

Physical Activity, Physical Function and Neighborhood Environment Adaptation Among Older Adults Dwelling in Asaba, Delta State, Nigeria

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Abstract: Background: Consequent upon the increasing pressure on health system created by growing population of older adults, attention has been channeled to ways to smoothen the aging process among older adults including studying on their physical activity (PA), physical function (PF) and neighborhood environment adaptation (NEA). This study aimed to determine the level and interrelationships between PA, PF and NEA among older adults dwelling in Asaba, Delta State, Nigeria. Methodology: This is a cross sectional study involving 150 older adults (56% females; mean age = 72.57±6.32 years) consecutively recruited from communities in Asaba, Delta State, Nigeria. The International Physical Activity Questionnaire, the Physical Function Activity Scale (SF-36) and Physical Activity Neighborhood Environment scale in Nigeria (PANES-N) were used to assess physical activity, physical function and neighborhood environment adaptation among the participants respectively. Data was analyzed using frequency counts, percentages, mean, standard deviation and spearman's correlation test at alpha level of 0.05. Results: The mean total of PA, PF, and NEA scores were 1324±1124.35MET-min/week (adequate), 60.58±17.44 (dependent), 2.32±0.27 (moderate) respectively. PF had direct correlation with PA ($\rho=0.69$; $p<0.001$) and general health ($\rho=0.51$; $p<0.01$). There was no significant correlation between PF and NEA ($\rho=0.15$; $p=0.07$). PA had direct correlation with NEA ($\rho=0.34$; $p<0.01$) and general health ($\rho=0.65$; $p<0.01$) also having inverse correlation with each of age ($\rho=-0.58$; $p<0.01$) and education attainment ($\rho=-0.17$; $p=0.04$) of the participants. There was inverse correlation between age and PF ($\rho=-0.63$; $p<0.01$) and each of NEA ($\rho=-0.19$; $p=0.02$) and general health ($\rho=-0.57$; $p<0.01$) of the participants. Conclusion: Older adults dwelling in Asaba, Delta State, Nigeria had adequate PA, dependent in PF and moderate NEA. Their PA correlated with each of their PF and NEA. This suggests that improvement of PA among older adults ameliorate their problem with PF and NEA.

Keywords: Older Adults, Physical Activity, Physical Function, Neighborhood Environment Adaptation

1. Introduction

Studies have shown a positive correlation between physical exercise and general well being and an inverse relationship in the occurrence of chronic diseases. Support data from epidemiologic and longitudinal studies have reported reduced

disease risk following lifestyles modification incorporating daily physical activity and having higher cardiopulmonary fitness and physical exercise are considered a principal intervention for primary and secondary disease prevention [14]. Maintaining moderate intensity physical exercise is associated with lower rates of morbidity and mortality rates [4]. Ageing is a natural and unavoidable process of life. The global increase

in the ageing population places increased pressure on health systems and services for older adults [9]. Demographic trends over the next three decades gave that the global numbers of adults aged 65 years and older will double to around two billion by 2050 [37]. Of these older adults, 80% of the increase will occur in low-middle countries [37]. Furthermore, life expectancy is increasing at a similar rate in less developed countries and by 2050, the global numbers of adults aged 80 years and older will be 268 million in less developed countries compared with 124 million in developed countries [33]. These demographic trends will have an impact on resources to manage the resultant increase in chronic disease, treat fall-related injuries and manage cost of care for older adults [9]. One of the most important approaches to delay the morbidity associated with aging is to increase physical activity (PA) among older people [9].

Physical activity is defined as bodily movement resulting in increased energy expenditure, including structured exercise, sport activities and everyday activities [35, 36]. Physical inactivity is the fourth leading risk factor contributing to deaths and the burden of disease globally, ranking above overweight or obesity [21]. Physical inactivity in older adults has been reported by a study [18]. Physical activity is the most important determinant of active aging and has played a major role in improving the quality of life, reducing disability and in the 'compression of morbidity' in later life [12]. In older adults, physical activities should include large muscle aerobic activities such as cycling, and many recreational activities and sports. Furthermore, the important dimension of physical activity which include muscle strength and balance training also have a major role in health promotion and disease prevention in older adults [16]. Physical activity benefits specifically for older adults can be summarized under improving psychological status and wellbeing, social well being, chronic disease prevention and risk reduction then improving functional status which includes improving cognitive function, quality of life, maintaining muscle strength, bone density and physical functioning (ADL) [34].

