Global Issues: Disease Control and Pandemic Prevention, Vol. 24, 2022, 37–45
https://doi.org/10.54941/ahfe1001357

Lifestyle-related Factors Affecting Physical Inactivity Issues among Filipino Aging Population during the COVID-19 Pandemic: A Multiple Regression Approach

Joehanna K. Ngo[1], Yoshiki B. Kurata[1], Zyra Mae V. Sicat[2], Dannah Isabelle G. Bunas[1], Jaylord D. Gutierrez[1], Pamela Rose D. Pangilinan[1], and Pamela Ann Mae J. Pascual[1]

[1]Department of Industrial Engineering, Faculty of Engineering, University of Santo Tomas
[2]Department of Physical Therapy, College of Rehabilitation Sciences, University of Santo Tomas

ABSTRACT

In the Philippines, physical inactivity is a significant concern among the elderly population. Due to the COVID-19 pandemic, most elderly people have stayed inside their residences, limiting to their routine requirements of daily physical activities and prevention in their exposure to the virus. Alcohol consumption and motivation contributes to how elderly population were limited to basic physical activities. This paper aimed to determine the factors affecting less physical inactivity among the ninety-seven Filipino elderly population through multiple regression analysis. Results were gathered through online surveys and showed that alcohol consumption (p-value = 0.015) and motivation (p-value = 0.000) contribute to how elderly population were limited to do basic physical activities. Recommendations include a weekly physical activity guide plan and low-intensity physical activities such as walking and stretching without compromising government restrictions due to the COVID-19 pandemic.

Keywords: Physical inactivity, Ageing population, Multiple linear regression, COVID-19 pandemic, Ergonomics

INTRODUCTION

Aging is known as one factor affecting the decline in physical activity [Moncatar et al. 2020]. In older adults aged 50–64 years old, 25% declared themselves physically inactive (Watson 2016). (Kivimaki et al. 2019) stated that insufficient physical activity is consistently associated with an increased risk of chronic illnesses. Globally, the estimated annual number of deaths related to physical inactivity is over 5 million (Roschel et al. 2020). The benefits provided by physical activities are categorized according to immediate and long-term benefits as immediate benefits include improving the quality of

sleep, reducing feelings of anxiety, and reducing blood pressure. On the other hand, long-term benefits include reduction of risks of developing dementia (including Alzheimer's disease) and depression, lowers the risk of heart disease, stroke, type 2 diabetes, and eight cancers such as bladder, breast, colon, endometrium, esophagus, kidney, lung, and stomach [Centers for Disease Control and Prevention 2020].

Further, regular physical activity is shown to impact senior citizens' physical and mental health positively; hence, performing regular exercise and maintaining an active lifestyle may benefit aging [Yen & Lin 2018, Carlson et al. 2018]. [Warburton & Bredin 2019] stated that maintaining an active lifestyle and engaging in physical activity has shown to have risk reductions of 20% to 30% for premature mortality and has improved the quality of life in patients with cardiovascular diseases as well as chronic medical conditions such as asthma, Parkinson's disease, Alzheimer's disease, arthritis, and diabetes. This study aimed to determine the factors leading to physical inactivity among senior citizens using multiple linear regression. Moreover, the study is deemed vital as it seeks to recommend an exercise plan that would potentially aid difficulty in commencing physical activities campaigning withdrawal of harmful habits such as vices or improper eating habits.

CONCEPTUAL FRAMEWORK

The researchers developed the conceptual model to pinpoint the factors that lead to physical inactivity among Filipino senior citizens [Rai et al. 2019]. Based on literature assessments done, the intensity of physical activity dramatically contributes to physical inactivity among senior citizens. Factors in the study considered the independent variables such as Smoking, Alcohol, Caffeine Intake, Level of Physical Activity, Time of the Day, Quality of Sleep, Body Pain, and Motivation, while Sedentary Lifestyle as the dependent variable.

These factors were considered for the following reasons: Smoking produces carbon monoxide, a component of tobacco products that attaches to red blood cells and displaces oxygen when inhaled [Caponnetto et al. 2018]. This directly impacts a person's physical endurance due to a lack of efficient oxygen supply to muscles and other bodily tissues, which affects active smokers' airways and lungs, as well as regular inhalation of second-hand smoke [Gibbs et al. 2016]. Thus, it causes shortness of breath and difficulty in performing physical activities. Most smokers typically consume alcohol, which causes central nervous system depression, leading to poor motor skills, coordination, delayed reactions, impaired judgment, and impaired balance, depending on the dose [Siekaniec 2017]. Thus, smokers and alcohol drinkers have the possibility of contributing to lesser physical activities. Moreover, coffee, along with energy drinks, is the primary source of caffeine and is one of the most widely consumed liquids on the planet [Reyes & Cornelis 2018]. According to [Schrager 2017], reducing senior citizens' caffeine intake will help maximize sleep and reduce the effects of mood, risk of falling, daytime sleepiness, and next-day physical activity.

