research has shifted towards evaluating the genetic determinants of chronic disorders such as CVD and its comorbid diseases.

Hypothesis: We assessed the hypothesis that cognitive and physical function measures share a common genetic basis with subclinical CVD measures such as blood pressures and carotid intima-media thickness (CIMT).

Methods: Participants for the current study included families from the Long Life Family Study (n=2,588, mean age=71.9 years, 44.5% female) who were recruited based on a family member’s exceptional longevity. A carotid ultrasound was used to measure mean CIMT and mean systolic and diastolic blood pressures were measured using an automated cuff. Mean pulse pressure was calculated as systolic--diastolic pressure. A number of physical and cognitive function tests (including, gait speed, grip strength, general cognitive function, working memory and semantic fluency) were conducted at the time of CVD assessment. We used SOLAR to estimate the genetic heritability and the genetic and phenotypic correlation between each pair of subclinical CVD and functional measures. All models were adjusted for age, age², sex, field centers, height, weight and whether or not participants currently smoked.

Results: All measures were significantly heritable (h² range 0.164 to 0.518, all p≤0.01). There were significant phenotypic correlations between both systolic and diastolic blood pressures and grip strength (all p≤0.004). Systolic and diastolic blood pressure were also genetically correlated with semantic fluency and overall cognition (all p≤0.04). Mean CIMT was found to be genetically correlated with working memory and pulse pressure (all p≤0.0009). There were no significant genetic or phenotypic correlations between pulse pressure and functional measures.

Conclusion: These results suggest that subclinical CVD shares a common genetic basis with cognitive but not physical function measures. This may allude to a potential biologic relationship between cognitive function and the pathophysiology of CVD in older adults.
Effectiveness of Influenza Vaccine for Preventing Laboratory-Confirmed Influenza Hospitalizations in Immunocompromised Adults, 2017-2018 Influenza Season

Kailey Hughes¹, Donald B Middleton¹,², Goundappa K Balasubramani², Mary P Nowalk², Emily T Martin³, Manjusha Gaglani⁴, H Keipp Talbot⁵, Jill M Ferdinands⁶, Richard K Zimmerman¹,², Fernanda P Silveira¹,², for the HAIVEN Study Investigators

1 University of Pittsburgh Medical Center, Pittsburgh, PA
2 University of Pittsburgh, Pittsburgh, PA
3 University of Michigan School of Public Health, Ann Arbor, MI
4 Baylor Scott & White Health, Texas A&M University Health Science Center College of Medicine, Temple, TX
5 Vanderbilt University Medical Center, Nashville, TN
6 Influenza Division, Centers for Disease Control and Prevention, Atlanta, GA

ABSTRACT

Background: Immunocompromised (IC) individuals are at high risk for severe complications of influenza. Yearly influenza immunization is recommended for this patient population, although vaccine effectiveness (VE) is expected to be lower than for the non-immunocompromised. The literature describing influenza VE in the IC is scarce. We evaluated VE against influenza-associated hospitalization among IC adults.

Methods: We analyzed data from adults >18 years hospitalized with acute respiratory illness (ARI) during the 2017-2018 influenza season at 9 hospitals participating in the US Hospitalized Adult Influenza Vaccine Effectiveness Network (HAIVEN) study. Details of disease severity, underlying health status, and vaccination status were obtained through enrollment interviews and medical records were used to define eight mutually exclusive IC groups. VE was evaluated with a test-negative case-control design using multivariate logistic regression with PCR-
confirmed influenza as the outcome and vaccination status as the exposure, adjusting for age, race, and other factors.

**Results:** Of 3,524 adults hospitalized with ARI during the 2017-2018 influenza season, 1210 (34.3%) had an immunocompromising condition. IC adults were more likely to be vaccinated than non-IC (60.2% vs 54.6%, p=0.002). Among all adults, VE against influenza hospitalization was 33% (95% CI, 21%-44%). Effectiveness among IC vs non-IC adults was 6% (29%-31%) vs. 41% (27%-52%) and there were differences in the IC groups.

**Conclusions:** Results from the current study support using other preventative strategies in addition to vaccinating adults with immunocompromising conditions, such as vaccination of close contacts and chemoprophylaxis with antiviral drugs.
Presenter: Meg Carr, EPIDEM
Internship Agency: Pennsylvania Department of Health/Allegheny County Department of Health
Internship Preceptor: Dr. Lauren Orkis/ Dr. Kristen Mertz

Title: Limited Hepatitis C Testing Available in Drug and Alcohol Treatment Facilities in Pennsylvania (Preliminary Analysis)

Background: Hepatitis C is an infectious disease that can cause liver related morbidity and mortality. The epidemic of opioid use has led to an increase in new hepatitis C infections transmitted by intravenous drug use. Pennsylvania is among the top ten states for prevalence of chronic hepatitis C infection with an estimated 209,982 adults with the disease. The Pennsylvania Department of Health (PADOH) conducted a survey of drug and alcohol treatment facilities to assess the breadth of hepatitis C related services offered and to identify barriers to offering these services.

Methods: PADOH collaborated with the Pennsylvania Department of Drug and Alcohol Programs to compile contact information for all licensed drug and alcohol treatment facilities in Pennsylvania. The survey was conducted online and sampling was stratified by urban versus rural facilities, as defined by the Center for Rural Pennsylvania. Non-respondents received two follow-up phone calls to encourage survey completion. Data was cleaned and analyzed using Excel.

