UNIVERSITY OF CAPE COAST

BODY COMPOSITON AND CARDIORESPIRATORY ENDURANCE: PREDICTORS OF PHYSICAL FUNCTIONING AMONG OLDER ADULTS IN NAVRONGO, UPPER EAST REGION-GHANA

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BY

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DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result of my own original research and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature…………………………… Date………………………

Name: Eric Ayine Aloko

Supervisor's Declaration

I hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

Supervisor's Signature…………………….. Date……………………..

Name: Dr. Edward Wilson Ansah

ABSTRACT

Aging is an inevitable part of human life and everyone will grow and become old. The aging process is characterized by reduced physical activity levels, excess accumulation of fat and loss of muscle mass resulting in extra weight gain reduced cardiorespiratory function leading to loss of physical function among the aged. The purpose of this study was to determine the extent to which components of physical fitness (body composition and cardiorespiratory endurance) predict physical functional capacity of older adults in Navrongo. This study employs quantitative cross-sectional design to determine the role of physical activity in body composition and cardiorespiratory endurance which in turn influence physical functional capacity of the adults. A multistage sampling method was used to sample 998 participants for this study. The senior fitness test battery, international physical activity questionnaire short form for the elderly, weighing scale and tape measure were used to collect the data. The results indicated that older adults in Navrongo are minimally active with older women being overweight, with reduced cardiorespiratory endurance and physical functional capacity. The minimal physical activity levels of older adults correlated weakly with their cardiorespiratory endurance, body composition, and physical functional capacity levels. Body composition and cardiorespiratory endurance were found to be predictors of physical functional capacity of older adults in Navrongo. It is recommended that, mass education on the health benefits of regular participation in physical activity is done through the media in Navrongo. Additionally, it is recommended that, older adults should spend less time sitting and be more active.

KEY WORDS

Cardiorespiratory endurance

Body composition

Physical functional capacity

Older adults

Physical activity

Navrongo

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DEDICATION

To my family

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CHAPTER ONE

INTRODUCTION

Background to the Study

Aging is an inevitable part of human life, and everyone will grow and become old. This process of aging comes with limitations in physical functional abilities (World Health Organization, 2008). This becomes more apparent with the increase in body weight and compromised cardiorespiratory function. According to Magyari, Lite, Kilpatrick, and Schoffstall (2018), body composition and cardiorespiratory endurance are two most studied physical fitness components that affect physical functional capacity of older adults. They explained that physical functional capacity refers to a person's ease of performance of physical and motor activities of daily living. Meanwhile, physical activity, exercise, rest, and nutrition are key elements that must be taken seriously by individuals irrespective of age. Exercise is a systematic, repetitive body movement with the goal of enhancing or maintaining fitness, as opposed to physical activity (PA), which is any movement of the skeletal muscles that results in energy expenditure (Garber et al., 2011). Thus, physical activity and exercise, nutrition, and rest are some of the determinants of body composition and cardiorespiratory endurance, which determine how individuals' transit into healthy aging (Magyari et al., 2018).

Aging is a process that can be healthy or unhealthy. The process of ageing is characterized by decline in cardiovascular function (Bolton, & Rajkumar, 2019). This causes increase in blood pressure, compromised body composition as a result of decrease in muscle mass (sarcopenia), increase in adiposity, and muscle fat infiltration, all leading to a decrease in functional capacity (Carbone, Lavie, & Arena, 2017). The age-related decline in physical functional capacity resulting from reduced mobility and the increased efforts needed to perform daily activities, that could ultimately lead to avoidance of meaningful physical activity and exercise resulting in sedentary living. This places an individual at a high risk of cardiovascular diseases (CVD), obesity, and high risk of disability (Magyari et al., 2018). In as much as it is established that older adults are less active (Fernández-García, Castillo-Rodríguez, & Onetti-Onetti, 2019), it is also obvious that physical activity and exercise have several physiological and health advantages (Cartee, Hepple, Bamman, & Zierath, 2016). Exercise routines that focus on muscular and aerobic endurance, such as endurance and resistance training, have been shown to be effective (Banitalebi, Bovirhasani, & Baghanari, 2015). Thus, promoting physical and cognitive functional capacity of individuals and reduction in the risk for chronic diseases among older adults (de Asteasu, Martínez-Velilla, Zambom-Ferraresi, Casas-Herrero, & Izquierdo, 2017).

The aging bracket is increasing in all continents of the world. According to the United Nation Department of Economic and Social Affairs, Population Division’s (2019), there were 703 million people worldwide who were 65 years of age or older. The number of older people is expected to double over the next three decades, reaching 1.5 billion people by 2050. In Northern America and Western Asia, the number of elderly people is projected to climb at the quickest rate, from 29 million in 2019 to 96 million in 2050 (an increase of 226%). The second fastest rise in the number of older persons is foreseen in “sub-Saharan Africa with expected growth from 32 million in

2019 to 101 million in 2050 (218%)" (United Nation Department of Economic and Social Affairs, Population Division, 2019, p.5).

Unfortunately, the aging population is likely to increase the burden of chronic illness in all economies of the world. According to the United Nation Department of Economic and Social Affairs, Population Division, (2019), it is envisaged that the number of older adults with non-communicable diseases will increase, with more disabilities and decline in physical functional abilities globally, with CVDs as part of the three-leading causes of deaths in the world. The case in low-and-middle-income countries is worse, as WHO (2014) revealed that over 80 percent of deaths relating to CVDs occurred in these countries including Ghana. This is because the presence of one or more physical limitation increases with age (Holmes, Powel-Griner, Lethbridge-Cejku, & Heyman, 2009).

Accordingly, 7% of American adults aged 50-59 have one or more physical limitations while 43% in age groups 60-69, 70-79, 80 and over have three or more physical limitations. For example, according to Power (2020), CVDs associated with physical inactivity is the second leading cause of deaths among Canadians aged 60 years and above with a total of 53,134 deaths in 2018. In addition, obesity was pushed to the forefront as the leading risk factor for CVDs among individuals aged 60 years and above. Therefore, efforts must be made to regularly engage in moderate-vigorous intensity of physical activity and exercise as they attenuate the negative consequences of cardiovascular endurance and body composition.

Sub-Saharan Africa has a population rapidly reaching one billion people (Gu, Andreev, & Dupre, 2021). In addition, it is estimated that 4.9

percent of the total population of persons living in sub-Saharan Africa as at 2015 were 60 years and over, with this proportion projected to reach 7.6 percent by the year 2050. Accordingly, number of people 60 years and over which stood at 64 million in 2015 is projected to increase to 220 million by 2050. These increasing numbers and population proportions of older adults bring opportunities and challenges, but it is envisaged that the challenges will be on the ascendancy than the benefits. The increase of non-communicable diseases (NCDs), which are the main causes of death globally and account for 71% of all fatalities, is another issue. NCDs kill 41 million people annually. Additionally, there is already evidence of the burden of NCDs in sub-Saharan Africa, which is being driven by a rise in the frequency of cardiovascular illnesses connected to physical inactivity, poor nutrition, and obesity (WHO, 2014).

Unlike most western countries where there is the built environment for exercise, the sub-Saharan African built environment is not exercise friendly thereby increasing the avoidance of physical activity and exercise among the aged (Wendel-Vos, et al., 2015). Currently, there is no data on the number of people 60 years and over who have physical functional limitation. However, it is anticipated that more than 60% of the total population of older adults in sub-Saharan Africa have at least one or more physical functional limitation (Stuck, Tenthani, & Egger, 2013). Therefore, governments in Africa and the African Union (AU) need to pay attention to this rise in the number of older adults in the continent and make conscious efforts to put interventions that will save and preserve their lives. Among such interventions could be providing exercise education and creating exercise friendly environment where people can exercise safely outdoor with little or no challenges.

The number of people 60 years and over in Ghana from 2000 to 2010 have reduced from 7.2 percent to 6.5 percent (Ghana Statistical Service [GSS], 2013). Additionally, despite this reduction, it is projected that the number of older adults will triple by the 2030. The health-related problems that accompany the ageing process are so enormous that if care is not taken, the dependency ratio will be high as most older adults may not be functionally independent as a result of disability caused by physical inactivity (Stuck, Tenthani, & Egger, 2013). The avoidance and decline in physical activity and exercises, poor nutrition and tobacco use are the leading cause of chronic NCDs (WHO, 2014). In order not to lose the ageing population due to disability, illness, and death associated with physical inactivity and obesity, attention needs to be paid to the physical fitness levels which are key for maintaining good health and high life expectancy (Almeida et al., 2014)

Functional independence and care for the aged has become a global concern due to the fact that older persons are prone to a lot of health problems (United Nation Department of Economic and Social Affairs, Population Division, 2019). According to the GSS District Analytic Report for Kassena Nankana, the number of older adults in the Municipal capital as at 2010 was 9,728 and this number is projected to reach 20,000 by the next census. This calls for innovative interventions to save the lives of the aged in Navrongo

Statement of the Problem

Physical functioning capacity of individuals is key to their health but this could be compromised by the weight, and other illnesses. Sunghye, Xiaoyan and Stephen (2017) study on body composition and physical function in older adults and comorbidities in the US concluded that body composition is a predictor of physical function among individuals 60 years and over. A study from Denmark also found body composition as a determinant of physical function among older adults (Perdersen, Ovesen, Schroll, Avlund, & Era, 2002). Another study from US, by Manini and Pahor (2009) concluded that cardiorespiratory endurance was the determinant of physical functional capacity among older adults in Florida. However, there seems to be no available research from Africa and specifically Ghana on the interplay among body composition, cardiorespiratory endurance, physical activity levels and functional capacity of the aged.

From the 1970s through to the late 1990s, the economy of the Kasena-Nankana Municipal was largely agrarian (Oduro, 2012). One of West Africa's largest agricultural dams, the Tono dam, situated in the Kasena-Nankana Municipal made farming an order of the day with about 90% of the population dependent on subsistence agriculture. Most of the farming activities were manually done and required physical exertion of power. This in a way provided the people with their physical fitness needs. However, years later, farming activities in the Municipality declined due to low agricultural yields coupled with poor rainfall patterns, rural-urban migration, sales of farmlands for constructions purposes, among others. This trend saw a lot of people abandoning farming activities and doing other activities that required little physical efforts. Beside this, most of the rural dwellers are now migrating to the Municipal capital (Navrongo) in search of jobs. Thus, the people of the Navrongo who were farmers and via farming activities were able to meet the

WHO global PA recommendation of 150 minutes of moderate to vigorous intensity of PA per week, fell short of the WHO recommended due to changes in activities

A study on Self-reported health and functional limitation among older people in Navrongo showed that, over 80% of the participants self-rated their health and physical function to be good (Oduro et al., 1995). This positive result was attributed to the involvement of majority of the populace in farming activities. A follow up study in 2010 showed a different result as over 65% the participants self-reported at least 2 or more physical functional limitations (Kowal et al., 2010). They therefore concluded that, there was a high positive correlation between farming (PA) and overall health status and physical functional abilities. They however, were of the view that, the change in activities (abandonment of farming and other physically active activities to activities that involved less physical activity participation) among the people of Navrongo contributed significantly in the later results. It is worth noting that, the study in Navrongo relied on self-report and lacked physical measurement of physical functional capacity parameters. The lack of physical measurement of physical functional capacity and the new trend (of less opportunity of PA) which also coincides with an increase in the number of older adults in Navrongo (GSS, 2010), calls for innovative interventions to help promote PA and overall physical functional health capacity of the people. However, there seem to be no sufficient evidence to back such PA and exercise intervention programmes. Hence the need for this study.

