

AN ADAPTIVE EQUILIBRIUM REGULATION MODEL OF RESILIENCE

Steve Boker,¹ Steve Boker,¹ and Cindy Bergeman, ¹.
University of Virginia, Charlottesville, Virginia, United States, 2. University of Notre Dame, Notre Dame, Indiana, United States

Adaptive equilibrium regulation (AER) models distinguish between the effects of acute versus chronic stressors as a system responds to changes in the environment. Acute stressors have a short time interval during which the stressor is present. Chronic stressors have an onset and may also have an offset, but the stress persists over a period of weeks, months or years. Resilience to an acute stressors may involve rapid self-regulation back to equilibrium without affecting the regulation process itself. Resilience to a chronic stressor may require the system to readapt itself so that regulation of the chronic stressor becomes more effective over time. We present a differential equation model that allows for adaptation of regulation in response to chronic stress and illustrate its use in intensive longitudinal burst data from the Notre Dame Study of Health and Wellbeing.

QUANTIFYING SENSITIVE DEPENDENCE OF INITIAL CONDITION USING STRUCTURAL EQUATION MODELING

Robert Moulder¹ and Steve Boker¹, ¹. *University of Virginia, Charlottesville, Virginia, United States*

Human systems display sensitive dependence of initial condition. That is, even though two individuals may be similar in most regards, small differences between these individuals may have far reaching consequences later in life. In dynamical systems analysis, this sort of behavior is quantified with maximum Lyapunov exponents. These exponents quantify the degree to which small differences in initial condition between two systems affect trajectories of these systems later in time. Current methods for estimating maximum Lyapunov exponents are sensitive to noise and this sensitivity leads to estimation errors when researchers attempt to estimate these exponents on data obtained from human participants. Additionally, most current methods only allow for maximum Lyapunov exponent estimation using univariate time series. In this presentation, we present a method for using structural equation modeling for estimating latent maximum Lyapunov exponents from noisy multivariate time series and discuss applications of this method for analyzing human generated data.

SEQUENCE MINING FOR COMPLEX PATTERN FINDING

Tim Brick¹, ¹. *Pennsylvania State University, University Park, Pennsylvania, United States*

The processes of aging play out across multiple variables and multiple timescales, with patterns of daily, and weekly behavior that may be influenced by each other and by changes across the aging process. Further, many of these patterns do not fit neatly into the linear modeling approaches common in the field. Sequence mining, an approach from the data mining literature, provides a means of identifying commonalities and differences in these sequences in ways that can begin to handle the multivariate and multi-timescale nature of behaviors in aging. In this talk, I present an example of

sequence mining to illustrate its ability to find arbitrarily complex patterns of behavior that characterize and distinguish groups and individuals.

SESSION 2010 (PAPER)

COGNITIVE FUNCTIONING AND IMPAIRMENT

ASSOCIATION BETWEEN FAMILY TYPOLOGY AND COGNITIVE FUNCTION AMONG OLDER ADULTS IN THE US? FINDINGS FROM THE PINE STUDY

Mengting Li,¹ Man Guo,² Meredith Stensland,³ and XinQi Dong⁴, ¹. *Rutgers, The State University of New Jersey, New Brunswick, New Jersey, United States, 2. University of Iowa, Iowa, United States, 3. The University of Texas at Austin, Austin, Texas, United States, 4. Rutgers Institute for Health, Health Care Policy and Aging Research, New Brunswick, United States*

A broad literature has explored racial and ethnic disadvantages in cognitive aging. Migration and acculturation created additional challenges on cognitive aging of minority older immigrants. Asian Americans are the fastest growing minority group in the United States. Chinese Americans constitute the largest segment of Asian Americans. Family is a core social value in Chinese culture. Less is known regarding the impact of family relationship on cognitive function for US Chinese older immigrants. Data were derived from the Population Study of Chinese Elderly (PINE), a community-engaged, population-based epidemiological study of 3,157 US Chinese older adults aged 60 and above in the greater Chicago area from 2011-2013. A typology approach is a useful tool to operationalize multifaceted family relationships. Our prior study used Latent Class Analysis to cluster family typologies, evaluating structural, associational, affectual, functional and normative aspects of family relationship. Cognitive function was evaluated by global cognition, episodic memory, executive function, working memory, and Chinese Mini-Mental State Examination (C-MMSE). Linear regression and quantile regression were used. The findings showed detached and commanding conflicted typologies were associated with lower global cognitive function compared with unobligated ambivalent typology. Wish respect to cognitive domains, detached, commanding conflicted, and tight-knit typologies were associated with lower episodic memory, working memory, and C-MMSE than unobligated ambivalent typology, respectively. Commanding conflicted typology, featured by high intergenerational conflicts, was associated with lowest cognitive function among all typologies. Health care professionals and social service providers should focus on older adults with commanding conflicted typology and prevent them from cognitive impairment.

CAN HEARING AIDS DELAY THE ONSET OF ALZHEIMER'S AND OTHER AGE-RELATED CONDITIONS AMONG ADULTS WITH HEARING LOSS?

Elham Mahmoudi,¹ Tanimu Basu,² Kenneth Langa,² Michael McKee,² Phillip Zazove,² and Neil Kamdar², ¹.