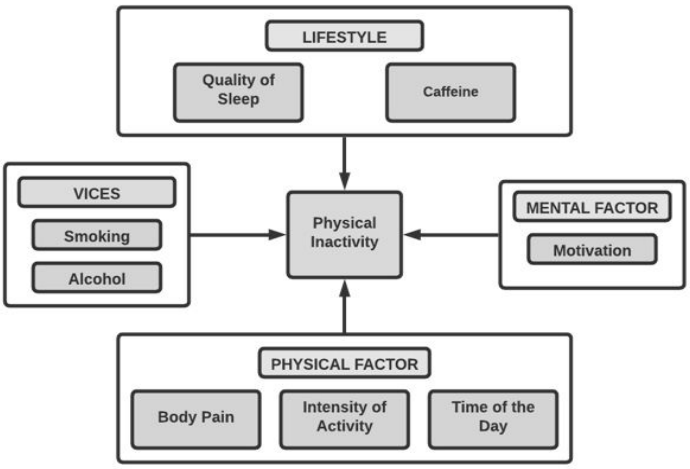

Figure 1: Conceptual framework.

Performing physical activity regularly is significant in keeping in shape, and one of the determinants influencing physiological outputs from exercise is the time of movement. Time of the day is considered since exercising while fasted (often first thing in the morning) is better for weight maintenance than exercising while fed (Sato et al. 2019). Motivation is also a key aspect in sustaining exercise to lose weight which is linked to various positive health effects and is thus a necessary factor. Studies suggest that consciously valuing a goal and intrinsic motives such as overcoming challenges and enjoying a workout predict physical activity [Rodrigues 2018]. One-third of older people in the Philippines (33%) said they are frequently bothered by pain, with no obvious gender difference. More than half of those in pain (58%) had moderate pain, while a tenth has severe pain (Cruz et al. 2019). Thus, this also shows that bodily pains directly contribute to immobility, thus decreasing the physical capabilities of senior citizens. With this in consideration, body pain is also considered a factor.

METHODS

The subjects considered in this study are senior citizens living within the Philippines' metropolitan and nearby rural areas. The researchers used a descriptive-normative survey as the developed questionnaire was distributed online due to the restrictions imposed by the COVID-19 restrictions and quarantine rules. In developing the questionnaire, the researchers determined the appropriate tools and considered these as good data collection instruments. To measure the intensity of activities by the respondents, this paper utilized the Physical Activity Scale for the Elderly (PASE) and computed it daily. Second, in measuring for the body pain experienced, the developed chronic pain measurement of [Parsons et al. 2006] was used. Lastly, sleep quality was determined using the Pittsburgh Sleep Quality Index (PSQI).

Table 1. Descriptive statistics of participants (n = 97).

Demographics		Frequency	Percentage
Gender	Male	39	40.21
	Female	52	53.61
	Rather not say	6	6.19
Age	60 – 64 years old	37	38.14
	65 – 68 years old	31	31.96
	69 – 72 years old	15	15.46
	73 – 76 years old	5	5.15
	77 – 80 years old	7	7.22
	81 – 84 years old	2	2.06
Marital Status	Single	14	14.43
	Separated	4	4.12
	Married	54	55.67
	Widowed	25	25.77
Residence	Urban	83	85.57
	Rural	14	14.43
Still Working?	Yes	16	16.49
	No	81	89.69

In this study, 97 older people participated (see Table 1). With the absence of physical interactions in gathering pertinent data for the paper, the researchers considered the lack of technical knowledge among the aging population in the Philippines. To aid the older people in answering the developed questionnaire, with the help of social media, the researchers conducted data gathering through interviews done online or through telephone calls. Table 2 shows the data measures used in gathering the data.

To answer the research hypotheses, the researchers utilized the Minitab Statistical Software to calculate and analyze the parameters set in the study. Multiple regression and correlation analyses were done to determine the significant factors affecting the physical inactivity among aging people, and its level of relationship to forecast its trend [Necio et al. 2019].

RESULTS

Spearman's correlation was used to analyze any association between the study's variables. This analysis will then produce a table with a correlation coefficient r or ρ (rho) that will indicate the strength of the relationship between two variables. The coefficient r-values can range from −1.00 to 1.00, wherein 1.00 translates to a perfect linear relationship. Thus, the values closer to 1 present a stronger relationship. The coefficient r values above imply that smoking and alcohol have the strongest association with an r-value of 0.689 while sedentary and motivation follow with an r-value of 0.607. Both pairs above have a p-value of 0.000 which means both relationships are significant.