Results: Of the 330 drug and alcohol facilities sampled, 316 were eligible for response, of these 242 (76%) submitted surveys. Of the 242 respondents, 76 (32%) test their clients for hepatitis C. Of those, 26 (34%) test all clients. Of the 50 that provide testing but not to all their clients, 40 (82%) reported testing people who inject drugs. Of the 76 facilities that provide testing, in 33 (43%) testing is only provided by an outside organization and in 16 (21%) testing is only provided by referral. Just 24 (10%) of respondents provide onsite confirmatory testing for hepatitis C. The most common barrier to providing hepatitis C testing was funding.

Conclusions: Pennsylvania residents in drug and alcohol treatment are a high-risk population for hepatitis C infection. With just 32% of facilities offering testing to their clients drug and alcohol treatment facilities are an untapped resource for hepatitis C testing and linkage to care in Pennsylvania.
Background: Gestational hypertension remains a significant predictor of both adverse birth outcomes and future cardiovascular risk among women. Evidence from the literature consistently indicates sizeable racial/ethnic disparities in these conditions as well. However, few studies have incorporated neighborhood-level factors which may help to explain such disparate health outcomes, and even fewer have failed to consider the spatial context in which a neighborhood (and individual) is geographically imbedded. Residential segregation, in particular, can result in significant inequalities in resource distribution, social capital, and economic opportunities between communities. However, the degree to which it might impact cardiometabolic health among pregnant women remains unclear.

Methods: We used birth record data from 2003-2009 and information from the 2000 US Census to determine whether neighborhood-level economic segregation is associated with gestational hypertension among a diverse cohort of women from the Pennsylvania Delaware Valley Region. Economic segregation was measured using the local Getis-Ord Gi* statistic based upon the percentage of residents living in poverty within a given census tract. Quantified as a z-score and unique to each census tract, the Gi* incorporates the economic conditions of surrounding communities in its calculation, thereby reflecting the influence of spatial autocorrelation and the larger geographic context in which neighborhoods are imbedded. As such, we used the Gi* to detect “hot spots” of residential economic segregation within the Delaware Valley Region, and later assigned this information to each woman based upon her census tract of residence. We obtained prevalence ratios and differences using hierarchical mixed effect models with random intercepts at the census tract level. We tested for interaction by maternal race/ethnicity throughout, with models sequentially adjusted for both maternal and neighborhood-level characteristics.

Results: Our analytic sample included a total of 220,897 NH-Black, NH-White, and Hispanic women, from 971 unique census tracts (median n per tract = 207 women). Four percent of women developed gestational hypertension in our sample, and 65%, 14%, and 21% of women resided in low, moderate, and high segregation neighborhoods, respectively. However, a much greater proportion of NH-Black women developed gestational hypertension and lived in high segregation neighborhoods compared to NH-White and Hispanic women. Moreover, maternal race/ethnicity significantly modified the impact of residential segregation on gestational hypertension development, on both the relative and absolute scales. After full adjustment for maternal characteristics (age, marital status, education level, prenatal care use, insurance type, WIC use, pre-pregnancy BMI, smoking status, and parity) as well as neighborhood-level factors (population density, % NH-Black residents in census tract, and a PCA-derived composite index of neighborhood socioeconomic disadvantage), NH-Black women living in moderate and high economic segregation had 16% higher prevalence (PR=1.16, 95%CI: 1.03-1.30) and 22% higher prevalence (PR=1.22, 95% CI: 1.08-1.38) of gestational hypertension, respectively, compared to those living in low segregation neighborhoods. Segregation was not associated with gestational hypertension among Hispanics, and only marginally significant findings were observed among NH-White women.

Conclusions: Higher levels of residential economic segregation were associated with higher rates of gestational hypertension among NH-Black women in the Delaware Valley Region, after full adjustment. While more precise definition and measurement of the neighborhood context in which a woman resides remains warranted, our findings reinforce the consideration of residential segregation as a fundamental cause of health disparities, and stress the need for continued work towards resource and economic equity at the neighborhood level.
Title: Patterns of prefrontal activation and performance during walking tasks among older adults

Authors: Nemin Chen,¹ Theodore Huppert,² Robert Krafty,¹ Andrea Rosso¹

Affiliations:
1. School of Public Health, University of Pittsburgh, Department of Epidemiology
2. Electrical and Computer Engineering, University of Pittsburgh

Abstract:
Prefrontal cortex (PFC) is related to information processing and executive functions. It’s one of the areas that show greatest aging-related atrophy. Differences in prefrontal cortex control of walking in older age likely arise from changes in neural capacity and compensation, which could be related to structural change of areas. PFC activation by changes in oxygenated hemoglobin was examined in 29 older adults (mean age=76) using functional near infra-red spectroscopy, which is an optical neuroimaging method allowing indirect evaluation of neural activation. Tasks included standing with cognitive challenge and walking with and without cognitive challenge on even and uneven surfaces. Three PFC activation-performance patterns were identified using K-means clustering: 1) low activation during walking tasks and high activation during standing cognitive task, with the best performance in terms of walking speed and cognitive performance (n=10); 2) low activation on all tasks, with the lowest performance (n=15); 3) high activation during walking and low activation during cognitive, with intermediate performance (n=5). Associations of patterns with cognitive function and structural neuroimaging will be explored. These results will inform interpretation of functional changes of PFC during aging, including primary network impairment and compensatory mechanisms.
Introduction:

While fatigue in older age has been well studied in relation to negative health outcomes, the clinical relevance of maintaining higher energy late in life is less known. We explored associations of self-reported energy levels with cognitive performance, mood, and physical function.