Physical function is the ability to perform both basic and instrumental activities of daily living. The ability of older adults to reside in the community depends to large extent their level of physical function [16]. The physical function domain is theoretically composed of four subdomains which are conceptually interrelated but distinct such as mobility related to the lower extremities, dexterity related to the upper extremities, axial or central related to the neck and back function, and complex activities which involves more than one subdomain are related to instrumental activities of daily living [16]. As an older person encounters decline in physical function, there is increasing difficulty in engaging in the instrumental activities of daily living and may address these difficulties by avoiding or limiting these activities. Because this decline can occur gradually, the accompanying changes in physical function may be subtle and not readily apparent to the healthcare providers, family or even to the individual until not being able to perform the activity at all [16]. A

study has shown that neighbourhood environment is important to the functional health of older adults [8].

Neighborhood environment adaptation refers to the demands of the environment on an individual. Whereby perceived or conceived low, safety of a neighborhood environment could surpass an older adult's physical ability to manage the demands of the environment, thereby predisposing them to hazard especially fall [23]. Neighborhoods characteristics affect people of older population and they typically experience higher levels of exposure to neighborhoods conditions often having spent decades in their communities [22]. As older adults become less mobile, their effective neighborhoods may shrink over time to include only the immediate areas near their homes [6, 13]. Eighty percent of adults aged 45 and older report a desire to stay in their current residence or to "age-in-place" (and out of institutions) for as long as possible [1]. In addition to the emotional and social benefits allowed to the individual, such as a comfortable environment, familiarity with the neighborhood and feelings of independence, aging-in-place also has economic benefits to society [20]. Public policymakers and other professionals are now recognizing older adults' desire to stay out of institutions as well as the cost efficiencies of doing so [26]. Given this shift toward aging in community, the role of neighborhood environments in encouraging individuals' older adults' adaptive behaviors and promoting their health and well-being becomes very important.

Older adults face a lot of physiological changes which impacts on their quality of life, physical activity participation and ability to live independently [3, 20]. Consequently, attention has been channeled to ways to smoothen the aging process among older adults including information on their physical activity and functions and also on their neighborhood or community environment. Various researchers [3, 9, 16] have studied older adults giving insights on one or two constructs of this present study. However, hardly had there been any study available for referencing on the interrelationship among physical activity, physical function and neighborhood environment adaptation among older adults which is the ultimate goal for active or smooth aging. Hence, this study is aimed at determining the levels and interrelationship between physical activity, physical function and neighborhood environment adaptation among older adults in Asaba, Delta State, Nigeria.

2. Methods

2.1. Design

This was a cross-sectional study involving 150 volunteering older adults consecutively recruited from a community (Asaba) in Delta State, Nigeria. The participants were ambulant older adults (65 years and above) who were well oriented in time, place and person. Written or verbal consent were obtained from each of the participants after the aim of the study had been explained to them. The sample size was calculated using G-power 3.0.10 software. A sample size

of 150 had an 80% power of determining a change of 0.3 at an alpha level of 0.05 [15]. The participants' socio-demographic variables (age, sex, occupation, highest education attainment, general health and marital status) were documented. The International Physical Activity Questionnaire, the Physical Function Activity Scale (SF-36) and Physical Activity Neighborhood Environment scale (PANES) were used to assess physical activity, physical function and neighborhood environment adaptation respectively among the participants. The questionnaires were either self or researcher-administered depending on each participant's preference and literacy level.