University of Michigan, Department of Family Medicine, Ann Arbor, Michigan, United States, 2. University of Michigan, Ann Arbor, Michigan, United States

In this study, we examined the association between hearing aids (HAs) and the onset of Alzheimer's disease or dementia; depression or anxiety; drug or alcohol disorders; and falls among adults aged 50 and older with hearing loss (HL). We performed a retrospective study of 176,716 adults (50+) with HL diagnoses using a national, insurance claims data (2008-2016). We used Kaplan Meier curves to examine disease-free survival and Cox regression models to examine the risk-adjusted association between HAs and time to diagnosis of 4 age-related/HL-associated conditions within 3 years of HL diagnosis. Large gender and racial/ethnic differences exist in HAs use. Approximately 11.3% of women vs. 14.5% of men used HAs (95% CI Difference: -0.04, -0.03). About 14.1% of Whites (95% CI: 0.14, 0.14) vs. 9.5% of Blacks (95% CI: 0.09, 0.10) and 7.8% of Hispanics (95% CI: 0.07, 0.08) used HAs. The risk-adjusted hazard ratios of being diagnosed with Alzheimer's disease or dementia, depression or anxiety, drug/alcohol disorders, and injurious falls within 3 years after HL diagnosis, for those who used HA vs. those who did not, were lower by 0.82 (95% CI: 0.76-0.88), 0.92 (95% CI: 0.89-0.95), 0.91 (95% CI: 0.80-1.04), and 0.86 (95% CI: 0.81-0.92), respectively. Use of HAs is associated with delayed onset of Alzheimer's, dementia, depression, anxiety, and injurious falls among adults 50 years of age and older with HL. This is important because HL are increasingly common among older adults and early HL diagnosis and use of HAs may prevent or delay physical and mental decline.

INTRODUCING ARTIFICIAL COMPANIONS TO USERS WITH DEMENTIA IN UNREGULATED MARKETS: OPPORTUNITIES VS. ETHICAL ISSUES

Elena Portacolone,¹ Jodi Halpern,² Jay Luxenberg,³ Krista Harrison,⁴ and Kenneth Covinsky¹, 1. *University of California San Francisco, San Francisco, California, United States, 2. University of California Berkeley, Berkeley, California, United States, 3. On Lok, San Francisco, California, United States, 4. UCSF, San Francisco, California, United States*

Because of the high costs of providing long-term care, artificial companions are increasingly considered an opportunity to provide support to older adults with cognitive impairment while saving costs. Artificial companion can comfort and inform, thus inducing a sense of being in a relationship. Sensors and algorithms usually allow these applications to exude a life-like feel. The explosion of these technologies has created a "cultural lag" between their rapid commercial introduction and the slower evolution of regulations. An outcome of this cultural lag is a tension between the potential of artificial companions to support users and a series of unresolved ethical issues related to the fact that users might lack the capacity to fully understand the implications of using these technologies. Specific challenges of deception, surveillance, consent and social isolation are raised by the introduction of these technologies in users with cognitive impairment. The case study of a sophisticated artificial companion commercially available in the United States lends the opportunity to examine the tension between the potential of this technologies vs. unresolved ethical issues. This companion is an

avatar on an electronic tablet that is displayed as a dog or a cat. Whereas artificial intelligence guides most artificial companions, this application is a hybrid of robots and human beings because it also relies on technicians "behind" the on-screen avatar, who via surveillance, interact with users. We conclude with a call to develop regulations promoting artificial companions as "human-driven technologies," i.e. technologies focused on truly empowering users according to their cognitive abilities.

LONELINESS, MARITAL STATUS, AND COGNITIVE IMPAIRMENT AMONG OLDER AMERICANS

Jack Lam,¹ Anthony R. Bardo,² and Takashi Yamashita³, 1. *University of Queensland, Brisbane, Queensland, Australia, 2. University of Kentucky, Lexington, Kentucky, United States, 3. University of Maryland, Baltimore County, Baltimore, Maryland, United States*

Loneliness has been linked to increased risk of mortality and morbidity, and emergent research has identified a negative association between loneliness and cognitive functioning. While the determinants of loneliness are wide in scope, loneliness is closely tied to marital status in later life. At the same time, research has shown that those who are married have lower risk of cognitive impairment. The aim of this study was to determine the association between loneliness and cognitive impairment, and examine whether it is moderated by marital status. Data come from 9 waves of the RAND version of the HRS (1998 - 2014). Consistent with previous research, results from random effects logit models showed that loneliness is associated with greater risk of cognitive impairment [Odds-ratio (OR) = 1.41, $p < 0.01$]. Additionally, those who are widowed (OR = 1.29, $p < 0.01$), separated/divorced (OR = 1.33, $p < 0.01$), or never married (OR = 1.70, $p < 0.01$) are also more likely to have a cognitive impairment, compared to those who are married. However, the association between loneliness and cognitive function was found to only differ among those who are widowed. Contrary to expectations, widows who report feeling lonely are 29% ($p < 0.01$) less likely to have a cognitive impairment. In sum, while loneliness and marital status are closely linked with one another, they are both independent determinants of cognitive impairment. The distinct theoretical mechanisms linking loneliness and marital status to cognitive function in later life are discussed.

PHYSICAL ACTIVITY MEDIATES THE EFFECTS OF DEPRESSIVE SYMPTOMS ON THE COGNITIVE FUNCTION OF OLDER ADULTS

Yit Mui Khoo,¹ and Hisako Matsuo¹, 1. *Saint Louis University, St. Louis, Missouri, United States*

Evidence suggests that depressive symptoms among older adults were associated with cognitive impairment and affect cognitive decline over time, while physical activity was associated with lower risk of cognitive decline or have positive effect on cognitive function. The purpose of this study is to examine whether physical activity could mediate the effects of depressive symptoms on the cognitive function of older adults. Data from the 2014 Health and Retirement Survey (HRS) of older adults ≥ 60 years ($N=9,753$) were used. Hierarchical regression was conducted to examine the relationship between depressive symptoms, physical activity, and