Purpose of the Study

The purpose of this study was to determine the extent to which BC and CRE predict physical functional capacity of older adults in Navrongo. It is hypothesized that, physical activity participation will improve cardiorespiratory endurance, body composition and physical functional ability of these older adults.

Research Objectives

The objectives of this study are to:

1. Determine the physical activity levels of older adults in Navrongo.
2. Find out the gender difference in body composition, cardiorespiratory endurance, physical functional capacity and physical activity participation levels.
3. Find out the correlation between body composition, cardiorespiratory endurance, functional capacity and physical activity levels of adults in Navrongo.
4. To determine the effects of body composition and cardiorespiratory endurance on functional capacity of older adults.

Research Questions

The study was influenced by the following research inquiries:

5. What are the physical activity levels of older adults in Navrongo?
6. What is the gender difference in body composition, cardiorespiratory endurance, physical functional capacity and physical activity participation levels?

7. What is the correlation between body composition, cardiorespiratory endurance, functional capacity and physical activity levels of adults in Navrongo?
8. What are the effects of body composition and cardiorespiratory endurance on functional capacity of older adults?

Significance of the Study

This study will be beneficial to the aged and people of the Navrongo as the findings of the study will bring to light the health-related components of physical fitness that determine physical functional capacity. Also, findings of the study will inform the populace the likely physical activities that could improve the health-related components of physical fitness with emphasis on components that predict physical functioning among older adults.

The findings of this study will be significant to gym instructors in the municipality as they will be informed on how to design a good training programme for their clients especially the aged. This training programme guidelines will include how to take pulse, calculate maximum heart rate (MHR), how to determine intensity levels etc. In addition, the findings will add to existing literature and contribute to new knowledge.

Delimitations

The study was delimited to only adults who are 60 years and above in Navrongo in the Upper East Region of Ghana. The instruments for data collection are also delimited to the Senior Fitness Test Battery (functional fitness test), weighing scale, tape measure and IPAQ short form for older people.

Limitations

Extraneous variables such nutrition and medical conditions of the participants were not controlled and could have influenced the performance of participants during the various test.

Definition of Terms

Body composition: The ratio body fat to lean mass

Physical activity: Any bodily movement carried out by the skeletal muscles that require energy expenditure.

Cardiorespiratory endurance: The ability of the cardiovascular and respiratory systems to deliver oxygenated blood to all working muscles and other organs during continuous physical exercise

Physical functional capacity: The ability to carry out activities of daily living without undue fatigue.

Body mass index: It is a measure of body fat by dividing weigh in kilogram by square of height in meters.

Older adults: Individuals who are 60 years and above

Sedentary lifestyle: a lifestyle characterized by a lack of physical activity or exercise. It involves sitting or lying down for extended periods of time, typically for more than 8 hours a day, with little to no physical activity

Obesity: A medical condition characterized by excess body fat that increases the risk of various health problems. It is typically defined by a body mass index (BMI) of 30 or higher.

Physical fitness: Physical fitness refers to the ability of the body to carry out daily tasks and activities with vigor and without excessive fatigue.

Organisation of the Study

This study is organised into five chapters. Chapter one comprises, introduction, background to the study, statement of the problem, purpose of the study, research questions, significance of the study, delimitation, limitations, definition of terms and organisation of the study. Chapter two focused on the review of related literature. Chapter three focused on research methods, research design, study area, population, sampling procedure, data collection instruments, data collection procedure and data processing and analysis. Chapter four looked at results and discussions. Finally, chapter five looked at summary of the study, conclusions, recommendations and suggestions for further studies.

CHAPTER TWO

LITERATURE REVIEW

The purpose of this study was to determine the extent to which BC and CRE predict physical functional capacity of older adults in Navrongo. This chapter is dedicated to the review of related literature based on the following headings:

1. Concept of Aging
2. Aging and Physical Activity Participation
3. Disengagement Theory of Aging
4. Physical Activity Participation and Gender
5. Relationship Between Body Composition and Cardiorespiratory Endurance
6. Influence of Built Environment on Physical Activity Participation
7. Effects of Aging and Physical Activity Levels on Body Composition, Cardiorespiratory Endurance and Physical Functional Capacity.

Concept of Aging

The body's tissues and organs undergo gradual but accelerated changes as we age (Fedarko, 2018). Increased vulnerability to disease and mortality, loss of homeostasis, decreased ability to respond to internal and external stress, and deterioration of functional characteristics at the molecular, cellular, tissue, and organ level are all consequences of functional capacity loss (Borrás, 2021). Ageing is a highly complex phenomenon (Trojahn, Dobos, Lichterfeld, Blume-Peytavi, & Kottner, 2015). The pace of aging varies within each individual member of any given species, in addition to differing between individuals of the same species (Franceschi et al., 2018). The causes of this are not entirely understood. According to some theories, people are born with a certain quantity of vitality (the capacity to support life), which gradually decreases as they get older (Cabeza et al., 2018). External conditions also influence how long people live and when they die (Galluzzi, et al., 2018). Most organs have a decline in their ability to operate and to maintain homeostasis as people age (Chandel, Jasper, Ho, & Passegue, 2016; Fedarko, 2018). Ageing is gradual but dynamic process that is influenced by a variety of internal and external factors, such as genetics or social and physical settings (Sachdev et al., 2015). Additionally, aging is multidimensional and multi - directional in that the rate and direction of alteration (gains and losses) in various traits for each person and between persons can vary (Wurm, Diehl, Kornadt, Westerhof, & Wahl, 2017). As a result, aging must be looked at from a life-course perspective. Galkin, Zhang, Dmitriev, and Gladyshev (2019) explained that with passage of time, aging occurs inside a cell, an organ, or even the entire organism. Additionally, it is also a process that all living creatures go through during their entire adult lives.

Gerontology, the study of aging, is committed to the understanding and control of all variables contributing to the finiteness of individual life, according to Vieira, de Oliveira, Moreira, and Vieira (2017). They therefore, defined gerontology as the science that studies the three characteristics of longevity, aging, and death which are expressed in the finitude of life from both an evolutionary and an individual (ontogenetic) perspective. Ageing, in contrast to longevity, is the sequential or gradual change inside an organism that raises the chance of debility, illness, and mortality (Nikhra, 2020). These aging-related phenomena make up senescence (Calcinotto et al., 2019). Age and aging are viewed by gerontologists by at least four angles.

The first is chronological age, which is based on the year(s) since a person's birth. Biological aging, which is defined as a collection of internal, common, damaging, progressive, and cumulative processes, is a second factor.

These methods reduce the subject's tolerance for stress and other survival risks (Ljubuncic & Reznick, 2009). The third factor, referred to as psychological aging, refers to the psychological changes that occur as we age, particularly those that have an impact on our personalities and cognitive abilities. Age according to the calendar is not always indicative of biological or psychological maturity, say gerontologists. For instance, some 65-year-olds can appear and act considerably younger than 50-year-olds (Fedarko, 2018). The social aspect of aging is the fourth. Changes in a person's roles and relationships in formal institutions like the workplace and places of worship as well as their social networks of friends and family are referred to as social aging. Social aging can vary from person to person, but it is also significantly influenced by how a culture views aging culturally, claims Donizzetti (2019). In cultures where aging is viewed favorably compared to those where it is not, people may have happier and more positive social aging experiences.

Levels of Physical Activity and Aging

Age-related declines in physical activity are caused both by social and physiological factors. Physical impairments, disease, and discomfort are frequently linked, as is retirement accompanied by a loss of interest. According to reports, elderly adults engage in incredibly little physical activity and many of them choose to stay inactive despite knowing the advantages of doing so (McPhee et al., 2016). Physical inactivity among healthy older adults raises the risk of cardiovascular disease, osteoporosis, muscle mass loss and type 2 diabetes mellitus. Age-related declines in physical activity are caused both by social and physiological factors. Physical impairments, disease, and discomfort are frequently linked, as is retirement accompanied by a loss of interest. According to reports, elderly adults engage in incredibly little physical activity and many of them choose to stay inactive despite knowing the advantages of doing so (McPhee et al., 2016).

Physical inactivity among healthy older adults raises the risk of cardiovascular disease, osteoporosis, muscle mass loss and type 2 diabetes mellitus. (D'Isanto, Manna, & Altavilla, 2017). Impairment in muscle protein synthesis and enhanced insulin resistance are both caused by a proportionate increase in fat content at the detriment of muscle mass (Calonne et al., 2019). According to estimates, 10% of the world's population, or around 650 million individuals, live with a handicap. (Moody-Ayers, Mehta, Lindquist, Sands, & Covinsky, 2005). Additionally, they contend that this number is anticipated to rise in the future due to improvements in medicine and a longer life expectancy. furthermore, studies have indicated that risky lifestyle choices like engaging in intense physical exercise can help prevent disability. In particular, research indicates that exercise can delay the onset of infirmity in the elderly, even if it is started later in life (Lafortune et al., 2016).

Physical inactivity is thought to be the fourth biggest global risk factor for mortality. Heart disease and stroke, the leading and second-leading causes of death worldwide, respectively, are also exacerbated by inactivity (such as increased sitting time) (Kraus et al., 2018; Physical Activity Guidelines

Advisory Committee. 2019). For the purpose of promoting health, older persons should perform at least 150 minutes per week of moderate aerobic exercise, 75 minutes per week of vigorous aerobic exercise, or a similar combination of moderate and vigorous intensity physical activity, according to the WHO's approved physical activity guidelines for promoting health (Troiano, Stamatakis, & Bull, 2020). Additionally, it has been shown that aerobic exercise of a higher intensity is more efficient at reducing arterial stiffness, which also is linked to cardiovascular events. Older adults should engage in at 150 minutes of moderate aerobic exercise per week, at least 75 minutes of intense aerobic exercise per week, or a similar blend of moderate and vigorous intensity physical activity for health promotion, according to the WHO's approved physical activity guidelines for promoting health (Troiano, Stamatakis, & Bull, 2020).

A higher intensity of aerobic exercise has also been proven to be more effective at reducing arterial stiffness, which is similarly connected to cardiovascular events (Evans, Willey, Hanson, & Stoner, 2018). In order to maintain or improve health and to stop the onset of diseases like cardiovascular disease, it is crucial to encourage older persons to engage in more overall physical activity and to avoid higher intensity physical activity from declining. Additionally, experts point to lifestyle variations as one of the causes of health disparities in groups (Mendes De Leon, Barnes, Bienias, Skarupski, & Evans, 2005).

Given that there are numerous age-related factors at play in this process, it appears difficult to gain muscle mass and strength as we become older. Younger and older individuals can both increase their relative strength following strength training, according to reports (Fragala et al., 2019), while others have noted a diminished benefit for the elderly. Older women should avoid physical inactivity since they have lower muscle mass, strength, and power than men do and are more likely to be at risk for losing their independence in daily living activities (Hoang, Jullamate, Piphatvanitcha, & Rosenberg, 2017). Additionally, compared to their male counterparts, women have reportedly shown less ability to gain muscle growth after working out (Trombetti et al., 2016).

Disengagement Theory of Aging (DTA)

Everyone will eventually grow old and lose the appeal of youth due to the inevitability of aging. Being old is a bad state because it comes with issues with the economy, society, and one's health. In addition, the health problems brought on by aging are linked to the marginalization of older people from society (Saffarinia, & Dortaj, 2018). This rationale is in line with the Disengagement Theory of Ageing (DTA), first put forth by Cumming and Henry (1961). The idea holds that as people age, their abilities deteriorate, especially their ability to engage with friends and family. People who are developing progressively break ties with others in their community, in contrast to their younger counterparts, which results in inactivity and loneliness. However, the fact that they are senior does not lessen their importance in society. They actually have more life experience than those who are typically perceived as being active and productive.