2.2. Research Instruments

2.2.1. The Short Last 7- Day International Physical Activity

Questionnaire (7-Day IPAQ-SF): This questionnaire was used to obtain data on health-related physical activity. The short form IPAQ is a 7-item scale, assessing physical activity undertaken across a comprehensive set of domains including: leisure time physical activity; domestic and gardening (yard) activities; work-related physical activity; transport-related physical activity. This questionnaire asks about three specific types of activity undertaken in the four mentioned domains. The specific types of activities was assessed by this questionnaire are walking, moderate intensity activities and vigorous intensity activities.

The IPAQ has good test-retest reliability (Spearman's $r=0.80$) and moderate criterion validity (Spearman's $r=0.30$) with an accelerometer in healthy adults (Craig *et al.*, 2003).

2.2.2. Physical Activity Neighborhood Environment Scale in Nigeria (PANES-N)

This 17-item instrument measures perceived attributes of the neighborhood environment hypothesized to be related to physical activity, particularly for transport and recreation. Neighborhood is defined as being within a 10- to 15-minute walk from home. Concepts assessed by PANES include residential density (1 item), access to destinations (3 items), pedestrian and bicycling facilities (4 items), recreational facilities (1 item), aesthetic qualities (1 item), social environment (1 item), street connectivity (1 item), traffic safety (2 items), crime safety (2 items), and household motor vehicles (1 item). With the exception of the residential density and household motor vehicle questions, items were rated on a 4-point Likert scales ranging from strongly disagree to strongly agree, as well as don't know or doesn't apply response option. Response options for the residential density question ranged from single-family detached homes to apartments or condos of more than 12 stories. The question on numbers of working motor vehicles in the household was open ended.

2.2.3. The Physical Function Activity Scale (SF-36)

The Physical Function Activity Scale (SF-36) was used to assess level of physical function in older adults. This aimed at measuring activity limitation which are chief target of physical therapy (Bohannon, 2010). It is a 10-item self

administered scale with a 3-likert scale response option scored thus: (1) yes, limited a lot, (2) yes, limited a little, (3) no, not limited at all. Thereafter, the total scores are determined. The physical function scale is reliable and valid among community-dwelling older adults (Bohannon, 2010).

2.3. Data Analysis

Obtained data were analyzed using the Statistical Package for Social Sciences (SPSS) version 21. Descriptive statistics of frequency counts, percentages, mean and standard deviation were used to summarize Participants' socio-demographic data and their scores on physical activity (PA), physical function (PF) and Neighborhood environment adaptation. Spearman rank order correlation was used to determine the relationships between each pair of PA, PF and neighborhood environment adaptation. Spearman rank order was also used to determine relationship between some socio-demographic data (age, general health and educational attainment) and each of PA, PF and neighborhood environment adaptation. Alpha level was set at 0.05.

3. Results

3.1. Socio-Demographic Profile

A total of 150 older adults (56% females; mean age of 72.57 ± 6.32 years) participated in the present study. Majority of the participants had at most post-secondary education (75.3%). There was 61.3% increase of unemployment in the participants following old age. Majority of the participants rated their general health as being good (60.7%) (Table 1).

3.2. Levels Physical Activity, Physical Function and Physical Activity Neighborhood Safety

The mean total physical activity scores (1324 ± 1124.35 MET-min/week) of the participants was adequate with walking being the most contributor to physical activity. The mean value of the physical function among the participants of this study was 60.58 ± 17.44 given them to be disabled/dependent. The neighborhood safety among the participants of this study was considerably fair having a mean score of 2.32 ± 0.27 (Table 2).

3.3. Correlation Analysis

Physical function had direct correlation with physical activity ($\rho=0.69$; $p<0.001$) and general health ($\rho=0.51$; $p<0.01$) of the participants but there was no significant correlation between physical function and neighborhood environment adaptation ($\rho=0.15$; $p=0.07$). Physical activity had direct correlation with neighborhood environment adaptation ($\rho=0.34$; $p<0.01$) and general health ($\rho=0.65$; $p<0.01$) of the participants also having inverse correlation with each of age ($\rho=-0.58$; $p<0.01$) and education attainment ($\rho=-0.17$; $p=0.04$) of the participants. There was inverse correlation between age and physical function ($\rho=-0.63$; $p<0.01$) and each of neighborhood environment

adaptation ($\rho=-0.19$; $p=0.02$) and general health ($\rho=-0.57$; $p<0.01$) of the participants. Education attainment of the participants had no significant correlation with any of the physical function, neighborhood environment adaptation and general health of the participants ($p<0.05$) (Table 3).