Methods:

The Health, Aging and Body Composition study collected data on high functioning older adults (N=2,529, mean age=75.7, 58.3% white, 51.5% female, median Modified Mini Mental State Exam [MMSE] score: 92.0). Self-report of energy level over the past month was recorded on a scale of 0-10, from least to most energy. Cognitive performance was captured through MMSE and Digit Symbol Substitution test scores. Mood was evaluated through the Center for Epidemiologic Studies Depression (CESD-10) scale. Pre-existing chronic conditions included presence/absence of diabetes, cancer, cardiovascular disease, peripheral artery disease, and arthritis (per self-report and medication history). Physical function was assessed through a timed 400 meter walk, self-reported physical activity, gait speed, and muscle strength (measured by Kin-Com dynamometer). Self-reported energy was dichotomized into high and low categories based on the median value. Variables bivariately associated with energy entered a logistic regression model with energy high/low as the outcome, adjusted for demographics, pre-existing chronic conditions, muscle strength, and body mass index (BMI).

Results:

Self-reported energy score was normally distributed (median =7) and greater for women, blacks, and those with less education (p<0.05). Prevalent diabetes, cardiovascular disease, peripheral artery disease, and osteoarthritis were all bivariately associated with energy. Lower odds of higher self-reported energy were found for participants with depression (aOR = 0.53 [0.48, 0.59]) and longer time to walk 400 meters (aOR = 0.73 [0.64, 0.83]). Even when excluding the energy-related question from CESD-10 scores, those with depression still had lower odds of high self-reported energy (aOR = 0.74 [0.67, 0.81]). Increased odds of higher self-reported energy were found for participants with faster gait speed for usual walking pace (aOR = 1.4 [1.3, 1.6]), rapid walking pace (aOR = 1.4 [1.2 – 1.5]), self-reported minutes of walking per week (aOR = 1.1 [1.0 – 1.2]), and self-reported minutes of walking briskly per week (aOR = 1.3[1.2 – 1.5]). Associations with cognitive performance were not significant.

Conclusion:
In this cohort of high-functioning older adults, self-report of higher energy reflects overall better mood and physical function, independent of demographics, pre-existing chronic conditions, muscle strength, and BMI. Future studies should validate self-reported energy against objective energy metrics, and evaluate if longitudinal changes in energy protect against poor clinical and functional outcomes.
Plasma metabolites associated with muscle fat infiltration in community-dwelling older adults from the Health ABC Study

Samaneh Farsijani¹, Megan M. Marron¹, Iva Miljkovic¹, Mary Elizabeth Baugh², Stephen B. Kritchevsky², Anne B. Newman¹

¹Department of Epidemiology, Graduate School of Public Health, University of Pittsburgh, Pittsburgh, PA
²Section on Gerontology and Geriatric Medicine, Department of Internal Medicine, Wake Forest School of Medicine, Winston-Salem, NC

Background: Age-related increase in muscle fat depots, i.e., myosteatosis, is a contributing factor to muscular dysfunction in the older adults leading to frailty and disability. Myosteatosis is a complex condition that is associated with aging as well as diverse pathological conditions, including cancer cachexia and diabetes. We have previously shown that the relationship between muscle fat deposition and reduced physical function is moderated by muscle area and it is only observed in individuals with high muscle area. However, the phenotypic and metabolic heterogeneity associated with myosteatosis remained unknown. Here, we further explored the heterogeneity of myosteatosis using a semi-targeted metabolomics approach to determine the plasma metabolites associated with muscle fat infiltration in community-dwelling older adults.

Methods: We performed a cross-sectional analysis of 314 African-American men (age: 69-79 years) from Health Aging and Body Composition study at baseline. Mid-thigh inter-muscular fat (IMF) area (cm²) by CT and 350 plasma metabolites by liquid-chromatography/mass spectrometry were measured. Partial correlation analysis was performed to determine metabolites associated with IMF.

Results: One hundred and sixty-one metabolites were correlated with IMF (P<0.05). After adjustment for age, weight, physical activity, medications and smoking, 36 metabolites remained significant with a false discovery rate of ≤0.25 to correct for multiple comparisons. Majority of the metabolites associated with IMF were lipids and lipid-like molecules (26 out of 36), followed by organic acids, including amino acids (5 out of 36). Among these metabolites, only glutamine (from organic-acids) and mevalonic acid (from fatty acids sub-class) were negatively correlated with IMF. The remaining 34 metabolites were positively correlated with IMF. Additionally, metabolic profiles of participants were distinctly different across different levels of myosteatosis, as categorized by quartiles of IMF area.

Conclusion: Our results show dysregulated lipid and amino acid metabolism as the metabolomic hallmark of myosteatosis in older adults. Further exploration of metabolic heterogeneity of myosteatosis may help better understand the significance of fat retention on muscle health in aging.
Racial differences in memory-related gray matter volume regions of interest among cognitively normal older adults

Sara L. Godina, Caterina Rosano, Peter J. Gianaros, Howard J. Aizenstein, Michelle Carlson, Andrea L. Rosso

