Section 2

Old Diseases and New Plagues: Human Physiology Has Not Changed

Jacqueline L. Angel

Jacqueline L. Angel
LBJ School of Public Affairs and Department of Sociology, The University of Texas at Austin, Austin, Texas, USA
E-mail: jangel@austin.utexas.edu

Although malnutrition, disease, and political upheaval continue to plague humanity, since the nineteenth century improvements in living standards and better medical care have resulted in increased global life expectancy (McNeill, 2010). Significant differences between developed and developing nations remain, even though the poorest nations have seen improvements (World Health Organization, 2017). Diseases, such as dementia, depression, and diabetes have always existed. They are part of the human condition. But what has changed is the fact that life spans have increased dramatically, and more people live long enough today to manifest those conditions for longer periods (Beard et al., 2016). High-sodium and high-fat diets, stressful living conditions typical of urban environments, loneliness, and sleep disorders accompany longer life spans (Rogers and Crimmins, 2011). The health consequences of increases in life expectancy raise serious questions for both developed and developing nations as exemplified by example in Mexico and the United States.

As discussed in the preface, in the United States, the focus on cognitive aging and other chronic diseases is motivated by the fact that the Mexican-American population has, on average, extremely low levels of education, health insurance, income, and wealth, and it suffers from high rates of diabetes, hypertension, obesity, and disability (Angel and Angel, 2015). Yet compared to African-Americans and even non-Hispanic whites, its mortality experience is remarkably favorable (Markides and Eschbach, 2005). Mexico has undergone a significant demographic transition that has resulted in dramatically increased life spans. Unfortunately, this transition has been accompanied by a diabetes epidemic, obesity, heart conditions, and other seriously disabling chronic conditions if gone untreated (Angel et al., 2008; Canedo and Angel, 2019).

The chapters in this section of the volume take a transdisciplinary view of these issues, examining various risk factors for cognitive aging. Cognitive decline is not due to chronological aging per se, but rather reflects multiple causal factors from a broad range of biological and physical health domains that operate along the age continuum (MacDonald et al., 2011). Several lines of evidence suggest that pathologic changes underlying dementia and related disorders begin years prior to the clinical expression of the disease. A complex set of social and biological factors

may be precursors to the progression of the disease (from cognitively healthy aging to serious cognitive impairment). Greater knowledge of early signs and symptoms that may predict changes in cognitive function in the Mexican-origin population is needed, especially given the earlier onset of the disease (Fitten et al., 2014). For these reasons, the authors address the social, biological, and economic implications of increasing life spans, focusing specifically on aspects of cognitive and mental health among Mexican-origin older adults in Mexico and the United States. In addition to reviewing the literature, the papers propose crucial areas of research that require immediate attention to serve the growing aging population in the Americas and around the world. Two of the papers focus on people with dementia in both nations.

Social determinants of cognitive aging

Social determinants of health have been shown to play an important role in explaining variations in the estimates of dementia among the Hispanic diaspora in the United States and in Mexico where health inequalities are highly prevalent. Alzheimer's dementia is a neurodegenerative disorder characterized by progressive cognitive decline and dementia that is affected by a constellation of biopsychosocial factors. The field of cognitive aging, broadly construed, is at a crossroads because few studies contextualize the heterogeneity that exists within these populations. Understanding how social determinants influence patterns of risk for cognitive decline and dementia and related conditions is a fundamental start point for risk mitigation. Social determinants affecting Mexican-origin populations in both nations are numerous, and include gender, lack of education, little income and few material assets, limited use of health services, rural locale, migration processes (including late-life migration), and physically-dangerous indoor environments (Custodio et al., 2017).

The key biological determinants that can adversely affect cognitive function and dementia and related behavioral disorders include pathological counts of amyloid beta plaques and neurofibrillary tangles, positive ApoE4 status (Price, 1994; Safieh et al., 2019), whole-brain atrophy, i.e., loss of brain cells (Sluimer et al., 2008), and dopamine receptor binding (Martorana and Koch, 2014).

Combined, these are examples of social determinants and biomarkers that increase risk of cognitive functioning and dementia, representing a global challenge for research and intervention development (Downer et al., 2020; Livingston et al., 2020).