Regression analysis was performed to determine the statistically significant factors influencing the physical inactivity of Filipino senior citizens.

Table 2. Data measures (instrumentation).

Factor	Unit of Measurement	Measurement Instrument	Cronbach's Alpha	References
Smoking	Packs per week*	Questionnaire	-	-
Alcohol Intake	Bottles/cans per week**		-	-
Caffeine Intake	Cups per week***		0.87	Heaton (2012)
Time of the Day	Periods	Questionnaire	-	-
Intensity of Activity	Likert Scale	Questionnaire	0.75	Physical Activity Scale for the Elderly (PASE)
Sleep Quality	Likert Scale	Questionnaire	0.83	Pittsburgh Sleep Quality Index (PSQI)
Body Pain	Likert Scale	Questionnaire	0.91	Parsons et al., (2006)
Motivation	Likert Scale	Questionnaire	0.84	RM 4–FM: Motivation for Physical Activity Questionnaire

*Packs of cigarette = 29 milligrams of Nicotine content × Number of cigarette packs per week

**Bottle/can per week = 5% alcohol by volume

***Cups per week = Caffeine content (in milligrams) × Number of intake

Table 3. Spearman's correlation analysis.

Factor	Smoking	Alcohol	Caffeine	Time of Day	Sedentary	Intensity of activity	Sleep Difficulty	Body Pain
Alcohol	0.689							
Caffeine	0.084	0.217						
Time of Day	−0.135	0.023	0.295					
Sedentary	−0.118	−0.211	0.174	0.002				
Intensity of activity	−0.014	0.084	0.280	0.285	0.276			
Sleep Difficulty	0.006	0.215	0.154	0.219	0.225	0.311		
Body Pain	0.010	0.074	−0.089	−0.018	0.223	0.266	0.429	
Motivation	−0.060	−0.006	0.053	0.227	0.607	0.444	0.346	0.368

Based on the results generated by Minitab statistical software, factors such as Alcohol (p-value = 0.015), Motivation (p-value = 0.000), Time of Day (p-value = 0.000), and Body pain (p-value = 0.000). According to [Dela Cruz 2016], there is an association between the physical activity participation of older adults and lack of time, social influence, and willpower,

Table 4. Multiple regression results – minitab statistical software.

Analysis of Variance					
Source	**DF**	**Adj SS**	**Adj MS**	**F-Value**	**P-Value**
Regression	18	28.8848	1.6047	11.40	0.000
Alcohol	1	0.8898	0.8898	6.32	0.015
Motivation	1	13.8175	13.8175	98.20	0.000
Time of Day	2	4.0680	2.0340	14.46	0.000
Body Pain	14	8.6290	0.6164	4.38	0.000
Error	48	6.7538	0.1407		
Total	66	35.6386			

Table 5. Coefficients – minitab statistical software.

Coefficients					
Term	**Coef**	**SE Coef**	**T-Value**	**P-Value**	**VIF**
Constant	1.216	0.150	8.10	0.000	
Alcohol	−1.941	0.772	−2.51	0.015	1.36
Motivation	0.1240	0.0125	9.91	0.000	1.41
Time of Day	−0.514	0.115	−4.45	0.000	1.58
Body Pain	0.759	0.301	2.52	0.015	1.25

which are all related to a person's motivation, thus resulting in a direct contributor to physical inactivity. Based on our data, most physically active respondents are motivated by intrinsic factors related to their health and self-satisfaction.

On another note, even if dose-dependent, the general consumption of alcohol can lead to impaired motor skills, reduce coordination, deferred reactions, misjudgements, and loss of balance [Siekaniec 2017], which can affect physical movements and eventually lead to physical inactivity. Moreover, considering time of the day, exercising while fasted (commonly in the morning) is better for weight maintenance than in a fed state [Chomistek et al. 2016]. It is a prominent factor in physical inactivity because senior citizens' will to exercise is lessened when missing the ideal morning time. Lastly, an elderly person that is affected by a disease or bone fractures often experiences a lack of mobility and pain. It usually sets when bones and muscle groups need to be stimulated but cannot be, further reducing mobility and thus creating more pain [UEW 2018]. Therefore, this indicates that bodily pains directly contribute to immobility, thus decreasing the physical capabilities of senior citizens.