Previous studies indicate there are racial differences in the prevalence of Alzheimer’s Disease or other dementias, suggesting older Blacks are about twice as likely to have dementia as older Whites. Incorporating neuroimaging measures is necessary to understand the neural pathology underlying the mechanisms of these racial disparities, however limited data exists on neuroimaging outcomes among racially diverse adults of advanced age. We examined cross-sectional associations of race and memory-related gray matter volume (GMV) regions of interest (ROIs) in 263 community-sampled adults (mean age 83, 57% female, 39% Black) from the Healthy Brain Project, a substudy of the Health, Aging, and Body Composition Study. Generalized linear models were used to test associations between race and memory-related GMV ROIs (hippocampus, posterior cingulate cortex, parahippocampal gyrus, and entorhinal cortex), quantified using magnetic resonance imaging. Compared to Whites, Blacks consistently showed smaller GMV in four memory related ROIs, cross-sectionally. Racial differences in GMV remained in the parahippocampal gyrus ($\beta=-433.42, 95\% \text{ CI: } -642.96, -233.87$) and entorhinal cortex ($\beta=-159.18, 95\% \text{ CI: } -245.89, -72.48$), after adjusting for demographic, environmental, and psychosocial covariates. Future directions of the analysis include quantitative bias analysis to address whether these findings are the result of selection bias due to racial differences in recruitment, as found in recent studies.
Accelerated brain aging and gait speed in a middle-aged Type 1 diabetes mellitus cross-sectional cohort
Royse SK, Costacou T, Nunley K, Orchard T, Rosano C
Department of Epidemiology

Introduction: Accelerated brain aging is a hallmark of childhood-onset Type 1 diabetes mellitus (T1DM) such that by middle-age, those with T1DM demonstrate brain abnormalities similar to elderly, non-diabetic persons. While the association between such pathology and cognition in T1DM populations is well-characterized, the effects on mobility are unknown. This work investigates the relation of gray matter volumes (GMV) and white matter hyperintensities (WMH) with gait speed in a middle-aged T1DM cross-sectional cohort.

Methods: 45 subjects without diabetic peripheral neuropathy (DPN) (46.2 ± 6.99 years, 24F/21M) and 57 subjects with DPN (51.9±6.94 years, 27F/30M) were recruited from The Pittsburgh Epidemiology of Diabetes Complications Study. Each subject obtained T1 and T2/FLAIR magnetic resonance image (MRI) scans on a 3T Siemens Tim Trio machine. T1 MRIs were processed using the Automatic Labeling Pathway technique to define GMV. Severity of WMH was rated using Fazekas scoring. Gait speed was quantified by timing subjects walk a 20-meter course, averaged over three passes. Spearman correlations measured associations between sample characteristics, including GMV and WMH, and gait speed. Linear models adjusted for age, depression, and physical activity tested the associations between DPN, GMV, and WMH with gait speed. Additional linear models replaced DPN with other T1DM-related microvascular disease variables. All models were then repeated substituting age for disease duration.

Results: DPN (r=-0.273, p=0.01), caudate GMV (r=-0.243, p=0.01), and WMH (r=-0.237, p=0.02) were all negatively correlated with gait speed. In separate linear models, caudate GMV (β=-0.017, p=0.01) and WMH (β=-0.122, p=0.02) were significantly associated with gait speed after adjusting for age, depression, and physical activity, but DPN was not (β=-0.085, p=0.08). When included in a model together with age, depression, and physical activity, caudate GMV (β=-0.014, p=0.04) and WMH (β=-0.103, p=0.04) remained significantly associated with gait speed independent of each other. Models that included other T1DM-related microvascular diseases and/or duration produced similar results.

Conclusions: WMH, which have been implicated in cognitive impairments in T1DM populations [2], are also associated with gait speed in this middle-aged cohort. These associations are remarkably independent of other microvascular complications or causes of reduced locomotion, such as DPN. The negative association between caudate GMV and gait speed warrants future investigations.

REFERENCES
Does increasing driving distance to the hospital of delivery increase the risk of adverse perinatal health outcomes?: an analysis of Pennsylvania birth records from 2011-2015

Minion, Sarah, MS; Mendez, Dara, PhD, MPH; Brooks, Maria, PhD; Krans, Elizabeth, MD, MSc; Haggerty, Catherine, PhD, MPH

Objective: To investigate associations between driving distance from maternal residence to hospital of delivery and adverse perinatal health outcomes.

Methods: This study included all live births ≥20 weeks gestation that could be geocoded and listed a hospital of delivery in Pennsylvania birth records from 2011-2015 (N=666,697 births). Driving distances were calculated using ArcGIS Network Analyst. We examined the following outcomes: small-for-gestational age <10th percentile, Cesarean section delivery, maternal morbidity (the presence of one of the following: maternal transfusion, unplanned operation, ruptured uterus, unplanned hysterectomy, or intensive care admission), infant Neonatal Intensive Care Unit (NICU) admission, preterm birth <37 and <32 weeks. We used multivariate generalized linear models with a log link, Poisson distribution, and robust variance to calculate relative risks and 95% confidence intervals. We included the following covariates in all models: birth year, education, insurance, infant sex, marital status, WIC use, breastfeeding, smoking status, race, body mass index, age, presence of sexually transmitted disease, parity, centroid or address geocoded, prenatal care adequacy, delivery hospital’s NICU level, Urban Influence Codes, and pregnancy risk (the presence of one of the following: pre-pregnancy diabetes, gestational diabetes, pre-pregnancy high blood pressure, gestational hypertension, previous preterm births, previous poor pregnancy outcomes, vaginal bleeding, infertility treatment, or previous c-section). Distances were stratified as: <5km (reference category), 5-<10km, 10-<15km, 15-<30km, 30-<60km, 60-<90km, and ≥90km. We handled the 20.3% of records missing important data using multiple imputation.