Age thus continues to be crucial to socioeconomic development. Though some scholars agree with DTA (Saffarinia, & Dortaj, 2018) have also discovered that loneliness and physical inactivity are strongly connected with the senior population. Studies that supported the DTA were carried out in underdeveloped nations. For instance, it could be surprising and almost inappropriate for older couples or individuals to attend a night club in some developing countries like Ghana, Nigeria, Kenya. However, the life expectancy of older adults in a developing country is relatively short; about 63 years (Stenholm et al., 2016).

The social aspects of engaging in vigorous physical activity activities can also be influenced by the physical surroundings. For instance, older people's social engagement and physical activity involvement are more likely to be influenced by towns that are well-designed to facilitate physical exercise like walking, jogging, and cycling (Salvo, Lashewicz, Doyle-Baker, & McCormack, 2018). For example, Bernard et al. (2019) found that urban areas and infrastructural facilities in affluent nations support social activity and physical exercise for all ages better than those in poor developing nations like Ghana, where its social environment is not conducive to physical activity. What this condition suggests is that each person in such a setting is most likely to lose the majority of the social contacts they can make as they age. Being a part of a culture where there are few individuals or no one to socialize with at old age may contribute to low average lifespan and be more common among adults in developing countries. Such a society is also extremely likely to deter social interaction and physical exercise in old age (Asiamah, Petersen, Kouveliotis, Eduafo, & Borkey, 2020).

The aging process is characterized by decline in physical activity participation as a result of the extra efforts required to perform such activities. This is predominantly found among the aged because of the decline in cardiovascular function, muscle mass (sarcopenia), increase in adiposity, and muscle fat infiltration (Carbone et al., 2017). Age-related functional abilities (strength, endurance, agility, and flexibility) loss makes it harder to perform daily activities. Furthermore, despite the fact that physical exercise is proven to increase quality of life, independence in daily living, and the avoidance of chronic health issues, older persons tend to become less active as they age. Even though functional losses (such as trouble strolling, having to carry packages, and climbing stairs) are associated with aging, this may be exacerbated by a lack of physical activity, which can lead to a decline in cardiovascular fitness and exercise performance, disuse atrophy, and occasionally cellular loss (Bolton, & Rajkumar, 2019). Thus, from figure 1, aging leads to social disengagement and decline in physical functioning. In turn, physical inactivity and loss of family ties and friends also results from social disengagement. Age-related losses in an individual's level of physical activity are accompanied by declines in their health-related physical fitness (body composition, cardiorespiratory fitness, muscular strength and endurance, and flexibility), which further reduces their physical functional skills.

Theoretical Framework

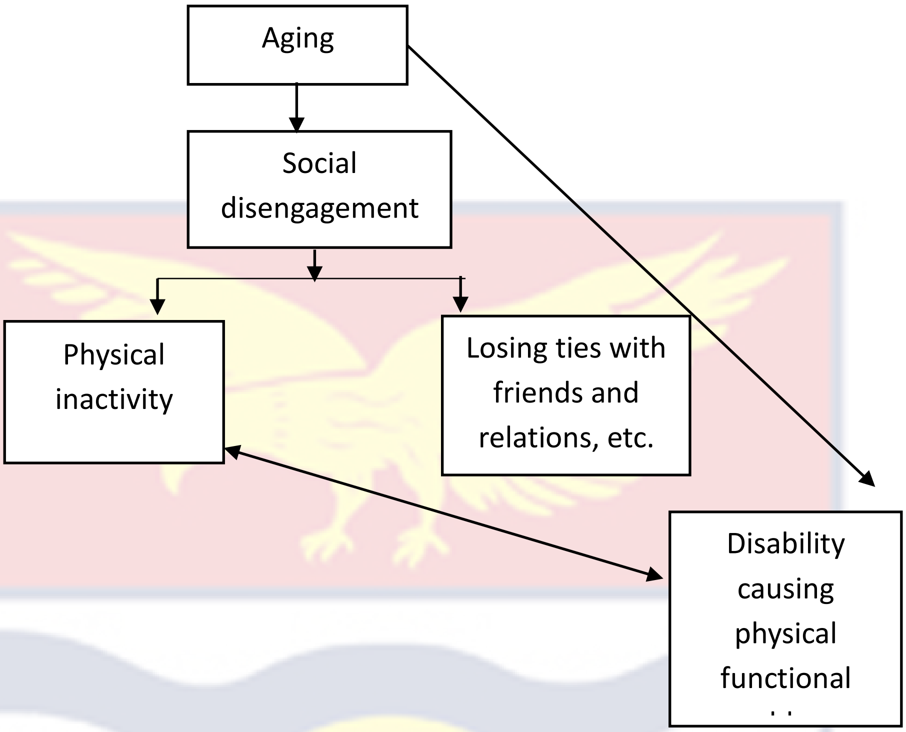

Figure 1: Disengagement theory of aging and physical activity model (Cumming & Henry 1961).

Conceptual Framework

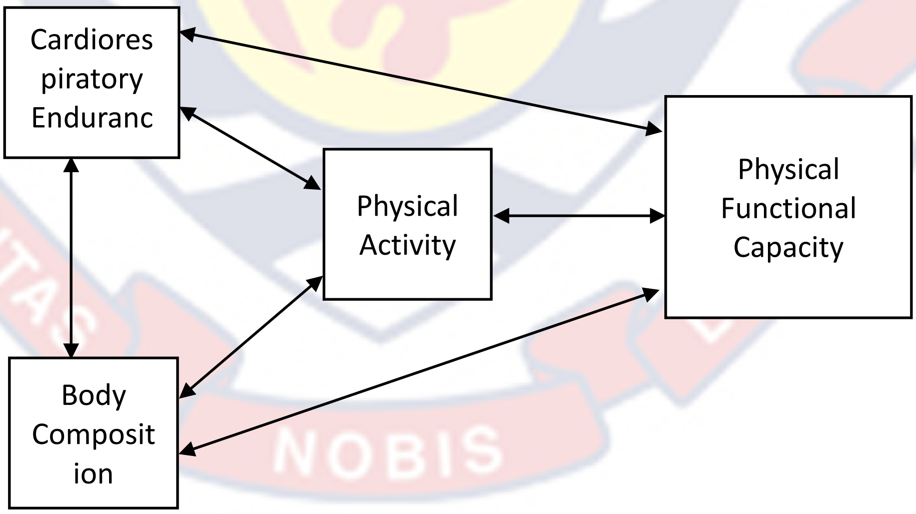

Figure 2: Diagram showing the interplay between CRE, BC, PA and PFC among older adults

Based on the theoretical framework, the above conceptual framework showing the interplay between BC, CRE, PA and PFC designed. From figure

2 above, BC and CRE levels have direct effects on PFC. Therefore, an increase in CRE levels will lead to improved PFC and vice versa holding all factors constant (Kuner, & Kuner, 2020). Like a health body weigh may lead an enhanced PFC. Also, a relationship exists between BC and CRE. CRE levels are known to be improved only through aerobic PA (Landon-Cardinal et al., 2020). Therefore, an individual with an improved CRE measurement is likely to have a healthy body weight since aerobic exercises are also known to reduce body fat. However, if an individual has an unhealthy body weight or is obese, he or she may avoid meaningful PA because of the extra effort that is required to perform such activities leading to reduced CRE levels (Izquierdo et al., 2021) It is also depicted from the diagram that, limitation in PFC brought about as a result of aging may lead to reduced CRE and PA levels as well as unhealthy body weights.

Physical Activity Participation and Gender

The benefits of physical activity for physical, social, and emotional health are well known and support the public health justification for promoting adequate physical activity levels each day (Haynes et al., 2020). As of now, male and female children, adults, and prescribed levels of physical exercise are all the same throughout numerous nations. For adults, the recommendations are 30 minutes per day of moderate-intensity exercise and 60 minutes per day for children, but there are no gender-specific modifications. (Martin, Booth, Laird, Sproule, Reilly, & Saunders, 2018). Additionally, health professionals continue to ignore the concept that ladies may require different amounts of exercise than males (Anantharam, 2018). According to Amagasa et al. (2020), females were consistently identified as 6–

10% less active than males when the degree of physical activity has been quantified, irrespective of measurement instrument, technique, or terminology.

This circumstance poses a number of questions, including how much the lesser levels of physical activity among women compared to men have an impact on their health. Is the idea that a "one size fits all" strategy is the best way to get both male and female, moving in a meaningful and healthy way? These queries are made all the more important when you take into account that, while generally being more physically active than women, men typically have a worse state of health. For instance, men are more likely than premenopausal women to develop cardiovascular disease and hypertension (Colafella, & Denton, 2018).

The leading cause of lost years of life in men in 2007 was cardiovascular disease (CVD), which had an age-adjusted mortality rate that was over 75% higher in men than in women (Pylypchuk et al., 2018). Therefore, despite the fact that women exercise less than men, it does not follow logically that they aren't healthy (Hands, Parker, Larkin, Cantell, & Rose, 2016). Hands et al. further stated that it is critical to take into account the various requirements and preferences according gender, mode, and setting in order to motivate everyone to engage in sufficient and meaningful physical activity. It is clear that there are distinctions among males and females throughout the lifespan. In prenatal (Bischoff, da Silva, Dalle, Maróstica, & Silveira, 2018), infanthood (Prioreschi et al., 2017), childhood (Telford, Telford, Olive, Cochrane, & Davey, 2016), adolescence (Bahmani et al, 2017), adulthood and old age males are more physically active (Corder et al, 2019). Due to these disparities, females are frequently regarded as having a higher risk of experiencing negative health effects and are designated as a major priority category for programs promoting physical activity (Dogra, 2017). However, there is minimal proof that lower levels and intensities of physical activity pose a health risk to women (Rhodes, Janssen, Bredin, Warburton, & Bauman, 2017).

Studies revealed that previously there has been a failure to recognize the physiological distinctions between men and women and how these can affect the use of suitable cardiovascular disease treatments and sex-specific pathophysiology (Hands et al., 2016). Numerous Caucasian guys between the ages of 18 and 20 who were either in the military, athletics, or medical schools are believed to have provided the majority of the data on healthy individuals (Knapik, Sharp, & Steelman, 2017). The workout responses cannot be generalized to females or even to males who do not meet this description (Hands et al., 2016). In addition, they discovered that the relationship between MET hours/week of physical activity and mortality risk hazard ratios for men and women was different. It is well known that when activity levels go from sedentary to low intensity, both men and women experience the greatest health benefits. Additionally, when physical activity intensities rise above modest levels, variations between men and women become apparent. While intense physical exercise (>6 METs) boosts male health, data suggests that women can have significant health advantages from as little as fifteen minutes per day of low- to moderate-intensity physical activity (3 METs to 3-6 METs). Many research, particularly those that involve post-menopausal women, have revealed that so many women gain less from increasing their physical activity to a strong intensity (Dbrowska-Galas, Dbrowska, Ptaszkowski, & Plinta

2019). Overall, it seems that when physical activity is increased beyond low to moderate intensity, women benefit more than males in terms of mortality reduction (Warburton, & Bredin, 2017).