The results' variance inflation factors (VIF) are significant indicators or measures of the multicollinearity presence in each data set [Kurata & Matias 2018]. In general, a VIF should not exceed a value of 5. As the highest variance inflation factor in this paper is 1.58, the study concludes that no multicollinearity exists in the study's data.

CONCLUSION

Based on the results, four factors were found to significantly contribute to Physical inactivity among senior citizens in the Philippines. Motivation, time of day, and body pain exhibit the most influence with a coefficient P-value of 0.000, while alcohol has a P-value of 0.015. According to the [Statista Research Department 2021], 33.3 percent of those aged 60 to 69 were consumers of alcohol in the Philippines during 2019. Alcohol drinkers made up 49.4% of males and 14.8% of females in the aging population during the same year, apparently because drinking is considered as one of the social norms. With this, the elderly must focus and keep a close eye on their alcohol consumption, as too many leads to physical inactivity and various illnesses. As a recommendation, older adults should participate in a 50-minute aerobic activity of moderate intensity or 75-minute aerobic activity of vigorous-intensity, as well as muscle-strengthening activities for two or more days per week. Additionally, it is recommended that each barangay or small community conduct weekly activities and seminars that promote and encourage senior citizens to participate in physical activities. With the goal of improving their physical, psychological, and social health, most of the elderly population are motivated to engage in physical activities by the advice of a physician and a desire to regain their full function. Aging Filipinos are also motivated to improve their aerobic condition and flexibility for increased mobility, strengthen their legs and upper body, and refine their balance and coordination to prevent falls. The older adults will comply with an exercise program that has personal relevance to them. They can benefit from group exercises that will encourage their social interaction with a friendly instructor, songs with mid-range vocals, and music with moderate tempo and an easily identified beat. Adherence to the exercise program will continue if it consistently provides positive experience to the individual.

Furthermore, older adults must also engage in physical activities that are not too difficult to follow to stimulate bones and muscle groups to reduce immobility and prevent body pain. An early morning workout is recommended and best for weight loss as the fat burn is highest when exercising before breakfast. These factors will generate the feeling of belongingness, a key ingredient in motivating older adults to exercise. With all these considered, maintaining an active lifestyle can reduce the risk of developing diseases among older adults that might otherwise arise if they are not prevented.

REFERENCES

Caponnetto, P., Maglia, M., Prosperini, G., Busà, B., Polosa, R., (2018). Carbon monoxide levels after inhalation from new generation heated tobacco products. Respir Res 19, 164. https://doi.org/10.1186/s12931-018-0867-z

Carlson, Susan A.; Adams, E. Kathleen; Yang, Zhou; Fulton, Janet E. (2018). Percentage of Deaths Associated With Inadequate Physical Activity in the United States. Preventing Chronic Disease, 15(), 170354–. doi:10.5888/pcd18.170354

Chomistek, Andrea K., Shiroma, Eric J., Lee, I-Min (2016). The Relationship between Time of Day of Physical Activity and Obesity in Older Women. Journal of Physical Activity and Health, 13(4), 416–418. doi:10.1123/jpah.2015-0152

Cruz, C. J. P., Cruz, J. C. P., Saitō, Y., Economic Research Institute for ASEAN and East Asia, & Demographic Research And Development Foundation, I. (2019). Ageing and Health in the Philippines. Economic Research Institute for ASEAN and East Asia (ERIA).

Dela Cruz, J., Monte, R., & Buan, A. (2016). Physical activity participation and perception of older adults living in a Philippine rural community Authors. Asia Life Sciences, 25(1), 281–290. https://www.researchgate.net/publication/289608026_Physical_activity_participation_and_perception_of_older_adults_living_in_a_Philippine_rural_community

Gibbs K., Collaco J. M., & McGrath-Morrow S. A. (2016). Impact of tobacco smoke and nicotine exposure on lung development. Chest Journal, 149(2), 552–561.10.1378/chest.15-1858

Health benefits of physical activity for adults. (2020, December 2). Centers for Disease Control and Prevention. http://www.cdc.gov/physicalactivity/basics/adults/health-benefits-of-physical-activity-for-adults.html

Hayes, A. (2021, March 30). *Multiple Linear Regression (MLR) Definition*. Investopedia. https://www.investopedia.com/terms/m/mlr.asp

Kivimaki, M., Singh-Manoux, A., Pentti, J., Sabia, S., Nyberg, S., Alfredsson, L., Goldberg, M., Knutsson, A., Koskenvuo, M., Koskinen, A., Kouvonen, A., Nordin, M., Oksanen, T., Stranberg, T., Suominen, S., Theorell, T., Vahtera, J., Vaananen, A., Virtanen, M., Jokela, M. (2019). Physical inactivity, cardiometabolic disease, and risk of dementia: An individual-participant meta-analysis. BMJ Clinical Research. doi:10.1136/bmj.l1495

Kurata, Y. B., & Matias, A. C. (2018). Work-Related Factors Affecting Sustained Alert State Among Bank Security Personnel in the Philippines. In L. E. Freund & W. Cellary (Eds.), Advances in The Human Side of Service Engineering (pp. 193–202). Springer International Publishing.