Results: Mothers who traveled ≥20km were more likely to be college educated, non-Hispanic white, married, use private insurance, receive adequate prenatal care, and breastfeed. They were less likely to deliver in a Level 3 NICU and live in a metropolitan area. In multivariate models, increasing driving distance increased the risk of all adverse outcomes in a dose-response manner. Starting with >15km distance, each distance category was associated with preterm birth <37 weeks (1.05, 1.19, 1.44, 2.49, 3.31), preterm birth <32 weeks (1.12, 1.63, 2.62, 4.61, 8.14), infant NICU admission (1.10, 1.29, 1.68, 2.81, 4.24), c-section (1.02, 1.01 (NS), 1.05, 1.15, 1.27), and maternal morbidity (1.07, 1.24, 1.36, 2.16, 3.25) compared to <5km. Risks of SGA were significantly higher with a >45km drive (1.05, 1.15, 1.27).

Conclusion: Longer driving distance from maternal residence to the hospital of delivery increases the risk of adverse outcomes in Pennsylvania mothers. Risks were independent of potential confounding factors, suggesting that geographical barriers to maternity care may have a significant impact on birth outcomes; however, unmeasured confounding may explain the associations between increased distance and adverse outcomes. Driving distance may serve as a proxy of inadequate healthcare accessibility for rural mothers in Pennsylvania.
OBJECTIVE: To examine whether the association of dopamine-related genotype and gait speed differs according to frailty status.

DESIGN: Cross-sectional population-based study (Cardiovascular Health Study)

SETTING: Multi-center study, 4 US sites

PARTICIPANTS: Volunteer community-dwelling adults aged 65 and older, free from Parkinson’s Dementia (N=3,744, 71 years, 82% white, 39% male)

MEASUREMENTS: Gait speed (usual pace, m/sec), physical frailty (Fried definition), and genetic polymorphism of Catechol-O-methyltransferase (COMT, rs4680), an enzyme regulating tonic brain dopamine levels, were assessed. Interaction of COMT by frailty and by race predicting gait speed were tested and, if significant, analyses were stratified. Multivariable regression models of COMT predicting gait speed were adjusted for demographics and known locomotor risk factors.

RESULTS: Compared to Val/Val (lower DA signaling) the Met/Met genotype (higher DA signaling) was less likely to have frailty and faster gait speed (adjusted p=0.01 and p=0.02). The interaction of COMT by frailty predicting gait speed was p<0.001. The association of COMT with gait remained significant among those with frailty, but not among those without frailty (adjusted p value: p=0.03 and p=0.53, respectively). The interaction by race was not significant.

CONCLUSION: Dopaminergic signaling appears positively linked with gait speed, with effects stronger for frail older adults. The influence of higher dopamine on higher physical function in vulnerable populations, especially frail older adults, should be further examined.
Accounting for selection biases in an observational study of rehabilitation among children with severe traumatic brain injury

Shiyao Gao\textsuperscript{1}, Anthony Fabio\textsuperscript{1}, Bedda L. Rosario\textsuperscript{1}, M. Kathleen Kelly\textsuperscript{2}, Sue R. Beers\textsuperscript{3}, Stephen R. Wisniewski\textsuperscript{1}

\textsuperscript{1}Department of Epidemiology, University of Pittsburgh
\textsuperscript{2}Department of Physical Therapy, University of Pittsburgh
\textsuperscript{3}Department of Psychiatry, University of Pittsburgh

Abstract

Selective follow-up may introduce bias and limit the generalizability of a study analyzing the determinants of outcomes of children with severe traumatic brain injury (TBI). In a multisite, multinational cohort study of 868 children with severe TBI, who were enrolled from native English-speaking countries, we approached all families of 716 children discharged alive from acute care hospitals, and asked about their interest in returning for outcome assessments at 12-month post-injury. Of the 716 children, 496 (69.3\%) were interested in a follow-up assessment. Only 298 (60.1\%) of these interested children returned for outcome assessments at 12-month post-injury. In these children, we evaluated the associations of receiving any inpatient rehabilitation versus receiving non-inpatient rehabilitation alone with global function measured by the Pediatric Glasgow Outcome Scale – Extended (GOS-E Peds), and explored the potential effect modification for level of consciousness measured by the Glasgow Coma Scale (GCS) score at hospital discharge. We used generalized boosted regression to fit predictive models of attrition (1) due to drop-out among all interested children; and (2) due to refusal among all children discharged alive, and computed inverse probability of selection weights to account for dropout bias and volunteer bias respectively. We fitted ordinal logistic regression with inverse probability of treatment and selection weights to contrast outcomes for inpatient rehabilitation versus non-inpatient rehabilitation alone. The weighted analysis without adjustments for selection biases demonstrated less unfavorable GOS-E Peds in those receiving inpatient rehabilitation (Odds Ratio [OR] =0.12, 95\% CI: 0.02-0.95, p=0.05) among children with a GCS score < 13 at discharge, though no such association was observed in children with a higher GCS score (OR = 1.12, 95\% CI: 0.51-2.47, p=0.77). For children with a GCS score < 13 at discharge, the effect size persisted when weighted for children consenting for outcome assessments (OR [95\% CI]: 0.12 [0.01-1.01], p=0.05) and slightly increased when weighted for all alive children at discharge (OR [95\% CI]: 0.10 [0.01-0.95], p=0.04). For children with a GCS score ≥ 13 at hospital discharge, the OR for higher GOS-E Peds scores comparing inpatient rehabilitation to non-inpatient rehabilitation alone attenuated to 1.08 (95\% CI, 0.49-2.37, p=0.85) when weighted for children consenting for outcome assessments and attenuated to 1.06 (95\% CI, 0.50-2.28, p=0.87) when weighted for all alive children at hospital discharge. In conclusion, analyses that weight for the inverse probability of selection based on the information from a well-characterized population can help to reduce the impacts of selection biases and provide more generalizable estimates.
Title: The Impact of a Yearlong Diabetes Prevention Program-based Lifestyle Intervention on Cardiovascular Health Metrics