Table 1. Socio-demographic profiles and environmental settings of the participants.

Variable	Class	Frequency (%)	Mean \pm SD
Sex	Male	66 (44.0)	-
	Female	84 (56.0)	-
Occupation	Unemployed/retired	92 (61.3)	-
	Civil/public servant or EPE	11 (7.3)	-
	Farming	10 (6.7)	-
	Trading	37 (24.7)	-
Marital status	Single	3 (2.0)	-
	Married	103 (68.7)	-
	Widowed	44 (29.3)	-
Educational attainment	None	8 (5.3)	-
	Primary	21 (14.0)	-
	Secondary	34 (22.7)	-
	Post-secondary	50 (33.3)	-
General health	Post-graduate	37 (24.7)	-
	Poor	3 (2.0)	-
	Fair	45 (30.0)	-
	Good	91 (60.7)	-
	Very good	11 (7.3)	-
Age (years)	Excellent	0 (0.0)	-
	-	-	72.57 \pm 6.32

Table 2. Mean and levels physical activity, physical function and neighborhood environment adaptation among the participants.

Variable	Mean \pm SD	Level
Physical activity (MET-min/week)		
Vigorous	14.67 \pm 77.88	-
Moderate	400.40 \pm 370.38	-
Walking	909.59 \pm 798.14	-
Total	1324.66 \pm 1124.35	Adequate
Physical function	60.58 \pm 17.44	Disabled/dependent
Neighborhood environment	2.32 \pm 0.27	Moderate
Adaptation		

Table 3. Spearman rank test showing the relationship between physical activity, physical function, neighborhood environment adaptation and some social demographic data (general health, age and education attainment) of the participants variable.

Variables	PA	PF	PANES	Health	
PF	$\rho=$	0.69	-	0.15	0.51
	$P=$	$<0.001^*$	-	0.07	<0.01
PANES	$\rho=$	0.34	0.15	-	0.13
	$P=$	$<0.01^*$	0.07	-	0.13
Health	$\rho=$	0.65	0.51	0.13	-
	$P=$	$<0.01^*$	$<0.01^*$	0.13	-
Age	$\rho=$	-0.58	-0.63	-0.19	-0.57
	$P=$	$<0.01^*$	$<0.01^*$	0.02*	$<0.01^*$
Education	$\rho=$	-0.17	-0.03	0.08	-0.11
	$P=$	0.04*	0.69	0.35	0.17

KEY: * = significant at $p<0.05$; PA= physical activity; PF= Physical function; PANES=physical activity neighborhood environment scale

4. Discussion

This present study was designed to determine physical activity, physical function, and neighborhood environment support among older adults in Asaba, Delta state, Nigeria. Various researchers [2, 25, 31, 40] have studied older adults both locally and internationally looking at one or two of the aforementioned constructs amongst older adults. However, no published study has assessed the levels and

interrelationship between each variable of physical activity, physical function and neighborhood environment adaptation and the way in which sociodemographic factors (health, age and educational attainment) relates to each of these variable in a sub national sample of Nigeria older adults.

This study revealed the level of physical activity among its participants was adequate. This is contrasting to a report [24] which suggests that physical activity among older adults remains low especially those living in a less affluent area. The reason for the adequate level of physical activity could

be as a result of the locality where the study was undertaken and secondly, as a result of certain level of ambulation seen in the participants owing to their recruitment as the main contributor to their physical activity level was walking. Physical activity in this study reveals a significant positive correlation with physical function of the participant. This agrees with many literatures [11, 19, 38] suggesting physical activities as essential in improving physical functions even in delimiting conditions.