The current emphasis on the necessity of moderate to intense levels of physical exercise for health in everyone, to may not be as appropriate to women as it is to men (Hands et al., 2016). Additionally, there are gender disparities in the advantages of various degrees of physical exercise in relation to a variety of adverse health outcomes. For instance, older women are more protected against coronary artery disease, disability, diabetes, enhanced physical functioning, and independent living than older males are from light to moderate intensity exercise such as brisk walking. Studies have revealed that perhaps the relative risk for heart disease decreased more quickly in women than in men with lower amounts of physical exercise (Zong, Rabinowitz & White, 2016). Physical activity levels and risk reduction are related to several cancer types, and gender may also be important. For instance, Friedenreich et al. (2019) found a link between higher female leisure activities and a decreased risk of colon cancer. However, both recreational and professional physical exercise were linked to risk decrease in males. While there are signs that regular exercise has some benefits for smokers, it does not appear to reduce risk for non-smokers when it comes to lung cancer. Friedenreich et al. (2018), reported that the effect is more noticeable in recreational activities for males than in females compared to job-related physical activity.

There are also variations in how different genders react to risk reduction through exercise. Many different sorts of activity, such as chores and leisure pursuits, reduce the risk of breast and endometrial cancer, with endometrial cancer risk decreasing with mild to moderate workouts (Lal & Sarhadi, 2020). Nevertheless, it differs based on the type of prostate cancer. Additionally, there is some evidence linking increasing levels of physical activity to a lower risk of prostate cancer (Shephard, 2017).

To obtain meaningful reductions in many types of cancer, it appears that there is a need for improved understanding of the type of physical exercise and the dose response. When one considers the health advantages associated with physical activity, gender implications are further confounded. According to Asztalos et al. (2017), engaging in strenuous physical activity reduced symptoms of anxiety and depression in men and increased mobility, especially in the elderly. Additionally, the fact that males are exercising more frequently and with greater intensity may not be as harmful to their overall health. Walking was found to be favorably associated with older women's emotional wellbeing, and moderate-intensity exercise helped older women live independently by reducing the symptoms of functional disability. Walking in particular is advised because it might provide possibilities for social connection and bonding, which are highly desired by women. They came to the conclusion that men benefit more from intensive exercise than women do from lighter exercise. According to Morimoto et al. (2018), physical activity has varied effects on men's and women's health-related quality of life.

Relationship between Age, Gender and Cardiorespiratory Endurance Among the Aged

According to Curtis, Karki, Hattoum, and Sharma (2018), cardiorespiratory fitness is a crucial indicator of a person's overall health since it reflects both accumulated physical activity and underlying genetic makeup. However, it is well recognized that men and women have different levels of fitness (Dawes et al., 2017). There are several numbers of behavioral and social differences between the sexes, in addition to certain physiological disparities in fitness (e.g., skeletal muscle mass, heart and lung size) (Ansdell et al., 2020). For example, Katzmarzyk, Lee, Martin, and Blair, (2017), espoused that, men reported being more physically active than women in a poll of individuals in the United States conducted in 2003–2004.

Since many of the available cohort studies on fitness have only included either men or women rather than both sexes, it is unknown whether or not these gender-specific differences in fitness translate into a difference in mortality risk. Furthermore, gender-specific fitness disparities are not taken into consideration in the existing recommendations for enhancing personal fitness through physical activity (Imboden et al., 2018). Steenman and Lande (2017) argue that the deterioration in cardiovascular function brought on by aging significantly raises the risk of coronary artery disease (CVD) in older people. In addition to atherosclerosis, stroke, and myocardial infarction, it has been shown that the prevalence of CVD increases with age in both men and women (Einarson, Acs, Ludwig, & Panton, 2018). According to Malmborg et al. (2021), the incidence of CVD in men and women is 40% between the ages of 40 and 59, 75% between the ages of 60 and 79, and 86% in people over the age of 80. Because of the high incidence of CVD, older persons represent a significant burden for the current global healthcare system.

The burden of CVD is directly associated to higher mortality, morbidity, and frailty in affected persons, which also translates to significant overall healthcare expenses (Rodgers et al., 2019). The need for a greater knowledge of the etiologies linked to CVD in older persons is crucial given that the global population of the aged is predicted to increase by up to two- and three-fold by 2050 (Götmark, Cafaro, & Sullivan, 2018; Rodgers et al., 2019). Numerous risk factors, including obesity, diabetes, and hypertension, have been associated to the emergence of CVD (Barroso et al., 2017). However, there are also many instances where gender disparities in the development or prevalence of CVD are seen in aging adults (Rodgers et al., 2019). Malmborg et al. (2021) mention that the AHA 2019 Heart Disease and Stroke Statistical Update found that the incidence of CVD was reported to be 77.2% in males and 78.2% in women between the ages of 60 and 79 years. Additionally, it was discovered that 89.3% of males and 91.8% of women over the age of 80 had a CVD.

Along with male sex and age, the main risk factors for cardiovascular disease (CVD) include. According to Rodgers et al. (2019), sex hormones and their accompanying receptors are primarily responsible for the overall sex variations between men and women that result in differences in CVD risk factors and outcomes. Furthermore, estrogen (E2) has been widely researched for its possible cardio preventive effect due to the significant difference in cardiac risk factors among premenopausal and postmenopausal women. However, because of the possibility for serious side effects and variable benefits, hormone replacement therapies (HRT) that use estrogen therapy are highly contested (Genazzani, Monteleone, Giannini, & Simoncini, 2021).

Age is a major independent risk factor for cardiovascular disease since it is connected to a higher likelihood of developing a number of additional heart disease risk factors, such as diabetes and obesity (Rodgers et al., 2019). The majority of CVDs are substantially more common in elderly people than in the general population. Malmborg et al. (2021) report that between 2013 and 2017, 77.8% of females and 70.8% of males aged 65 to 74 were diagnosed with hypertension, also known as high blood pressure. In addition, rates of diagnosed hypertension dramatically rose to 80.0% for males and 85.6% for women over 75. One of the main risk factors for CVD is hypertension, which has been associated with a number of things including drinking alcohol, eating poorly, tobacco use, and overweight (Rodgers et al., 2019). Furthermore, among older adults, obesity, gender, and age are strongly linked to hypertension.

According to the AHA, older men are more likely than older women to have coronary heart disease (CHD) (Upadhya, Taffet, Cheng & Kitzman, 2015). Furthermore, older adults are more likely to have heart failure with preserved ejection fraction (HFpEF), and older women are more likely to have it than older men. In terms of myocardial infarction (MI) in people aged 60 to 79 years, 11.5% of males had a diagnosis, compared to 4.2% of women. Moreover, compared to women, males over 80 years old have higher incidence of diagnosed MI than women (Benjamin et al., 2019). Although reported underdiagnoses and misdiagnoses of cardiovascular problems in women, including MI, are not reflected in this data, there may be differences in the diagnoses of acute coronary syndrome in women (Chapman et al., 2018). One of the main risk factors of sudden cardiac death is believed to be arrhythmias, which are also known to rise with age (Srinivasan, & Schilling, 2018).

Atrial fibrillation (AF) was recorded in roughly 10% of older persons over the age of 60 who were outpatients (Lindberg et al., 2019). These elderly adults ranged in age from 60 to 95. Accordingly, AF caused up to 23.5percent of strokes in older persons (aged 80–89) and roughly 2percent of total of strokes in elderly (aged 50–59). Inpatient hospital stays for stroke patients in the US between the ages of 65 and 84 were roughly equal for males and females, although those under the age of 85 made up over 66% of the total (Benjamin et al., 2019). The elderly population (those over 60 years old) is predicted to experience the majority of these potentially deadly episodes, with the number of incident strokes projected to grow double during the next 40 years (2010-2050). (Rodgers et al., 2019).

According to reports, one of the main causes of chronic diseases like CVD is physical inactivity (Anderson, & Durstine, 2019). Walking has been reported to help elderly men manage coronary heart disease as a benefit of physical activity (Izquierdo, Duque, & Morley, 2021). Regular walking may also lengthen life by reducing the likelihood of CVD and other aging-related disorders. Exercise has also been demonstrated to be very advantageous for aging adults, as it protects against age-related negative systemic and cellular consequences of aging and lowers cellular senescence. Furthermore, exercise has been shown to increase endothelium function among older adults, however there are some disparities between men and women in this regard. Due to their lack of estrogen and resulting increased oxidative stress, postmenopausal women are more consistently related with better endothelial function than are males (Campbell et al., 2019). Studies demonstrate that telehealth and mobile self-management strategies, such as mobile blood pressure monitoring, can improve results for people with hypertension (Chandler et al., 2020). However, older folks use these devices less frequently than younger adults.

A group of lipid-lowering medications known as statins is commonly used as a major prevention strategy for CVD in addition to changes in lifestyle (Hero et al., 2020). Therefore, statins are thought to lower total cholesterol in aged people. Low-density lipoprotein cholesterol was shown to decrease by 31% in older persons taking statins, although high-density lipoprotein cholesterol increased by 14%. While age is a risk factor for CVD in both men and women, it is clear that older women are more vulnerable to specific effects of heart disease. Before menopause, women are normally protected against cardiovascular disease, but after menopause, their risk for the condition significantly increases. It has been shown that the decline of sex hormones contributes significantly to the development of CVD with advancing age in both men and women. (Rodgers et al., 2019). Cardiovascular disease (CVD) is a prominent cause for concern in the aging population. Although old age is an independent risk factor for CVD, it has been shown that the risks are increased by other risk factors such as frailty, obesity, and diabetes.

Despite having a slightly higher life expectancy than men, women often account for the majority of CVD diagnoses in the elderly population, or in those over the age of 80. These concurrent risks have been shown to increase cardiovascular risks in older patients after ICU admission. Gender is an important risk factor for the onset, presentation, and management of CVD in elderly people. Despite the potential that the decline in hormone levels considerably contributes to the etiology of CVD in older men and women, hormone replacement therapy has not yet shown a significant benefit in older people with regard to cardiovascular health. Given the anticipated increase in older patients, it is critical to comprehend how physical exercise influences cardiovascular risk factors in order to improve cardiorespiratory fitness in the aging population. A comprehensive physical activity intervention program must also be created.

Relationship between CRF and Body Composition

The capability of the respiratory and circulatory systems to supply oxygen during extended physical activity is referred to as cardiorespiratory fitness, which is a part of physiologic fitness (Kohzuki, Cho, Takahashi, & Harada, 2018). Body composition, which has a direct bearing on the cardiovascular system, is the ratio of fats to lean tissue in human system (Ponti et al., 2020). The cardiovascular system is made up of the heart, blood arteries, and blood (Molnar & Gair, 2020). It performs a number of vital tasks that are required for life, including the transportation of oxygen and nutrients, the removal of carbon dioxide and waste, the prevention of disease, and the regulation of body temperature. Overweight, obesity, and cardiovascular illnesses are global public health issues (Roth et al., 2017; Hamid, Groot, & Pavlova, 2019). According to Hajar (2016), a collection of illnesses known as CVDs damage the heart and blood arteries. These illnesses include rheumatic heart disease, which develops after rheumatic fever, which is brought on by streptococcal bacteria, and cerebrovascular disease, which affects the blood vessels supplying the brain, coronary heart disease, which affects the blood vessels supplying the heart muscle, peripheral arterial disease, which affects the blood vessels supplying the arms and legs.

The main cause of heart attacks and strokes, which are typically sudden, severe occurrences that stop the blood flow via the heart or brain, is a blockage. (Sifat, Vaidya, & Abbruscato, 2017). The accumulation of fatty plaques on the interior lining of the blood arteries which supply the heart or brain is therefore the most frequent cause of this. Strokes can also result from blood clots or bleeding from a brain blood vessel. Additionally, a number of risk factors, including tobacco use, an unhealthy diet, obesity, inactivity, harmful alcohol use, hypertension, diabetes, and hyperlipidemia, are frequently present in people who have heart attacks or strokes (Hajar, 2016). Nowbar, Gitto, Howard, Francis, and Al-Lamee (2019) assert that heart disease has remained the world's biggest cause of death for the past 20 years. Sadly, it is now the cause of more fatalities than ever. For instance, the number of heart disease fatalities has increased by more than 2 million since 2000, reaching over 9 million in 2019. Furthermore, 16% of all deaths globally are caused by heart disease at the moment (Senoner, & Dichtl, 2019). Several lifestyle factors have been discovered to be linked to CVD, including obesity, low CRF, smoking, diabetes, poor diets, and risky alcohol use (Chen et al., 2017).