Susan Devaraj MS, RD1; Bonny Rockette-Wagner PhD1; Vincent Arena PhD2; Rachel G. Miller PhD1; Jenna Napoleone MPH1; Molly B. Conroy MD, MPH3; Andrea M. Kriska PhD1

1: University of Pittsburgh Graduate School of Public Health, Department of Epidemiology
2: University of Pittsburgh Graduate School of Public Health, Department of Biostatistics
3: University of Utah School of Medicine, Division of General Internal Medicine

Introduction: The AHA created “Life’s Simple Seven” metrics to measure progress toward the goal of improving the cardiovascular (CV) health of all Americans, classifying each metric as “ideal”, “intermediate,” or “poor”. Few studies have examined the impact of behavioral lifestyle interventions on CV health metrics. We evaluated changes in CV health metrics during the course of a CDC recognized Diabetes Prevention Program-based lifestyle intervention known as Group Lifestyle Balance (DPP-GLB).

Hypothesis: DPP-GLB will be associated with improvements in CV health metrics after 6 months of intervention and maintenance of these improvements at 12 months post-baseline.

Methods: We used combined data from two similar intervention trials (occurring 6 years apart) offering a 12 month DPP-GLB program in the community setting to overweight/obese individuals with prediabetes and/or metabolic syndrome. Changes in individual CV health metrics (BMI, blood pressure, total cholesterol, fasting blood glucose, physical activity; measures of smoking and diet were not available) and total metric score (sum of metric profile where ideal=2, intermediate=1 and poor=0 for each metric, possible “total range of 0-10) were considered after 6 and 12 months of intervention.

Results: Among 305 participants (82%) with complete data for all 5 metrics at intervention baseline, 6 and 12 month follow up, there was a significant beneficial shift from baseline to 6 and 12 months in the proportion of participants within CV health metric categories for BMI, physical activity and blood pressure (Figure 1). Total metric score also improved significantly (p<0.01, signed-rank test) at 6 [median (IQR) change: +1.0 (0-1.0)] and 12 months [median (IQR) change: 0.0 (0-1.0)]. Significant improvement was also seen in the median number of ideal metrics at 6 and 12 months (p<0.01 for both).

Conclusions: The DPP-GLB intervention was successful in improving CV health metrics at both 6 and 12 months, demonstrating the potential of this program to decrease CVD risk.
**Figure 1: Individual Metric Category Percentages at Baseline, 6 and 12 months in Combined GLB Cohort Pre/Post Analysis Sample, n=305**

*p*-value <0.05 using Marginal Homogeneity Test for shift in ordered proportion of participants within metric category compared to baseline.
Successful Attainment of the Primary Goals of a Diabetes Prevention Program Based Behavioral Lifestyle Intervention by Socioeconomic Factors and Race/Ethnicity

Susan Devaraj MS, RD¹; Jenna Napoleone MPH¹; Bonny Rockette-Wagner PhD¹; Rachel G. Miller PhD¹; Vincent Arena PhD²; Andrea M. Kriska PhD¹

University of Pittsburgh Graduate School of Public Health, 1: Department of Epidemiology, 2: Department of Biostatistics

Introduction: The Diabetes Prevention Program (DPP) was a landmark study demonstrating that a behavioral lifestyle intervention promoting weight loss and adequate physical activity reduces incidence of type 2 diabetes in at-risk adults across racial/ethnic groups. Successful DPP translation efforts such as the DPP-Group Lifestyle Balance (DPP-GLB) have led to Centers for Disease Control recognition and Centers for Medicare and Medicaid Services reimbursement for participation in these programs. Evaluating success in these increasingly accessible DPP-translation efforts by race/ethnicity and socioeconomic status is essential given the greater diabetes risk noted among marginalized groups. Two community-based CDC recognized DPP-GLB efforts offered in diverse neighborhoods provide the opportunity to explore participant success in achieving the primary goals of this program, weight loss and adequate physical activity, across socioeconomic factors and by race/ethnicity.

Methods: Data were combined from two similar intervention trials (occurring 6 years apart) offering a 12 month DPP-GLB program in the community setting to overweight/obese individuals with prediabetes and/or metabolic syndrome. Community partners were engaged and the intervention was offered in a variety of neighborhoods to capture the diversity of the greater Pittsburgh area. Continuous change in weight as well as achieving a 5% weight loss goal (yes/no) and achieving 150 minutes or more of moderate or greater intensity physical activity (yes/no) were determined after 6 and 12 months of intervention and compared across race/ethnicity, employment, and education categories using Wilcoxon Signed Rank and Two Sample tests, Chi-Square and Fishers Exact tests. There were too few non-white males to look at race/ethnicity by sex.