Perceived health is a widely used surrogate for measuring individuals' health status across different populations, including older adults. It is commonly reported subjective. However, this study revealed a direct significant relationship between physical activity and perceived general health of its participants. This is consistent with a study [29] where participants who rated their health as good and excellent had more physical activity. In this present study 68% of the participants perceived their health as either good or very good. Physical activity was found to have a negative correlation with age of the participants in the present study. The correlation among these variables agrees with previous studies [7, 32] where increase in age comes with decrease in physiological functions thereby reducing physical activity levels.

In this present study, physical activity had an inverse correlation with educational attainment of its participant. This is in contrast with studies [17, 30, 39] which suggest educational attainment leading to increase knowledge of physical activity, being employed, higher incomes, and reduced disease condition and hence increasing physical activity. This present study views higher education attainment by its participant to make them sedentary in the veins of depending on their cars and incomes (even though not statically proven) to get things even on retirement rather than their low education attainment counterpart who even at old age walk some distance and perform other duties to survive thereby increasing their physical activity levels. A local report [25] in Nigeria supports the argument of this present study.

The total mean score of the physical function among the participants of this study denotes dependence/ disable. Physical function correlated positively with physical activity. This is in agreement with several studies [10, 11, 19, 38]. In this study, it has been seen that despite the level of physical activity found among the participants of this study and its direct relationship with their physical function one can arguably say that their physical activity level is not adequate enough to help physical functioning amongst participants of this study.

Physical function has a direct significant correlation with the perceived general health of the participant of this study. This agrees with the report [28] where participants that had good / or excellent general health are physically active and thus had good physical functions. In this present study, there was no significant correlation between physical function and neighborhood environment adaptation among the participants. This is consistent with reports [41, 44]. On the other hand,

studies [5, 45] found some relationship between physical function and neighborhood environment adaptation probably because their studies investigated individual characteristics of age, sex, medical history, pain, medication, social isolation, depressive symptom, functional capacity and cognitive functions as related to physical functions of their participants. In this present study, physical function had no significant correlation with any of the variables of age and educational attainment among participants.

Neighborhood environment adaptation level in this present study was found to be fair/moderate. This could be as a result of considerably good road networks and terrains in the locality of the study hence facilitating ambulation and physical activity among the participants of this study. In this present study, there was a significant positive correlation between neighborhood environment adaptation and physical activity. This is concordant with studies [27, 42, 43]. Neighborhood adaptation had no significant correlation with physical function and any of the items of the socio-demographic data (age, general health and educational attainment) of the participants of this study and reason for this is still unknown.

5. Limitations

This study has some limitation which includes the use of self report measures especially of physical activity and physical function, with the potential for information bias. Over reporting due to social desirability leading to overestimation or underestimation of the levels of physical activity and physical functions. Secondly, there was lesser time to recruit many participants for the study. The participants were recruited irrespective of their comorbidities thereby making it difficult to determine the roles of comorbidities on the level and interrelationships between the constructs.

6. Conclusion

Older adults in Asaba, Delta State, Nigeria had: adequate physical activity, dependent in performing activities (physical functions) and fair neighborhood environment adaptation. There were significant direct relationships between physical activity and each construct of physical function and neighborhood environment adaptation. Physical activity had direct significant correlation with some of the socio demographic data of general health and educational attainment and inverse relationship with age. There was no significant relationship between physical function and neighborhood environment adaptation, reason is still not clear. Greater effort should be made by stakeholders (government, families, communities, healthcare workers) in increasing the physical activity by given rewarded tasks that prevents sedentary lifestyle among older adults in Asaba, Delta State, Nigeria as physical activity has been shown to directly correlate with physical function and neighborhood environment adaptation. Further studies can be done on how several comorbidities associated with older adults affects the constructs of this study.

Declaration of Conflict of Interest

The authors wish to declare that there are no potential conflicts of interest which could partially or full prejudice the research report.

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