Obesity has drawn the most attention among these risk factors since it is acknowledged as a global problem (GBD 2015 Obesity Collaborators, 2017). Thus, according Cheng (2016), 39% of adults worldwide were classed as overweight in 2016 (BMI 25.9-29.9 kg/m2 and BMI > 29.9 kg/m2), doubling from 1975. Obesity rates increased from 6.4% for women and 3.2% for men in 1975 to 14.9% and 10.8%, respectively, in 2016. Adults who were overweight or obese made up 13% of the world's population in 2017 (Al-Lawati, 2017), and there were 2.1 billion of them worldwide. There is a stealth epidemic worse than HIV that is sweeping across sub-Saharan Africa. For instance, over half of the 20 countries with obesity that are experiencing the fastest growth are in Africa (Chan, 2018), which adds to the health burden on the continent (Nyirenda, 2016).

Africa has historically been depicted as a hungry and starving continent (Jaca, Iwu, Duro, Onyango, & Wiysonge, 2020). That appears to be quickly altering. Obesity is now posing a health threat, especially to the continent's urban poor and middle class (Haggblade et al., 2016). Additionally, eight of the twenty nations where adult obesity is increasing the quickest are in Africa. Obesity or overweight, according to Rutter (2018), is an abnormal or excessive fat buildup that poses a risk to human health. Being overweight, whether it be around the arms, legs, or waist, increases the chance of developing non-communicable diseases including diabetes, heart disease, and even stroke. Additionally, it might cause tumors including ovarian, kidney, breast, colon, and other types of cancer (Barnard, 2017). It's a common misperception that having a pot belly signifies riches and a healthy diet in African households. A bulging stomach or even being overweight is simply a sign of poor nutrition and inactivity, rather than a stomach tumor or any other sickness (Shephard, 2017). More individuals worldwide die from obesity and overweight than from underweight (Fox, Feng, & Asal, 2019). Obesity and overweight in Africa have increased the already overburdened health sectors' burden of caring for infectious diseases (Haggblade et al., 2016; Reardon., 2021). For instance, type 2 diabetes, which has been on the rise in many African countries, is one of the primary causes of obesity (Roglic, 2016). Since 1980, there has been a concerning 129% increase in the numbers of diabetes in Africa.

As a result, the cost of managing diabetes in just sub-Saharan Africa is predicted to reach about $60 billion (53 billion euro) by 2030. (Pinchevsky, Butkow, Raal, Chirwa, & Rothberg, 2020). Exercise with a heart helps keep a healthy body weight (Chiu et al., 2017). Exercises that are both aerobic and anaerobic, especially at greater intensities, help the body burn calories in a healthy way. Additionally, during a period of lengthy or intensive activity, stored on the body is reserved and utilised. Additionally, strengthening the cardiovascular system through high-intensity interval training raises the activity of specific hormones that promote fat burning, such as growth hormone and testosterone. Additionally, while high-intensity exercise increases overall calories burned and speeds up the enzymes involved in fat burning, minimal-intensity, fairly constant cardio activities burn a higher percentage of fat (Longland, Oikawa, Mitchell, Devries, & Phillips, 2016). According to research, overweight or obese people are more prone to develop cardiovascular issues. This is mostly caused by the growing amount of effort needed to engage in physical activity or exercise. A poor body composition may also lead to extra body fat and increased blood cholesterol levels. Due to these compounds' propensity to accumulate and obstruct blood flow to the heart, brain, and other organs, the cardiovascular system becomes impaired (Elagizi et al., 2018). Therefore, someone who has improved their body composition through aerobic, muscular, and strength training will be able to perform everyday tasks without feeling overly tired and will have enough of energy to engage in leisure activities (Howie, 2020). Hence, an improved cardiovascular system has a significant positive effect of body composition (Hoeger, Hoeger, Hoeger, & Fawson, 2018).

Effects of Aging and Physical Activity Levels on Body Composition, Cardiorespiratory Endurance and Physical Functional Capacity

For promoting independent living and a healthy population, the need for knowledge on how aging and physical activity involvement affect functional capacities is growing (Smith et al., 2017). Understanding the effects of ageing and physical activity involvement on older people's health conditions, on their ability to perform basic tasks and participate in social situations, and on their functional capability is necessary for ensuring the health and well-being of the elderly (Mota et al., 2019). Both the ability to carry out everyday tasks and to participate in social interactions are considered to be functional capability. These two broad categories also comprise everyday tasks like eating, taking a bath, dressing, transferring, and going to the bathroom, as well as situations like school or play for kids, and work outside the home or taking care of a home for adults. Basic physical and cognitive activities like walking or reaching, concentrating, and communicating are also included (Stamm, Pieber, Crevenna, & Dorner, 2016).

When a person's ability to do certain tasks is impaired by a health condition or injury and is not made up for by the environment, functional constraints result (including physical, social, and attitudinal factors). Additionally, physical, developmental, behavioral, emotional, social, and environmental factors all have an impact on functional capacities. This idea takes into account how the whole individual interacts with their physical and social surroundings. Additionally, although the definition of functional capacity varies for individuals in various ages (Williams, Ma, & Martin, 2017), Zelle et al. (2017), suggests that physical inactivity, obesity, and a damaged cardiorespiratory system may be the direct causes of impairment and loss of independence in the elderly. All human cells, tissues, and organs undergo morphological and physiological changes as they age, and these changes have an impact on how each body system functions (Sgarbieri, & Pacheco, 2017). The main modifications in body weight are an increase in FM and a decrease in FFM. Additionally, the FM shifts subcutaneous to abdominal fat deposition, causing a rise in the infiltration of fat into nonfat tissues. Aging also causes changes in the FFM's composition and content. FFM generally starts to decline by the age of 40 to 50 years, and the majority of this loss is caused by a decline in skeletal muscles and bone mineral density (Pappas, & Nagy, 2019).

The fall in levels of physical activity and changes in body composition, frequently without corresponding alterations in body weight and BMI, are characteristics of the aging process. Additionally, the distribution of FM is more concentrated in the abdominal area, which is a location linked to diabetes and cardiovascular risk (Pandey et al., 2017). According to Romieu et al. (2017), variations in energy balance cause changes in body composition, with a positive balance causing weight growth and a negative balance causing weight reduction. Additionally, it is known that aging has a distinct impact on a number of physiological processes, including changes in body composition, bone loss, decline of muscle and strength, and an increase in body fat that results in osteosarcopenic obesity syndrome. For instance, even with constant nutritional (energy) consumption and exercise routines, aging is associated with a 5-25% drop in basal (resting) metabolic rate, which most prominently results in an increase in body weight and body fat (Romieu et al., 2017). That is, between the ages of 20 and 25, when for the majority of people, body fat begins to progressively rise, it does so until around the age of 65.

Age-related declines in bone and muscle tissues coincide with increases in body fat (Lim, 2018). Obesity in older people as measured by a high BMI has been proven to be closely linked to a reduction in functional abilities, potentially resulting in impairment (Poggiogalle et al., 2019). According to Ponti et al. (2020), a person's lifetime history of being overweight or obese must also be taken into account when evaluating the risk of impairment and functional limits. Adiposity is not the only factor that influences functional status in old age. Accordingly, they discovered that compared to people who retained a normal weight throughout their lifespan, the chance of acquiring mobility impairments was nearly three times higher in older men or women who have been overweight and obese after the age of 25. On the other hand, people who just became overweight or obese in their later years had a 1.7 times higher risk (Ansari-Moghaddam, Khorram, Miri-Bonjar, Mohammadi, & Ansari, 2016; Ponti et al., 2020). So it seems that a prolonged background of high body fatness increases the chance of functional failure in old life. Another important factor influencing functional abilities as people age is weight increase (Tieland, Trouwborst, & Clark, 2018).

Sarcopenia, or the loss of skeletal muscle mass as we age, has been linked to a fall in functional ability in the elderly (Papa, Dong & Hassan 2017). A worse functioning and more rapid functional deterioration may result from muscle mass gain as opposed to decrease (Calderón-Larraaga et al., 2019). Increased adiposity, which is linked to larger skeletal muscle mass and poorer functional status, may be the cause of this interference. Thus, it is crucial to take body fat into account when examining the relationships between changes in skeletal muscle mass or functional status in the aged.

According to Cruz-Jentoft, and Sayer, (2019), the impact of high body fat on functional capacity in old age is far more severe than the impact of low skeletal muscle mass. Accordingly, the peak of muscular mass occurs about age 30, after which it gradually declines. Additionally, those over 60 who suffer from sarcopenia see a 20-40% reduction in muscle mass. The latter is the loss of muscle strength and isn't always proportionally coupled by a loss in muscle mass, making the distinction between sarcopenia and dynapenia significant. These reductions affect women more severely than they do men. Changes in bone and the beginning of osteopenia/osteoporosis with aging are unquestionably the subjects of the most research. For instance, bone mineral density (BMD), a surrogate for estimating fracture risk, begins to decline with aging around about 50. However, the age-related increase in bone turnover rate, which is brought on by an increase in bone resorption and leads to bone loss, is equally important. Women may lose up to 20% of their bone mass during menopause. The loss then continues at a rate of 0.5% to 1% per year after that (unless there is some adverse underlying condition or immobilization; when the rate is higher). As they age, men also lose bone mass, but this process starts later and progresses at a rate of around 0.5-1% per year. Osteosarcopenic obesity syndrome is the name given to a triad of simultaneous degradation in bone, muscle, and adipose tissues (Ilich et al., 2016). Although the body composition phenotype changes in older women were the basis for the initial discovery of osteosarcopenic obesity syndrome, current research has demonstrated that such phenotypes may also present in young (18–21 years old) overweight individuals (Stefanaki et al., 2016).

There are two other underlying factors that have only lately come to be completely understood within the osteosarcopenic obesity syndrome: osteopenic/ osteoporotic obesity and sarcopenic obesity, both of which may also exist on its own. (Ilich et al., 2016). All of these ailments may also cause a higher risk of fractures, morbidity, and a reduction in physical capability. However, weight swings are not always present when aging-related changes in body composition take place (Al-Sofiani, Ganji, & Kalyani, 2019). Lean mass and bone mineral density generally decline with aging, whereas body fat percentage rises. When a result, mobility is impacted as lean mass and bone mineral density decline due to weak joints and muscles that are unable to produce enough force to pull corresponding bones at joints to cause movement. Additionally, the combination of these changes in body composition and decreased physical activity could lead to a loss of physical function (Santos, Christofaro, Gomes, Freitas, & Gobbo, 2018).

Older persons are more vulnerable to cardiovascular disorders because of modifications in heart or vascular function and structure that are strongly linked to aging. These changes reduce the cardiovascular system's functional capacity (Xu et al., 2017). However, especially in older persons, obesity and coronary atherosclerosis are intimately connected. As a result, compared to people with normal body weight, patients with higher BMI values have more frequent and advanced atherosclerotic vascular lesions. Furthermore, a 10 kg increase in body weight raises overall risk of coronary artery disease by 12%

while also increasing systolic and diastolic blood pressure by 3 and 2.3 mmHg, respectively (Piché, Poirier, Lemieux, & Després, 2018).