Results: 240 participants (85%) had weight and physical activity data available at assessment visits after 6 and 12 months of intervention, with baseline demographic characteristics shown in Table 1. While both white and non-white participants demonstrated significant weight loss at 6 months, white participants lost significantly more weight (5.0% weight loss white vs 1.8% weight loss non-white, p=0.01). There were significant differences in reaching the 5% weight loss goal (yes/no) by race/ethnicity at 6 and 12 months [57% white vs 33% non-white (p=0.03) and 49% white vs 25% non-white (p=0.03) demonstrating success, respectively] and by employment status at 12 months (with 60% of retired, 80% of homemaker, and all other categories between 30-40% demonstrating success, p<0.01). There was a difference by education (50% high school or less, 53% some college, 60% college grad and 77% grad degree demonstrating success; p=0.03) in physical activity meeting goal (yes/no) at baseline. There were no differences in the proportion of participants who met the physical activity goal at 6 months, although a significant difference by education emerged again at 12 months, with a greater proportion of the highest level of education demonstrating success.

Conclusion: The DPP-GLB behavioral lifestyle intervention was successful across education and employment categories and may have helped to alleviate disparities in physical activity achievement after 6 months of intervention; however differences in weight loss success by race/ethnicity were noted and
may emerge by education or employment after 12 months of intervention. These findings indicate that racial/ethnic minorities and individuals who are not retired and those with less education may require additional attention and consideration in achieving and maintaining changes made during lifestyle intervention programs.

Table 1: Baseline Demographic Data (n=240)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>N (%) or mean (SD)</th>
</tr>
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<tbody>
<tr>
<td>Female</td>
<td>178 (74.2)</td>
</tr>
<tr>
<td>Age (years)</td>
<td>62.5 (10.2)</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>216 (90.0)</td>
</tr>
<tr>
<td>Non-white</td>
<td>17 (10.0)</td>
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<tr>
<td>Employment</td>
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<tr>
<td>Working full-time</td>
<td>91 (37.9)</td>
</tr>
<tr>
<td>Working part-time</td>
<td>30 (12.5)</td>
</tr>
<tr>
<td>Unemployed</td>
<td>6 (2.5)</td>
</tr>
<tr>
<td>Homemaker</td>
<td>5 (2.1)</td>
</tr>
<tr>
<td>Retired</td>
<td>102 (42.5)</td>
</tr>
<tr>
<td>Disabled/unable to work</td>
<td>6 (2.5)</td>
</tr>
<tr>
<td>Education</td>
<td></td>
</tr>
<tr>
<td>High school graduate or less</td>
<td>30 (12.5)</td>
</tr>
<tr>
<td>Some college</td>
<td>78 (32.5)</td>
</tr>
<tr>
<td>College graduate</td>
<td>68 (28.3)</td>
</tr>
<tr>
<td>Graduate degree</td>
<td>64 (26.7)</td>
</tr>
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</table>
Role of Coping Styles and Negative Life Events on Higher Perceived Mental Fatigability in Older Adults

Theresa Gmelin, MSW MPH; Stacy Andersen, PHD; Robert Boudreau, PHD; Kaare Christensen, PHD; Stephanie Cosentino, PHD; Mary Wojczynski, PHD; Nancy W. Glynn, PhD (Final order TBD)

Older adults are vulnerable to stress of negative recent life events (RLE) which deplete attentional resources and lead to feelings of cognitive exhaustion. Adaptive coping styles reduce perceived stress severity but their role on cognitive tiredness is unknown. We examined RLE and coping styles on perceived mental fatigability (Pittsburgh Fatigability Scale (PFS), 0-50pts, higher=greater fatigability) in the Long Life Family Study (N=1464, age=74.7±12.6, female=57.7%, 43.9%≥1 major RLE past 6 months, 27.8% higher mental fatigability≥13). PFS mental scores correlated with all NEO-FFI (60-item, 5-domain) personality traits representing maladaptive (neuroticism, r=0.25,p<.0001) and adaptive (eg. conscientiousness, extraversion: r=-0.18,p<.00001, r=-0.24,p<.00001, respectively) coping. Having ≥1RLE was associated with higher mental fatigability (OR=1.4, 95% CI:1.2,1.8, p=.0004); adjustment for neuroticism (OR=1.3, 95% CI:0.9,1.7 p=.06) attenuated the association. All analyses adjusted for family structure, field center, age, and sex. Providing education on adaptive coping may be a modifiable skill that allows older adults to maintain lower perceived mental fatigability despite stressful events.
Yan Yi, Department of Epidemiology

Women with type 1 diabetes (T1D) experience a shorter reproductive period compared with non-diabetic women: the Pittsburgh Epidemiology of Diabetes Complications (EDC) study and the Study of Women’s Health Across the Nation (SWAN)

Evidence suggests that insulin deficiency and hyperglycemia may disrupt the normal function of the female reproductive system, leading to delayed menarche and premature ovarian aging. We compared the length of the reproductive period of women with T1D and women without diabetes. We assessed age at menarche and natural menopause in women with childhood-onset T1D (diagnosed in 1950-80) who participated in the Pittsburgh EDC study's 2010-16 follow-up (where reproductive history was assessed) and non-diabetic participants from the Pittsburgh site of the SWAN study. Women who had not yet reached natural menopause, had a hysterectomy/oophorectomy before menopause, or received sex hormone therapy during the menopausal transition were excluded from analyses. In EDC, covariate data were selected from the follow-up visit where chronological age was closest to the baseline age in SWAN. Reproductive history was self-reported. The Women's Ischemia Syndrome Evaluation historical and hormonal algorithms were also used to assess menopause status. Women with T1D (n=105) were younger (42.8 vs. 46.0 yrs, p=.0003), more likely to be white (96.2% vs. 68.3%, p<.0001), never smokers (67.3% vs. 48.1%, p=.002), with lower BMI (25.2 vs. 26.5 kg/m2, p=.002) and higher HDL-C (61.0 vs. 53.0 mg/dl, p<.0001) compared with women without diabetes (n=341). Women with T1D were also older at menarche (13.3 vs. 12.6 yrs, p<.0001) but younger at natural menopause (50.1 vs. 51.9 yrs, p<.0001). Adjusting for age, race, smoking status, BMI, HDL, and number of pregnancies, T1D was associated with 3.3 (95% CI: 2.5-4.0) fewer reproductive years. The length of the reproductive period of women with T1D is shorter, having delayed menarche and earlier natural menopause, compared with women without diabetes. Factors that could be related to a shorter reproductive period in T1D should be investigated.

