

and application of the methodology presented in this symposium will highlight the importance of using longitudinal data to improve understanding of physical and cognitive trajectories with aging.

SYSTEMS-LEVEL MODELING OF BIOLOGICAL AND MOLECULAR AGING CHANGES OVER TIME

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Aging is associated with numerous changes at all levels of biological organization. Harnessing this information to develop measures that accurately and reliably quantify the biological aging process will require longitudinal modeling and incorporation of systems level approaches. We will describe applications of network modeling for longitudinal multi-system biomarker data. Using data from the Baltimore Longitudinal Study of Aging (BLSA) we are able to generate systems level models of biological and physiological function, and then demonstrate how these networks change with age. We will also link systems-level aging changes to hallmarks of aging, including epigenetic alterations, senescence, mitochondrial dysfunction, and proteostasis. Given the complexity of the biological aging process, modeling of systems dynamics over time will both lead to the development of better biomarkers of aging, and also inform our conceptualization of how alterations at the molecular level propagate up levels of organization to eventually influence morbidity and mortality risk.

TRAJECTORIES OF PHENOTYPIC MARKERS OF AGING AS PRECURSORS TO FUNCTIONAL CHANGE

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Delineating trajectories of aging phenotypes is essential to understanding mechanisms of clinical disease and disability. We investigated longitudinal changes in measures of body composition, energy expenditure, and brain volumes in >900 participants (age 67.0 (IQR: 57-77) years, 48.1% male) of the Baltimore Longitudinal Study of Aging using mixed effects regression models. Computed tomography-derived thigh muscle cross-sectional area declined 754.2 cm² per decade at age 60 years ($p < 0.001$) and 1294.3 cm² at 75 years ($p < 0.001$). Energy reserves, defined as a ratio of energy-cost-to-energy-capacity measured using indirect calorimetry, decreased 11.2% per decade at 60 years ($p < 0.001$), and 16.8% at 75 years ($p < 0.001$). MRI-derived measures of total brain volumes declined 41.6 cm³ per decade at 60 years ($p < 0.001$) and 44.9 cm³ at 75 years ($p < 0.001$). Linking these findings to biological and clinical measures of aging may contribute to more accurate assessment of phenotypic age.

LONGITUDINAL CHANGE OF PHYSICAL AND COGNITIVE FUNCTIONS IN BLSA

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Optimally integrating metrics of aging requires evaluating the metrics' change with aging. We investigated longitudinal changes of physical and cognitive functions in the Baltimore Longitudinal Study of Aging. Usual gait speed declined -0.08 m/s ($p < 0.001$) per decade at age 60 years, -0.10 m/s ($p < 0.001$) per decade at 65 years, and -0.13 m/s ($p < 0.001$) per decade at 70 years, after adjusting for sex and height. No sex difference of gait speed decline was observed after adjustment for height. Time to finish Trails B, an indicator of executive function, increased 11.3 seconds per decade at 60 years, 17.7 seconds ($p < 0.001$) per decade at 65 years, and 24.1 seconds ($p < 0.001$) per decade at 70 years, after adjusting for sex, education, and race. No sex difference of longitudinal decline in executive function was observed. Linking these findings to physiological measures may unveil an important mechanism of aging.

ANALYTICAL CONSIDERATIONS OF DEVELOPING A PHENOTYPIC AGING MEASURE: THE CONCEPTUAL FRAMEWORK MUST COME FIRST!

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We propose a latent structural model framework where phenotypic aging is a latent variable influenced by chronological age, genes and environment. Within this framework, phenotypic age influences aging-related outcomes and is reflected by latent domains of aging (body composition, energetics, homeostasis, and neural functioning) reflected by biomarkers. First, we validate the framework by selecting age-associated domain-specific biomarkers and assessing internal consistency and convergent construct validity (Cronbach's alpha). Using data from the Baltimore Longitudinal Study of Aging, within-domain Cronbach's alphas ranged from 0.80 to 0.92, supporting convergent construct validity. Second, we evaluate two broad methods for combining biomarkers into one phenotypic age measure customized to different objectives: 1) confirmatory factor analysis of chronological

age-adjusted biomarkers to create a measure to identify pleiotropic genetic and environmental mechanisms, and 2) machine-learning methods to create a measure optimizing predictive and concurrent criterion validity. This framework will enable evaluation of candidate biological mechanisms of aging.