Cardiac aging is followed by a gradual loss of myocytes and a moderate compensatory hypertrophy, but it is also accompanied by a decreased sensitivity to sympathetic impulses, which impairs the myocardium's ability to contract and pump in older persons (Jakovljevic, 2018). The cardiorespiratory system is in charge of supplying the brain, active muscles, and other organs with oxygenated blood. Additionally, as people age, their major arteries dilate, their walls thicken and stiffen as a result of collagen and calcium buildup and the fragmentation of elastic fibers, which reduces the heart's ability to supply muscles with oxygenated blood (Asahara, Endo, Liang, & Matsukawa, 2018).

Although aerobic physical activity engagement and exercises are linked to high levels of cardiovascular endurance and have the ability to lower all causes of heart disease, mortality, the risk of heart failure, and myocardial infarction, working muscles do not receive enough oxygenated blood during physical activity participation, causing cramps and other muscular injuries to set in.

To satisfy the body's need for energy, everyone must consume food (Munt, Partridge, & Allman-Farinelli, 2017). Eating more frequently (every day) and walking less causes excessive weight gain, which causes more body fat to accumulate. As a result, these fats have a propensity to build up into plaque, which narrows the arteries and prevents blood from freely flowing to the brain, working muscles, and other organs. Additionally, this plaque's obstruction of the arteries results in excessive blood pressure as well as other heart-related issues (Kreisler, Mattock, & Zorrilla, 2018). Connolly, Garvey, and McKee (2017) found that older adults' health-related physical fitness declined, making them more prone to falls, disability, and decreased mobility, which in turn limited their physical functional ability. This decline was attributed to older adults' increased weight, compromised cardiovascular system, and physical inactivity.

Influence of Built Environment on Physical Activity Participation

The environment plays a crucial role in promoting engagement in physical activity. The constructed environment is a component of the environment that is receiving increased scientific attention. According to the WHO, (2019), regular participation in activities like walking and cycling can help people meet their recommended daily physical activity goals. As a result, this can be promoted by a favorable built environment. Despite the fact that societal and individual factors influence physical activity (Sullivan, Lachman, 2017), studies have demonstrated that an environment's design matters (Smith et al., 2017). The built environment is the portion of the natural environment that has been created or altered by human activity. It consists of things like buildings, greenways, parks, workplaces, schools, and transportation networks (Barnett, Barnett, Nathan, Van Cauwenberg, & Cerin, 2017). The built environment is a phrase used by public health practitioners to describe physical spaces that were created with community health and wellness at their center. Parks, strolls, public spaces, and bike lanes are a few examples of these attributes (Wilkie, Townshend, Thompson, & Ling, 2018).

The importance of the built environment's function must be emphasized because it motivates people to engage in greater physical activity than an environment that discourages such behavior (Smith et al., 2017). Physical activity can be categorized into four different life domains, including leisure, employment, transportation, and home tasks, according to Stalsberg and Pedersen (2018). The built environment has an impact on and relevance to physical activity used for transportation and enjoyment. The built environment encourages physical activity by providing walking neighborhoods, sidewalks, bike lanes, and recreational amenities including parks, swimming pools, playgrounds, and sports facilities (Wilkie et al, 2018). There are many benefits to employing the built environment as an intervention to promote physical activity (Kärmeniemi et al., 2018). In addition to using a variety of tactics at the individual level, creating a welcoming environment has the ability to have the greatest impact on long-term, population-wide increases in levels of physical activity and the maintenance of behavior change (Smith et al., 2017). Additionally, promoting physical activity at the community level is typically more economical than doing so at the individual level (Howlett, Trivedi, Troop, & Chater, 2019).

Features of the built environment

Four categories have been established for the characteristics of the built environment that are thought to be related to leisure and transportation activities; (2) and usage features, including residential and employment density, land use mix , pedestrian walkways (grid pattern, cul-de-sacs, and loop holes), and proximity of destinations to residences; (3) Neighborhood form characteristics, such as the presence of sidewalks and streetlights; (4) Community environment, which mostly refers to environmental contexts like beauty, cleanliness, traffic, crime prevention, or community engagement or cohesion.

Mixed land usage, residential density, and street connection are certain aspects of the built environment that have been found to correspond with levels of physical activity. Additionally, these characteristics may have an impact on walking for leisure and travel-related physical activity (Ellis, Hunter, Donnelly, Kelleher, & Kee, 2016). For instance, the existence of walkways and streetlights may increase the appeal of recreational activities, particularly at night or throughout the evening. Meanwhile, being close to destinations and having streets that follow a grid design could make it simpler or more enjoyable to commute by walking or riding a bicycle (Salvo et al., 2018).

There is already strong evidence that the built environment has a favorable impact on physical activity (Smith et al., 2017). Based on the physical activity domain, the association may change. The built environment primarily influences the physical activity domains of recreation and transportation (Mavoa et al., 2019). For instance, walking can be a convenient mode of transportation on a street with plenty of connections. Around the world, people frequently use walking and cycling for transportation and/or recreation, and these activities can satisfy the suggested physical activity levels. The street connection's-built environment component has the ability to have a direct impact on physical activity, particularly hiking.

Walking from place to place is made easier by well-connected street networks that design paths that are quicker to destinations. As a result, grid streets' two features frequent crossings and orthogonal geometry help with pedestrian flow. Additionally, these elements make individuals feel secure and enjoy action more (Ellis et al., 2016). According to Litman (2017), putting residential and business sectors near together encourages active mobility while reducing dependency on cars. Additionally, the routes connecting the locations ought to promote biking and walking. Additionally, more people using bicycles has occasionally been linked to areas with bike lanes that isolate them from traffic. Additionally, having adjacent bus and train stops encourages active transportation by encouraging people to walk to and from public transportation (Van Cauwenberg, Nathan, Barnett, Barnett, & Cerin, 2018).

All demographic groups are encouraged to engage in physical activity during downtime via public open places. As a result, they offer destinations that people can reach on foot and also have spaces for sports, exercise, and other strenuous activities. Additionally, they have to be close by, accessible to locals, and equipped with high-quality amenities (Guthold, Stevens, Riley, & Bull, 2018). When people believe playgrounds and parks are secure and pleasant, they are more appealing places for physical activity (Van Hecke et al., 2018). According to Ettema (2016), if the neighborhood environment is appealing, families and organizations prefer to come and spend time there, strolling and engaging in other leisure activities. Examples of neighborhood aesthetics that encourage walking for enjoyment include neatness, appealing natural scenery, planting, and views. Last but not least, a constructed environment that fosters easy access to nutritious food and a range of possibilities for daily physical activity is seen to be favorable for the adoption of healthier lifestyle (Wen, Albert, & Von Haaren, 2018).

Walkable neighborhood

"Walkability" refers to the degree to which the built environment accommodates the presence of people who live, work, shop, visit, enjoy, or otherwise spend time in the region (Rafiemanzelat, Emadi, & Kamali, 2017). A neighborhood is considered walkable if it has a high density of people, many shops and services, and well-connected streets for quick access by transportation. A walkable neighborhood also has infrastructure for walking and cycling, such as walkways, pedestrian walkways, and bike lanes (Jensen et al., 2017). High urban sprawl, on the other hand, exhibits low land use density, low household density, lack of a central business district, and fewer street connectivity. Along with being unfeasible due to significant urban development, walking, bicycling, and using public transportation are all linked to sedentary lifestyles (Kärmeniemi et al., 2019).

The amount of housing units per unit of land area is referred to as residential density (Lu, Sun, Gou, Liu, & Zhang, 2019). It indicates that there are more local destinations, like shops, services, and bus stations. Land use mix variety also refers to the degree of integration of various physical space uses, such as residential, commercial, industrial, and public space, within a given location (Hersperger et al., 2018). Street connectedness, which is directly tied to aspects of street design, describes how simple it is to get from one place to another. Street connectedness is also characterized by a large number of interconnected streets (Demaj, 2020), which encourages accessibility the ease with which desired locations or activities may be reached (Levine, Grengs, & Merlin, 2019).

The planning and upkeep of neighborhoods, streets, and parks, as well as how people view those spaces based on factors like aesthetic attractiveness and perceived safety, can have an impact on both adults' and children's physical activity.

The perceived aesthetics, visual attractiveness, or pleasantness of a place, as well as protection from crime and traffic, can all have an impact on leisure walking. Additionally, the neighborhood's aesthetic qualities offer a welcoming environment for physical exercise (Huang et al., 2020). Studies looking at how neighborhood characteristics affect physical activity, particularly those done in the US, Australia, and a few European countries, found that walkable neighborhoods with high densities, well-connected grid-like street networks, and accessible and diverse destinations nearby were linked to active transportation, particularly walking for transportation. (Barrington-Leigh, & Millard-Ball, 2020). Greater physical activity appears to be linked to neighborhoods that have both new and existing public transportation choices (Van Cauwenberg et al., 2018).

Summary

The ageing is characterized by decreased PA levels, excessive fat buildup and muscle mass loss that results in additional weight gain, as well as decreased CRF levels that cause physical function loss in the elderly. The elderly avoids engaging in meaningful PA because it requires too much effort and there is a lack of a supporting physical environment. The DTA is cited as an explanation for why people become less involved in PA as they get older. The two health-related fitness factors that have been shown to best predict physical functionality in older persons are body composition and CRE.

Several research that separately analyzed BC and CRE came up with various conclusions. For instance, research from the US found that among people 60 and older, body composition was a predictor of physical function (Sunghye et al., 2017). Additionally, a Danish study indicated that among older persons, body weight was a factor in determining physical function (Perdersen et al., 2002). On the other hand, a study from Italy found that among community-dwelling men and women, cardiovascular health was a predictor of physical function (Jin et al., 2017).

A review of the literature, however, showed that few research has combined body weight and CRF to identify which of them is a major predictor of PFC in older persons.

CHAPTER THREE

RESEARCH METHODS

The purpose of this study was to determine the extent to which BC and CRE predict physical functional capacity of older adults in Navrongo. It is expected that, physical activity participation will improve CRE and BC will predict PFC of older adults in Navrongo. This chapter presents the research methodology, which covers the research design, study area, population, sampling strategy, data gathering tools, data collection procedure, data processing, and data analysis.

Research Design

This study employs quantitative cross-sectional research design to study the role of PA in BC and CRE which in turn influence PFC of the adults (Ihudiebube-Splendor, & Chikeme 2020). A quantitative cross-sectional descriptive survey has the advantage of using quantifiable data to describe a population, situation, or event being studied at a specific time. It tries to address the questions of how, what, when, and where of a research problem. (Silva, 2017). Thus, this research focuses on how changes in the BC, CRE, and PFC are brought about and when these changes occurred among adults in Navrongo. However, this design does not answer questions on why the problem exist in the first place and it is opened to bias as the researcher may decide to influence the results due to personal opinion. However, for the purposes of accurate description of the problem and the findings, the researcher will remain neutral and be objective in dealing with the research problem.

Study Area

The Kasena Nankana Municipal is one of Ghana's 260 Metropolitan, Municipal and District Assemblies (MMDAs) and is a member of the Upper East Region's fifteen (15) Municipalities and Districts, with Navrongo serving as the regional administrative center. Within the Guinea Savannah woods is Navrongo. Between latitudes 11o10' and 10o3' North and longitude 10o1' West is about where it is situated. Navrongo is the administrative center. The town shares boundaries with Paga and Bolgatanga, Sandema. However, it is also bounded to the north of the Ghana by Burkina Faso. The number of household in Navrongo stood at 32,000 with a total population 109, 944 with 53,676 males and 56,268 females (Ghana Statistical Service, 2013). The main occupation of the people in the Municipality is farming and trading. The built environment of the Municipality is not exercise friendly. Also, there exist a poor culture towards meaningful physical activity and exercise in the Municipality. Hence, sedentary living is gradually becoming an order of the day in the Kassena Nankana Municipality.