Total Character Count: 1800

Acknowledgments:

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The Study of Women’s Health Across the Nation (SWAN) has grant support from the national institutes of health (NIH), DHHS, through the national institute on aging (NIA), the national institute of nursing research (NINR) and the NIH office of research on women’s health (ORWH) (grants U01NR004061; U01AG012505, U01AG012535, U01AG012531, U01AG012539, U01AG012546, U01AG012553, U01AG012554, U01AG012495). The content of this abstract is solely the responsibility of the authors and does not necessarily represent the official views of the NIA, NINR, ORWH or the NIH.
Title: Added Sugar Intake as Measured by Ecological Momentary Assessment Versus 24-Hour Dietary Recall During Pregnancy

Authors: Yu-Hsuan Lai, MSPH, Meredith L. Wallace, PhD, Stephen L. Rathbun, PhD, MSc, Tiffany L. Gary-Webb, PhD, MHS, Esa M. Davis, MD, MPH, Lora E. Burke, PhD, MPH, Dara D. Mendez, PhD, MPH

Background: There is limited literature examining diet using ecological momentary assessment (EMA) compared to other assessment methods, such as diet diaries. We compared the use of EMA and 24-hour dietary recalls (24h recalls) in assessing the consumption of added sugar intake during pregnancy.

Methods: Data were obtained from an ongoing longitudinal study designed to examine factors associated with racial disparities in postpartum weight retention and cardiometabolic health. Participants completed two 24h recalls (one self-administered and one interviewer-administered) that were one to four weeks apart during the second to third trimester of pregnancy. Results from the two recalls were converted into Healthy Eating Index (HEI) scores. For every 28 days, EMA surveys assessing the intake of sugar foods and sugar drinks were prompted at the end of the day on 10 weekdays and 4 weekend days. We examined EMA responses between the first 24h recall and four weeks after the second recall. This analysis included descriptive statistics, correlations, and unadjusted linear models describing the relationship between the HEI scores and EMA data measuring sugar foods and sugar drinks.

Results: The 227 participants contributed 1,723 EMA observations. Participants were on average 29.9 years of age, 62.1% White, 58.2% college-educated or higher, and 55.5% employed full time. The mean number of sugar foods consumed per day was weakly correlated with HEI added sugar score (ρ=-0.21) and not correlated with the HEI total score. The mean number of sugar drinks consumed per day was moderately correlated with both the HEI added sugar and HEI total scores (ρ=-0.33). In unadjusted models, mean daily sugar food intake was negatively associated with the HEI added sugar score (β=-0.407, p=0.04), but not associated with HEI total score (β=0.736, p=0.44). Mean daily sugar drink intake was negatively associated with both the HEI added sugar (β=-0.98, p<0.0001) and HEI total scores (β=-4.724, p<0.0001).

Conclusion: EMA measures of added sugar intake captured key elements measured in 24h recalls. These findings contribute to current gaps in knowledge regarding assessment of added sugar intake in pregnant populations.
Physical Activity Attenuates Age Differences in Change in Perceived Physical Fatigability: The Long Life Family Study

Authors: Yujia (Susanna) Qiao; Theresa Gmelin; Robert M. Boudreau; Stacy L. Andersen; Stephanie Cosentino; Kaare Christensen; Mary K. Wojczynski; Nancy W. Glyn

Abstract
Lower physical activity is cross-sectionally associated with greater fatigability; whether such a relationship holds for longitudinal changes in fatigability is under-studied. We examined this question in offspring (≥60 years, range 60-93y, 99.7% white; 53.2% female) enrolled in the Long Life Family Study, a two-generation cohort enriched for exceptional longevity and their spousal controls. At Visit 2 (2014-2017), we measured self-reported physical activity (PA) with the Framingham Physical Activity Index (dichotomized by median value: less active <37 MET-hrs/wk and more active ≥37 MET-hrs/wk). Perceived physical fatigability was assessed using the Pittsburgh Fatigability Scale (PFS, 0-50) at Visit 2 and repeated during a follow-up contact 2.7±0.92 years later. We constructed a repeated-measures linear mixed-effect model to examine the effect of PA on longitudinal change in PFS by median age (younger <70y; older ≥70y) adjusted for family structure, field center, follow-up time, sex, and self-rated health. We found a strong dose-response relationship of PFS scores across the four age/PA groups (p<0.001). Specifically, older/less active (N=310) participants had the highest annual PFS increases of 0.37 points/yr (p<0.001) while those older/more active (N=340) had annual increases of 0.17 points/yr (p=0.03). Younger/less active (N=371) participants had annual PFS increases of 0.09 points/yr (p=0.008); those younger/more active (N=341) had annual decreases (improvement) of 0.18 points/yr (p<0.001). Although annual PFS changes were modest, our findings indicate physical activity attenuated age differences in these trajectories. Physical activity is emerging as a potential target for intervention aimed at reducing fatigability - an important risk factor in the disability pathway.