Moncatar, TJ Robinson; Nakamura, Keiko; Siongco, Kathryn Lizbeth; Rahman, Mosiur; Seino, Kaoruko (2020). Prevalence and Determinants of Self-Reported Injuries among Community-Dwelling Older Adults in the Philippines: A 10-Year Pooled Analysis. International Journal of Environmental Research and Public Health, 17(12), 4372–. Doi: 10.3390/ijerph17124372

Necio, A. J. F., Batac, N. E. C., Odias, T. M. P., Ricafort, J. L. B., Salazar, R. R., & Kurata, Y. B. (2019). Postural Analysis among Machinists Experiencing Work-related Musculoskeletal Disorders in the Philippines. IEEE International Conference on Industrial Engineering and Engineering Management, 2015, 59–63. https://doi.org/10.1109/IEEM44572.2019.8978765

Parsons, S., Carnes, D., Pincus, T., Foster, N., Breen, A., Vogel, S., & Underwood, M. (2006). Measuring troublesomeness of chronic pain by location. *BMC Musculoskeletal Disorders, 7*(1). doi:10.1186/1471-2474-7-34

Rai, Rajni; Jongenelis, Michelle I.; Jackson, Ben; Newton, Robert U.; Pettigrew, Simone (2019). Factors influencing physical activity participation among older people with low activity levels. Ageing and Society, (), 1–21. doi:10.1017/S0144686X1900076X

Rodrigues, F., Bento, T., Cid, L., Pereira Neiva, H., Teixeira, D., Moutão, J., . . . Monteiro, D. (2018). Can interpersonal behavior influence the persistence and adherence to physical exercise practice in adults? A systematic review. Frontiers in Psychology, 9. doi:10.3389/fpsyg.2018.02141

Roschel, H., Artioli, G., & Gualano B. (2020). Risk of Increased Physical Inactivity during COVID-19 Outbreak in Older People: A Call for Actions. PubMed. https://pubmed.ncbi.nlm.nih.gov/32392620/

Sato, Shogo; Basse, Astrid Linde; Schönke, Milena; Chen, Siwei; Samad, Muntaha; Altıntaş, Ali; Laker, Rhianna C.; Dalbram, Emilie; Barrès, Romain; Baldi, Pierre; Treebak, Jonas T.; Zierath, Juleen R.; Sassone-Corsi, Paolo (2019). Time of Exercise Specifies the Impact on Muscle Metabolic Pathways and Systemic Energy Homeostasis. Cell Metabolism, (), S1550413119301834–. doi:10.1016/j.cmet.2019.03.013

Schrager, M.A. (2017). *Addictive Substances and Neurological Disease || Sleep, Caffeine, and Physical Activity in Older Adults. , (), 365–371*. doi:10.1016/B978-0-12-805373-7.00031-1

Siekaniec, M. C. S. (2017, June 1). *The Effects of Alcohol on Athletic Performance. NSCA*. https://www.nsca.com/education/articles/nsca-coach/the-effects-of-alcohol-on-athletic-performance2/

Statista. (2021, November 23). *Share of the ageing population who drinks alcohol Philippines 2019*, by age group. http://www.statista.com/statistics/1116303/philippines-share-ageing-population-who-drinks-alcohol-by-age-group/

Warburton, D., & Bredin, S. (2019). Health Benefits of Physical Activity: A Strengths-Based Approach. Journal of Clinical Medicine. doi: https://doi.org/10.3390/jcm8122044

Watson, K. B., Carlson, S. A., Gunn, J. P., Galuska, D. A., O'Connor, A., Greenlund, K. J., & Fulton, J. E. (2016). Physical Inactivity Among Adults Aged 50 Years and Older — United States, 2014. *MMWR. Morbidity and Mortality Weekly Report*, *65*(36), 954–958. https://doi.org/10.15585/mmwr.mm6536a3

Yen, H., & Lin, L. (2018). Quality of life in older adults: Benefits from the productive engagement in physical activity. PubMed. https://pubmed.ncbi.nlm.nih.gov/30662493/

UEW Team (2019, August 6). Managing Movement Pain in Seniors. UEW Healthcare. https://www.uewhealth.com/managing-movement-pain-seniors/