Population

The population for this study includes individuals who are 60 years and older and live in Navrongo. There were 1,663 senior people from Navrongo with 941 women and 722 men (GSS, 2010). Even though there is presently no available data regarding the kind of activities these aged are engaged in, however, most of them are observed spending more time sitting either at home, road sides, or in the market doing petty trading. Also, on a number of occasions, a few have been spotted at keep fit centers performing some fitness activities. Only adults who have attained the age of 60 years and above and can walk and move their arms will be included this study. Individuals who fall within the aged brackets and were unable to move their limbs due to sickness or disability were excluded from the study as they were unable to follow the protocols of the functional fitness test.

Sampling Procedure

A sample size of 998 older adults were considered from 1142 household. Multistage sampling technique was used to sample participants for this study. First of all, the stratified sampling technique was employed to put the entire population into two strata (male and female). The quota sampling was then employed to sample 60% from the male population (722) and 60% from the female population (941), given a sample of 433 males and 565 females. According to Vasileiou, Barnett, Thorpe, and Young, (2018), 60% and above sample size of a population is good representation of the entire population. In an instance where time is of essence and limited availability of resources, 60% of the population was ideal to generalize the findings of the sample to the larger group. According to Mafuure (2017), the quota sampling is a simple yet effective way to do research. With the quota sampling, the researcher must put the sample into mutually exclusive sub-groups then a quota is calculated from each sub-group. The merits of this sampling procedure are that, it is good if the researcher is working within a limited time period. Additionally, it enhances the representation of any certain subgroup within the population, preventing these groupings from being over represented. (Sharma, 2017). However, the quota sampling may be prone to bias as the researcher is likely to assign a greater percentage to a particular group. But in other to be able to make proper comparison of the various sub-groups, the researcher will assign equal percentages to all sub-groups so that all groups will be equally represented. Navrongo is already grouped into four cardinal zones (North, South, East and West).

The North, South, East and West comprises 7, 9, 7 and 6 suburbs respectively. The sample size for each stratum (433 males and 565 females) was divided into four and assigned to each zone making it 108 males and 141 females each for the following zones (North, East and West) except for South which comprised 109 males and 142 females. The suburbs from each zone were labelled S1-S7 for North zone, S1-S9 for South zone, S1-S7 for East zone and S1-S6 for West zone. The North and East with 7 suburbs each will be assigned 15 and 16 males each for the first 4 (S1-S4) and last 3 (S5-S7) suburbs respectively. Also, 20 and 21 females each came from the first 6 (S1-S6) and 7th (S7) suburb respectively. For the West zone with 6 suburbs, each suburb (S1-S6) was assigned 20 males, while 23 and 24 females each came from the first 3 (S1-S3) and last 3 (S4-S6) suburbs respectively. Finally, the North zone with 9 suburbs comprised 12 and 13 males each for first 8 (S1-S8) and last 1 (S9) suburb respectively. While, 15 and 16 females each came from the first 2 (S1-S2) and the final 7 (S3-S7) suburbs respectively.

Five research assistants were assigned to each zone. Since there was no available data on the number of older persons in the various households, the research assistance visited the various suburbs and houses in each zone to conveniently sample as many as were available until the required number of males and females for each suburb was attained to give a total sample of 433 males and 565 females.

The stratified sampling ensures and guards against unrepresentativeness. This sample method is to ensure that all strata are equally represented. Finally, volunteer sampling was employed to include participants that self-select to become part of the study after explaining the purpose of the study to the participant. With this sampling method, the researcher included as many volunteers as possible from each zone until the required number of participants for each cluster was attained to give a total sample size of 998. This sampling method is mostly useful especially in sensitive research when it is necessary to rely on those who are willing to answer requests to provide data for a study. Data collected from this sampling method are in-depth, authentic and more reliable. This method also helps save time as only those who express interest in taking part are contacted for data. However, volunteer sampling is not advantageous or may not be applicable in most studies as it is highly susceptible to bias because participants in voluntary response choose to respond to surveys because they have a strong opinion on the subject in either direction and may give rise to bias results. On the contrary, this sampling method fits this study as physical measurement or data were collected from the volunteers. The volunteers in this study did not have the opportunity to express their opinions or emotions, but were required to undertake a physical assessment of their physical functional abilities. As a result, the data obtained was therefore never biased but accurate and precise for data analysis.

Data Collection Instruments

This study adopted four data collection instruments, namely, the Senior Fitness (Functional Fitness Test) battery, Omron weighing scale, tape measure, and international physical activity questionnaire (IPAQ) Elderly short form. Rikli and Jones created the Senor Fitness Test battery as part of Fullerton University's lifelong wellness programme. The test is frequently referred to as the Fullerton Functional Test as a result. It is a straightforward, user-friendly battery of tests that evaluates older individuals' functional fitness. The test is easy to understand and effectively test the aerobic fitness, strength and flexibility among adults, using minimal and inexpensive equipment. Within the test battery are specific tests and their reliability coefficients, the tests include; “chair stand test (.88), arm curl test (.79), sit and reach test (.81), back scratch test (.82), up and go test (.84) and 2-minute step up test (.81)” and a composite reliability of .83 for PFC (Rikli, & Jones, 2013). Reliability coefficients estimated from data collected using this instrument were .79, .80, .77, .78, .80, .79 for chair stand test, arm curl test, sit and reach test, back scratch test, up and go test and 2-minute step up test respectively and a general reliability of .81 for PFC.

The Omeron scale and meter tape were used to obtain the weight and height of older adults in Navrongo. Vasold et al. (2019) reported a reliability of .91 for the weighing scale and .90 for the meter tape. This study too estimated a reliability coefficient of .88 and .91 for the weighing scale and meter tape respectively when used in Navrongo.

The IPAQ-Elderly short form was used to measure the physical activity levels of older adults in Navrongo. This instrument was tested in six centers involving 12 countries across all continents and a reliability and validity values of .81 and .84 were reported under Africa (Craig et al., 2003).

This study also reports a reliability of .79 for this instrument. Below is a detailed description of each instrument.

Senior Fitness Test Batteries

Chair Stand Test

The chair stand test is one of the test batteries in the senior fitness test. It measures endurance of lower limbs. A chair without handles and a stopwatch are part of the test setup. The chair is set up in a sturdy position against a wall for this test battery. A participant crosses his or her arms at the wrists and leans them on the chest while sitting upright in the middle of the chair with their feet flat on the floor and their shoulders apart. The participant will need to be reminded to stand up straight and sit down again as many times as possible throughout the 30-second interval as part of the procedure. The participant is not allowed to touch the backside to the chair or to push off his/her thighs, rather, the arms must be crossed against the chest and not swing up as he/she rises.

Arm Curl Test

This test battery measures endurance of the upper limbs, with the use of 5-pound weight for women and 8-pound weight for men, chair without arms, stopwatch. In this test battery, the participant sits on the chair with back straight and feet flat on the ground, and performs the activity by the commands of the researcher. The participant is required to perform as many curls (arm), in a controlled manner, as possible for a period of 30 seconds.

Two Minute Step up Test

This test battery is a measure of cardiorespiratory endurance, using a stopwatch, tape measure and masking tape. Each participant is required to step or kneel at a minimum height. Between both the kneecap and the anterior hipbone, this is level with that spot (Iliac crest). A cord that has been stretched from the patella, or the center of the kneecap, to the hipbone can be used to measure it. The tape can then be folded over, and a strip of tape can be used to mark a location on the thigh. A corresponding mark of the mid-point of the knee cap and iliac crest measurement is made on the wall as well. On command to start, the participant begin stepping and lifting the knees to the appropriate height each time so that the knee is level with the tape mark on the wall. If the participant wishes to rest, he/she may do so but the time will continue to run. At the end of the 2-minutes, the number of steps is counted and recorded.

Chair sit and reach

The hamstring and erector spinae muscles' flexibility is assessed using the chair sit and reach test. A chair without arms and a tape measure are part of the test's setup. In order for the chair to be stable, it is leaning against a wall. The participant sits and leans forward on the chair until one of the legs can be straightened. The foot of the straight leg should be flat on the floor with the ankle flexed at around a 90-degree angle. The hands directly are on top of the other (the palms of one hand placed on the back of the other hand) so that they are stacked with extended fingers. The participant inhales while bending forward at the hip and attempting to touch his or her toes. In the event that the stretched leg starts to bow, the participant must recline the chair until the leg is straight. In order to complete the stretch, the participant must hold the stretched foot still for at least two seconds. Each leg receives two practices to determine which side is more flexible. Measurement is taken or recorded only on the most flexible side. The chair must be stable in other that It won't lean forward. participant reaches for their toes. A test partner will hold a ruler across the participant's shoe's toe after they have finished the practice reaches. The measurement "0" is regarded as being at the shoe's toe center. To the nearest half-inch, the score is noted. The participant will receive a positive score, measured to the nearest half-inch, for every inch they have advanced past this "0" point at the center of their toe. The participant will receive a negative score, measured to the nearest half-inch, for every inch they fall short of the "0" mark at the middle of the toe of their shoe if they are unable to touch their toes. The best measurement is taken after two runs of this test.

Up and Go

The purpose of the Up and Go test is to measure the speed, agility and balance of the adult person, with chair without arms, cone, stopwatch and tape measure. From the front of the chair, 8 feet measurement is taken forward and a cone is placed on the mark. The participant sits on the chair with hands on the thighs, one leg slightly ahead of the other and feet flat on the ground. On command “go”, the participant stands up and walk towards the cone, move round it and comes back to sit on the chair. The score is recorded as time taken from “go” command to when the participant returns to sit on the chair, to determine the speed, agility and balance for the participant.

Back Scratch

The Back Scratch Test evaluates your upper body's flexibility. Upper body flexibility affects a person's capacity to perform tasks that call for arm and/or shoulder movement upward, such as changing a lightbulb or reaching for products that may be high on a shelf. A ruler will be the testing tool. The subject in this test raises his or her left arm straight up above the left shoulder. With the fingers extended, bend the left arm at the elbow and reach behind you. The right hand is placed behind the back with the palm facing out and the fingers pointing upward. The elbow is pointing toward the ceiling. The right hand reaches as high as it can and tries to touch the fingers of the other hand. While some people's fingers may overlap, others cannot touch at all. Each arm is given two practice stretches to find out which side is more flexible. Only the side with the greatest flexibility will be measured and noted. To the nearest half inch, measure the space between the fingertips of each hand. The extent of any overlap between the fingers will be determined. If the fingertip tips barely contact, they receive a score of "0," but if they don't, they receive a negative score based on the distance between them, measured to the closest millimeter. 5 or 0.5 inches. If the fingers overlap, the participant is given a good grade; the overlap is measured to the closest fraction. 5 or 0.5 inches. Participants must not grab and pull on the fingers if they are touching together because doing so will skew the results. After completing the stretch twice, the best result is recorded as either a negative or positive score.

Omron Weighing Scale and Meter Tape

The tape measure and the weighing scale were used determine body mass index (BMI) of each participant. The tape measure recorded the height of each participant in meters and the weighing scale was recorded the weight of each participant in kilograms. The BMI value is derived by dividing the weight of the participant by his/her height in meters square. This measurement is used to determine if a person is underweight, normal weight, overweight or obese.