As García and colleagues point out, researchers have become increasingly interested in cognitive impairment in Mexico due to the rapid aging of the population. Understanding the risk factors for cognitive impairment is of importance as cognitive impairment may impact one's quality of life, ability to live independently, and may place considerable demands on family members, caregivers, and local governments. A new wave of studies is investigating rural-urban differences in the prevalence of cognitive impairment among older adults in the Americas, partly because older Mexicans living in rural areas have fewer educational opportunities, lower educational attainment, and lack community resources compared to urban residents. The chapter demonstrates a rural disadvantage in cognitive life expectancy in the Mexican Health and Aging Study, with rural residents spending more years after age 50 with dementia. Like other studies, they conclude that improved educational opportunities are critical for enhancing cognitive performance.

The Acosta chapter extends this work by focusing on potentially modifiable risk factors for dementia in lower- and middle-income countries across the life-course approach. They take a syndemic approach to identify a large fraction of the Mexican population at risk when

developmental, psychological, lifestyle (e.g., alcohol consumption), and chronic conditions, such as hypertension and obesity, are considered. The authors conclude that these factors are within the reach of public health and clinical professionals.

The third chapter examines the salient role of religion in the Mexican-origin population. Although numerous studies have shown that religious involvement is associated with better health across the life course, researchers have virtually ignored possible links between religious involvement and sleep-related outcomes. The topic is especially important because aging is associated with a greater number of sleeping disorders in general, but older individuals with dementia often face particular difficulties (Ooms and Ju, 2016). Some estimates suggest that about 25% of those with mild or moderate dementia and 50% of those with severe cognitive impairments suffer from sleeping problems, and they are accentuated as the disease progresses. Disrupted sleep and circadian functions in dementia are attributed to neurodegeneration of brain regions and networks involved in these functions. Sleep disturbances tend to get worse as dementia progresses in severity. Hill and his colleagues, building on previous work, examine the extent to which religious attendance is inversely associated with sleep disturbance among older Mexican Americans. The study assessed whether depressive symptoms would mediate the association between religious attendance and sleep disturbance in the original cohort of 3,050 older Mexican Americans age 65 and over in the Hispanic Established Population for the Epidemiologic Study of the Elderly. They find that religious attendance is positively associated with fewer depressive symptoms and sleeping disturbances. Moreover, the multivariate analyses revealed that depressive symptoms mediate the association between religious attendance and sleep disturbance. Taken together, these findings contribute to previous work by showing that religious attendance may protect against sleep disturbance by promoting mental health among older Mexican Americans.

The section ends with a chapter co-authored by Meghana Gadgil and Elizabeth Vásquez interrogating a relatively new cognitive morbidity. Diabetes is a highly prevalent chronic disease in the Mexican-origin population in both nations and accompanies serious complications that cause much suffering and shortens life. A growing body of evidence links diabetes with important cognitive sequelae, ranging from mild cognitive impairment to several types of severe dementias. Certain evidence suggests that both diabetes increases the risk of developing cognitive impairment, and that those with type II diabetes are more likely than those without diabetes to experience progression of cognitive decline to dementia, a proposed labeling of Type III diabetes (de la Monte and Wands, 2008). The interplay among these chronic conditions is poorly understood in populations of Latino ancestry. Gadgil and Vásquez present a probing analysis that synthesizes the current literature examining the important pathophysiological interplay among diabetes, disability, cognitive impairment, and particularly incident dementia. The chapter also describes potential strategies to prevent diabetes aimed at reducing dementia incidence and fostering new models of community-based care.

In summary, although a long and healthy life is everyone's desire, a long life is not synonymous with high-quality life or a high level of functioning. For older Mexicans and Mexican Americans being obese, suffering from Type 2 diabetes, dementia or having cardiovascular disease inevitably creates greater pressures on the family and the health care system. Low levels of education, low income, and little wealth, and longer life with "Type III diabetes" results in protracted periods of poor functioning and dependency. This new morbidity will increase rates of cognitive impairment. As the proportion of the population older than 80 increases in both nations, medical and social sciences will be faced with the responsibility of dealing with these issues. These chapters offer a road map.

References

Angel, R. J., & Angel, J. L. (2015). *Latinos in an aging world: Social, psychological, and economic perspectives*. New York: Routledge.

Angel, R. J., Angel, J. L., & Hill, T. (2008). A comparison of the health of older Hispanics in the United States and Mexico: Methodological challenges. *Journal of Aging and Health, 20*, 3–31.