SESSION 3045 (SYMPOSIUM)

FINANCIAL LITERACY, RETIREMENT, AND BECOMING FINANCIALLY CAPABLE IN A DEVELOPING COUNTRY

Chair: Julian G. McKoy Davis, *Mona Ageing & Wellness Centre, Kingston, Jamaica*

Discussant: Denise Eldemire-Shearer, *Mona Ageing & Wellness Centre, Kingston, Jamaica*

Worldwide, 3.5 billion (67%) of older adults do not understand basic financial concepts. In the Caribbean, families and professionals alike are struggling to assist and financially support a rapidly ageing population. The concept of children as “pension guarantee” is widely practised throughout the Caribbean, but factors such as modernization, urbanization, migration, and a shift in societal norms pertaining to familial responsibilities, have left many older persons financially fending for themselves. Less than half of all Jamaicans have adequate retirement funds. People with limited financial resources can and do save, but often use strategies that are not advantageous. The stark reality of low pension coverage among older Jamaicans and austere working conditions among public and some private sector workers indicate growing economic, financial, and societal challenges. Jamaica’s rapidly growing ageing population has resulted in both a workforce and a retirement financial crisis. This symposium provides an overview of the current policy and economic issues. We describe the design, implementation, and evaluation of an economic program to increase financial literacy and planning of adults nearing retirement age. To increase financial retirement literacy of Jamaicans with limited educational and financial resources, a peer-to-peer program was developed using a culturally adapted version of the FDIC Money Smart Program. A peer-to-peer approach has the potential to strengthen financial literacy and enhance retirement planning behaviours of underserved adults and avoid further burdening an already limited workforce. This project’s findings can inform policy, shape program development, and guide implementation of similar programs in low resource countries.

POLICY AND ECONOMIC INFLUENCES ON RETIREMENT, FINANCIAL LITERACY, AND ECONOMIC SECURITY IN JAMAICA

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The changing pension landscape, as well as the accompanying privatization, marketization and individualization of the pension planning process, has resulted in inadequate and risky investment practices. Jamaica, like many other countries in the international community, has

been engaged in pension reform. The main issues in the current dispensation of pension reform are in relation to pension adequacy to mitigate against longevity risk, low levels of pension coverage; with the aforementioned leading to the need to increase the number of persons contributing to the pension pool as well as possibly an increase in the value of pension contributions to account for inflation and investment risks. This paper describes the current legal and regulatory framework on pension reform in Jamaica within the context of population ageing and the National Financial Inclusion Strategy that targets persons who were previously underserved by the domestic financial system. Policy and programmatic recommendations are will be provided.

RETIREMENT FINANCIAL LITERACY LEVELS AMONG JAMAICANS

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Although the general literacy rate (ability to read and write at a 6th-grade level or higher) of Jamaicans is 89%, the number of people who are adequately prepared financially is not comparable. Dissertation research findings revealed that 52% (n=203) of respondents had not received any financial education. Approximately 71% of respondents who reported high levels of financial distress and low financial well-being, had not received financial information about retirement planning. Results from the 2012 Social Status on the Elderly in Jamaica showed that 60.5% (n=1,716) of respondents had no pension and of those receiving money from abroad, most (75.0%, n=813) indicated that they received it only occasionally. Those who were self-employed, women and rural residents were most likely not to have a pension. This paper describes financial literacy levels among Jamaicans using two separate data sets – the 2012 Social Status on the Elderly and the 2018 Financial Preparation Study.

APPLYING THE DIME APPROACH TO A FINANCIAL LITERACY PROGRAM

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Financial literacy is defined as “the ability to use knowledge and skills to manage financial resources effectively for a lifetime of financial well-being.” The Money Smart Peer-to-Peer Program (MSP) was developed by the FDIC for use with diverse populations. MSP was culturally adapted for use in Jamaica using the Johns Hopkins DIME process. Peer counselling programs consistently demonstrate that they are acceptable and effective with adults who have limited education and low-income by overcoming barriers that are typically encountered when people attempt to access unfamiliar services or guidance from a professional. Research conducted with the MSP program reveals that program participants were more likely to open and save using deposit accounts, use and adhere to a budget, and have increased confidence in their financial abilities 6 to 12 months after completing the course. Implementation of MSP increases the likelihood that people can retire with dignity and financial security.