

The Impact of Obesity, Physical Activity, and Nativity Status on ADL and IADL

Introduction

Approximately two out of three Americans experience some level of cognitive impairment at an average age of approximately 70 years. For dementia, lifetime risk for women (men) is 37% (24%) and mean age at onset 83 (79) years. Women can expect to live 4.2 years with mild impairment and 3.2 with dementia, men 3.5 and 1.8 years. My main goal is to find more information regarding cognitive impairment, which is the difficulty with remembrance, learning, and concentrating. I am using Instrumental activities of daily living (IADL) and activities of daily living (ADL). IADLs are those activities that allow an individual to live independently in a community. Ex: Use the phone, shop for groceries independently, plan, heat, serve meals, etc. ADLs are the basic self-care tasks we initially learned as young children. They include bathing or showering, dressing, getting in and out of bed or a chair, walking, using the toilet, and eating. These are the variables that I will be using to test daily life function as a measure of cognitive decline. My dependent variables are nativity status, obesity, and physical activity. Those used in this study were Mexican-Americans who immigrated to the United States at varying ages. Nativity Status is if an individual is foreign or native-born. Immigration can be considered a social determinant of health for various reasons. From a macro level, it is the structural racism and discrimination that result in well-documented health inequities. From 1999–2000 through 2017–March 2020, US obesity prevalence increased from 30.5% to 41.9%. During the same time, the prevalence of severe obesity increased from 4.7% to 9.2%. Obesity-related conditions include heart disease, stroke, type 2 diabetes, and certain types of cancer. I am using obesity datasets that measure this factor by looking at the waist circumference of different individuals.

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Obesity and muscle weakness are independently associated with an increased risk of physical and functional impairment in older adults. As people age, their muscle mass decreases due to less physical activity and other factors. Physical activity (PA) moderates physical and functional limitations risk in normal-weight and obese older adults. The patterns and risk factors for physical and psychiatric morbidity vary among differing nativity statuses and the age of immigration. Physical activity reduces the risk of diabetes, hypertension, and obesity, each contributing to cognitive impairment.

Additionally, the age of migration is essential when evaluating the health of foreign-born Mexican Americans from a life-course perspective. Life migrants experience more difficulty adapting to a new language and culture, which can increase the risk of dementia. Due to the challenges of establishing a new home in a foreign country, many don't have access to health care. Individuals who come over to the United States at carrying ages are more susceptible to not getting access to the American healthcare system and struggle to maintain health. These factors can affect untreated obesity and caring medical conditions. Physical activity in elderly Hispanics

protects vigorously against the onset of dementia. Diabetes was associated with a higher risk of developing dementia. In addition, those who migrated at age 50 or older had a higher dementia risk.

Purpose

My purpose in this research project is to investigate if there is a correlation between physical activity (PA), obesity, nativity status, and age of migration and IADL (complex daily living tasks) and ADL (essential self-care) using data from HEPSE. The HEPSE is the Hispanic Established Population for the Epidemiologic Study of the Elderly.

I hypothesize that physical activity (PA), obesity, nativity status, and migration age will correlate with cognitive impairment development in elderly populations. My null hypothesis is that there will not be a correlation between physical activity (PA), obesity, nativity status, and migration age.

Methods and Materials

The data was drawn from eight waves (1993-2013) of the Hispanic Established Populations for the Epidemiologic Study of the Elderly (HEPSE). HEPSE is a free public database based on data collected from 2010-2011. Its primary purpose was to categorize risk factors of Mexican Americans, comparing them to white Americans and other ethnic groups to see how various risk factors operate differently. The independent variables that are used are the occurrence of IADL and ADL coded against my dependent variables, which are as follows: nativity status, obesity (measured by waist circumference), and finally, physical activity. To test if my null hypothesis was false, I decided to code my data using R. R, a programming tool used primarily for data

analysis. I first converted the raw data obtained from the public database into a codable function. I coded each variable, dependent and independent, as such. I convert the data to a CSV file, which can R the information as. From there, the independent variable is the x variable, and the dependent is y. Having this established allows me to do the next step/ From here, my coding process was to find the linear regression between my independent and dependent variables to find statistically significant data points. I use the lm function for my coding. I used each dataset code individually to find a p-value and then included all of my independent variables for a total p-value for all chosen datasets.

Results

The first linear regression that was run was IADL against physical activity, which produced a p-value of .0071, meaning that this graph has statistical significance, showing that these two variables will correlate. The following linear regression was IADL vs. waist circumference as a function of obesity. This test also produced a statistically significant p-value, which was .047. Another test that was run was a multiple-variable linear regression with both of my independent variables and my three independent variables. This test also produced a statistically significant p-value of .03. Finally, nativity status against ADL did not create a statistically significant value, showing that these two variables individually don't correlate enough in a considerable way. The p-value produced was .359.

Conclusion

Due to the data chosen and then coded into the linear regression via and with the help of the linear regression feature on Excel, I can conclude that the three variables, nativity status, obesity, and physical activity, affect the development and systems of IADL and ADL. While running a

linear regression individually for each independent variable against one of my dependent variables, two out of my three were statistically significant. The one that did not have a statistically significant p-value was nativity status, which I incorporated into the age of migration. Standing alone against IADL, the age of migration and whether someone was born a US citizen did not prove to be significant. However, when coded as a multiple linear regression, it was shown to be statistically substantial, along with waist circumference, as a measure of obesity and physical activity. Indoducally, the other two variables were all statistically significant, showing that obesity as a single quantity, as well as physical activity as a single variable, has an effect on the development of IADL with more significant symptoms.

Hale JM, Schneider DC, Mehta NK, Myrskylä M. Cognitive impairment in the U.S.: Lifetime risk, age at onset, and years impaired. *SSM Popul Health*. 2020 Mar 31;11:100577. doi: 10.1016/j.ssmph.2020.100577. Erratum in: *SSM Popul Health*. 2020 Dec 10;12:100715. PMID: 32300635; PMCID: PMC7153285.

References

Hale JM, Schneider DC, Mehta NK, Myrskylä M. Cognitive impairment in the U.S.: Lifetime risk, age at onset, and years impaired. *SSM Popul Health*. 2020 Mar 31;11:100577. doi: 10.1016/j.ssmph.2020.100577. Erratum in: *SSM Popul Health*. 2020 Dec 10;12:100715. PMID: 32300635; PMCID: PMC7153285.

Vásquez E, Gadgil MA, Zhang W, Angel JL. Diabetes, disability, and dementia risk: Results from the Hispanic Established Populations for the Epidemiologic Studies of the Elderly (H-EPESE). *International Journal of Social Psychiatry*. 2022;68(7):1462-1469. doi:10.1177/00207640211037722

Vásquez, E., Batsis, J. A., Germain, C. M., & Shaw, B. A. (2014). Impact of Obesity and Physical Activity on Functional Outcomes in the Elderly: Data From NHANES 2005-2010. *Journal of Aging and Health*, 26(6), 1032-1046. <https://doi.org/10.1177/0898264314535635>