Beard, J. R., Officer, A. d. C., Islene Araujo, Sadana, R., Pot, A. M., Michel, J.-P., Lloyd-Sherlock, P., . . . Chatterji, S. (2016). The World report on ageing and health: A policy framework for healthy ageing. *The Lancet, 387*(10033), 2145-2154. doi:10.1016/S0140-6736(15)00516-4.

Canedo, A. P., & Angel, J. L. (2019). Aging and the hidden costs of going home to Mexico. *J Cross Cult Gerontol*. doi:10.1007/s10823-019-09379-3.

Custodio, N., Wheelock, A., Thumala, D., & Slachevsky, A. (2017). Dementia in Latin America: Epidemiological evidence and implications for public policy. *Frontiers in Aging Neuroscience, 9*, 221. doi:10.3389/fnagi.2017.00221.

de la Monte, S. M., & Wands, J. R. (2008). Alzheimer's disease is type 3 diabetes-evidence reviewed. *Journal of Diabetes Science and Technology, 2*(6), 1101-1113. doi:10.1177/193229680800200619.

Downer, B., Al Snih, S., Chou, L.-N., Kuo, Y.-F., Raji, M., Markides, K. S., & Ottenbacher, K. J. (2020). Changes in healthcare use by Mexican-American Medicare beneficiaries before and after a diagnosis of dementia. *The Journals of Gerontology: Series A.* doi:10.1093/gerona/glaa236.

Fitten, L. J., Ortiz, F., Fairbanks, L., Bartzokis, G., Lu, P., Klein, E., . . . Ringman, J. (2014). Younger age of dementia diagnosis in a Hispanic population in southern California. *International Journal of Geriatric Psychiatry, 29*(6), 586-593. doi:10.1002/gps.4040.

MacDonald, S. W. S., DeCarlo, C. A., & Dixon, R. A. (2011). Linking biological and cognitive aging: Toward improving characterizations of developmental time. *J Gerontol B Psychol Sci Soc Sci, 66 Suppl 1*(Suppl 1), i59-i70. doi:10.1093/geronb/gbr039.

Livingston, G., Huntley, J., Sommerlad, A., Ames, D., Ballard, C., Banerjee, S., . . . Mukadam, N. (2020). Dementia prevention, intervention, and care: 2020 report of The Lancet Commission. *The Lancet, 396*(10248), 413-446. doi:10.1016/S0140-6736(20)30367-6.

Markides, K. S., & Eschbach, K. (2005). Aging, migration, and mortality: Current status of research on the Hispanic paradox. *Journal of Gerontology: Social Sciences, 60*(October), S68-S75.

Martorana, A., & Koch, G. (2014). Is dopamine involved in Alzheimer's disease? *Frontiers in Aging Neuroscience, 6*, 252-252. doi:10.3389/fnagi.2014.00252.

McNeill, W. H. (2010). *Plagues and peoples*. New York, NY: Knofp Doubleday.

Ooms, S., & Ju, Y.-E. (2016). Treatment of sleep disorders in dementia. *Current Treatment Options in Neurology, 18*(9), 40-40. doi:10.1007/s11940-016-0424-3.

Price, J. L. (1994). Tangles and plaques in healthy aging and Alzheimer's disease: Independence or interaction? *Seminars in Neuroscience, 6*(6), 395-402. doi:https://doi.org/10.1006/smns.1994.1051.

Rogers, R. G., & Crimmins, E. M. (Eds.). (2011). *International handbook of adult mortality*. New York, NY: Springer Science.

Safieh, M., Korczyn, A. D., & Michaelson, D. M. (2019). ApoE4: An emerging therapeutic target for Alzheimer's disease. *BMC Medicine, 17*(1), 64. doi:10.1186/s12916-019-1299-4.

Sluimer, J. D., van der Flier, W. M., Karas, G. B., Fox, N. C., Scheltens, P., Barkhof, F., & Vrenken, H. (2008). Whole-brain atrophy rate and cognitive decline: Longitudinal MR study of memory clinic patients. *Radiology, 248*(2), 590-598. doi:10.1148/radiol.2482070938.

World Health Organization. (2017). Global action plan on the public health response to dementia 2017 - 2025. https://www.who.int/publications-detail/global-action-plan-on-the-public-health-response-to-dementia-2017---2025.