International Physical Activity Questionnaire for elderly short form

The adopted International Physical Activity Questionnaires is made up of four surveys The IPAQ short form consists of 4 basic items that can be administered over the phone or on one's own. The aim of the surveys is to provide uniform tools that can be used to gather data on physical activity that is related to health and that is comparable across borders. The questions on the questionnaire assisted the researcher in learning more about the kind of physical activities people engage in on a daily basis. they were questioned about how much time they spent exercising during the last seven days.

Data Collection Procedures

The Institutional Review Board of University of Cape Coast granted the ethical clearance (ID-UCCIRB/CES/2022/30). To collect the data, permission was sought from household heads and the participants and the purpose of the study well explained to them. Participants were also assured of confidentiality of their information. Also, for purposes of anonymity, names of participants names were not taken. First aiders were on standby during the fitness test to take care of any eventualities.

Data was collected from participants at their homes. Physical function capacity for each participant was assessed through the five physical functional test batteries. To assess physical activity levels of each participant, IPAQ elderly short form was used and each participant indicated the number of days in the week they walked, did moderate and vigorous activities and the amount of time spent doing such activities. Cardio-respiratory endurance was measured using 2-minutes step-up test. A 2-minutes test is performed by making a mark of the corresponding mid-point between the iliac crest and the knee on a wall and on command by the instructor, the participant lifts (step-up) the knees one after the other at the level of the mark on the wall as fast as he/she can. the total number of step-ups within 2-minutes are recorded for each participant.

Body composition was assessed using bodyweight and height to compute for their BMI. Body weight was measured using the omron weighing scale. Each participant climbed the scale and their corresponding body weight recorded in kilograms (kg). Height was measured using a meter tape attached to a wall. Each participant stood with the back facing the wall and heels touching the wall. A flat plastic meter rule is then place on the head of the participant in line with the meter tape. The corresponding number was then recorded in meters as the height of the participant. To obtain the BMI of each participant, the weight (kg) was divided by the square of the height in meter. The data were collected between August and December, 2022 between 8 AM and 4 PM during weekends when the participants were likely to be at home.

Chair Stand Test

The chair stand is a test to see how strong your lower body is. In order to perform tasks like getting out of a car and boarding a bus, one needs lower body strength., or standing up from a squatting position in the house or yard. People's lower body strength has a direct bearing on how easily they can go about their daily routines. The following are the test procedures:

Equipment

Chair without arms, Stopwatch.

Test steps

According to Rikli, and Jones, (2013), the following standardized test steps protocols must be followed to obtain information from participants and they stated that:

A chair placed against a wall where it was stable. Participant sat in the middle of the chair with the feet flat on the floor, shoulder width apart, back straight. Participant crossed the arms at the wrist and placed them against your chest. The tester tells the participant when to begin and will time the test taker for 30 seconds, using the stopwatch. The tester rises up to a full stand and sits again as many times as he or she can do that during the 30-second interval. Each time the tester stands during the test, he or she must come up to a full standing position. When the tester sits, he or she must sit down completely. The tester must not touch the backside to the chair. The tester must not push off from the thighs, or off the seat of the chair with the hands to help in getting up to stand unless it is necessary the arms must be kept against the chest, crossed and not allow the arms to swing up as the tester rises. If the tester is on his or her way up to stand when time is called, the participant is credited for that stand (Rikli, & Jones, 2013, p.116).

Per protocol instructions

Do not credit that rep as a "Per Protocol" stand if the athlete used their hands in any way to push off in order to stand. Only stands performed "per protocol" are those done without the use of any assistive aids, such as a walker or cane, and without pushing off the seat, off the thighs, or in any other way. stands. If the participant is unable to do any stands per the protocol, then you may let the individual do the test by pushing off their legs or the chair, or using their walker, but the test will then be scored as “Did Not Follow Protocol.” Only “Per Protocol” scores are recorded in the overall group outcomes reports. Both “Per Protocol” scores and “Did Not Follow Protocol” scores will be saved for each individual (Rikli, & Jones, 2013, p.116).

Arm Curl Test

The Arm Curl is an exercise used to gauge upper body strength. It helps to have upper body strength for tasks like hauling luggage, groceries, and washing. The ability to take up grandchildren and give them a good embrace is also crucial. Lack of upper body strength may prevent you from carrying out independent tasks like pouring milk from a jug or going grocery shopping on your own. The test protocols are as follows;

Equipment

5-pound weight and an 8-poud weight, stopwatch and a straight-back chair with no arms. Women will curl a 5 lb. weight in this test and Men will curl an 8 lb. weight for their test. It is extremely important to the accuracy of the test that you use the appropriate weight for men and women in this test (Rikli, & Jones, 2013, p.116).

Test Steps

When the exam is about to start, your test partner will announce it and time you for 30 seconds using a stopwatch or a watch with a second hand. With controlled movement, perform as many curls as you can in the allowed 30 seconds. Do not forget to squeeze your lower arm during a full curl. at the peak of each curl, press firmly against your upper arm before straightening your arm. Don't move your upper arm. The weight must not be swung. If you have started raising the weight again and are over halfway up when time is called, you may count that curl! Record the score on the scorecard (Rikli, & Jones, 2013, p.116).

Per Protocol Instructions

Demonstrate the test slowly and insure proper grip. Allow participant to practice 1-2 repetitions. If the participant cannot lift the appropriate weight for their gender, then the participant may do the test without a weight, raising just the weight of their arm. The participant's test will need to be scored as "Did Not Follow Protocol" if they do not use a weight or if they use a lighter weight such as a 3 lb or 1lb weight if they are a woman, or if they are a man and use a 5 lb, 3 lb or 1 lb weight. Only "Per Protocol" scores are recorded in the overall group outcomes reports. Both "Per Protocol" scores and "Did Not Follow Protocol" scores are saved for each individual (Rikli, & Jones, 2013, p.116).

Two Minute Step up Test

The Two-Minute Step Test measures how physically strong and resilient you are. Endurance is crucial for activities like traveling, shopping, and long walks.

The greater your physical stamina, the more energy you'll have to partake in your preferred activities. You'll be able to accomplish more while feeling less worn out. Your endurance has an impact on your capacity to carry out numerous everyday tasks and to retain your independence. Below are the test procedures;

Equipment

"Stop Watch, Measuring Tape, Visible Tape" (Rikli, & Jones, 2013, p.116).

Set up

Begin by setting the minimum knee or stepping height for each participant. This is at the level even with the midway point between the kneecap and the front hipbone. (Iliac crest). It can be determined using a tape measure or by stretching a cord from the middle of the kneecap (patella) to the hipbone. Then you can fold it over and mark this point on the thigh with a piece of tape (Rikli, & Jones, 2013, p.116).

Test Steps

Your test partner will announce the start time and use the stopwatch to time you for two full minutes. Step forward, being certain to raise your knees each time to the proper height so that they are level with the tape mark on the wall. To be sure you are not jogging, your full foot must make contact with the ground with each stride. When you elevate your right knee during the test, your test partner will count each complete stepping cycle. When both the right and left foot rise off the ground and land again, a whole step cycle has occurred. At every 30 second interval, your test partner should alert you so you may assess your feelings. It's fine if you can just do a portion of the two minutes; just finish what you can comfortably finish. You can pause the test at any point to take a break, then pick it back up again. As long as you are still within the two-minute test window, the stopwatch will continue to run and you are permitted to resume stepping. (Rikli, & Jones, 2013, p.116).

Per protocol instructions

If the participant cannot do any steps without holding onto a walker or a chair placed to their side, then the participant is not following the test protocol. The participant may still complete the test but if they complete the test holding onto a chair or assistive device their score will be saved as "Did Not Follow Protocol." Only "Per Protocol" scores that are completed by the participant without holding onto any assistive devices are recorded in the overall group outcomes reports. Both "Per Protocol" scores and "Did Not Follow Protocol" scores are saved in the scores are saved for each individual (Rikli, & Jones, 2013, p.117).

Sit and Reach Test

The Sit and Reach exam is designed to assess your lower body flexibility, particularly your hamstring flexibility. For the prevention of lower back discomfort, flexibility in the lower body is crucial. Additionally, it affects your walking gait, posture, fall avoidance, and balance. Maintaining an active, independent lifestyle requires lower body flexibility. The test procedures are as follows;

Equipment

"Sit and reach box, pen, note books" (Rikli, & Jones, 2013, p.117).

Description

It primarily evaluates the hamstrings' range of motion. The evaluation needs a solid box that is about 12 inches tall. The kids' feet were flat against the box's face, with both legs completely extended. (Rikli, & Jones, 2013, p.117).

Scoring

"The arms are extended forward over the measuring scale and the tip of the longest finger with its corresponding mark on the scale will be recorded" (Rikli, & Jones, 2013, p.118).

Per Protocol Instructions

Since there aren't really any adjustments to this exam, it should be graded as "Followed Protocol" for all trials that are taken.

Up and Go Test

Up and Go is a test that evaluates your balance, agility, and speed. Its objective is to help you on a daily basis. These are crucial for tasks like navigating crowds, traveling across strange spaces and across shifting terrain, and crossing the street before the light turns green. The more stable you are, the more comfortable you will feel leaving your house and leading an active lifestyle. As you go about your regular tasks, your speed and balance have a direct impact on how confident you feel. Below are the test procedures.

Equipment

“Chair, Cone (or other markers), Stopwatch” (Rikli, & Jones, 2013, p.117).

Test Steps

Place your hands on your thighs as you sit on the chair, keeping one foot slightly in front of the other on the floor. Your test partner will stand close to the spot where you will circle the floor marker while simultaneously keeping the stopwatch in hand. Your test subject will give the all-clear and start the watch. Your test partner must start the watch on the signal "go" for the test to be accurate. Do not wait until the participant has begun moving before starting the watch. It's crucial to be as precise as possible because the test is timed to the nearest tenth (.1) of a second. as possible when starting and stopping the watch. Upon the signal “go” rise from the chair and walk as quickly as possible out to the marker. You may press off your thighs of the chair when you rise. Do not run. Walk around the outside of the marker and return to your seat as quickly as possible, being sure to be safe in your movements. As soon as you are fully seated again your test partner will stop the watch and record your time to the nearest tenth of a second. If you would like to take a practice test before testing for a score you may. You may then take the test twice, recording your best score. Remember to record the score to the nearest tenth, for example 4.9 seconds or 8.9 seconds (Rikli, & Jones, 2013, pp.117-118).

Per protocol instructions

Allow the participant to utilize an assistance device, such as a walker or cane, but their score will be marked as "Did Not Follow Protocol," if they do not feel steady enough to complete the test without one. Since a score of "0" cannot be recorded in this test, it is crucial to try to have the participant record a "Followed Protocol" score if at all possible. It is not crucial how slowly someone completes the test "Per Protocol," as long as they are safe and working toward a "Per Protocol" score. Allow the person to finish the test with their walker and note their score as "Did Not Follow Protocol" if they choose to use an assistive equipment to help them perform better on the test, such as a walker. The aggregate group results report only includes "Per Protocol" scores. The user's IHP personal account and center account store both "Per Protocol" scores and "Did Not Follow Protocol" scores. (Rikli, & Jones, 2013, p.119).

Back Scratch Test

The Back Scratch Test is a daily benefit that assesses your upper body flexibility. Your ability to reach for objects that might be high up on a shelf, replace a lightbulb, or do any other action that involves arm and/or shoulder movement is impacted by your upper body flexibility. Your ability to live independently will be aided by maintaining upper-body flexibility. The test procedures are stated below.

Equipment

Ruler, pen and booklet.

Test steps

Over your left shoulder, raise your left arm straight in the air. With your fingers stretched toward your back, bend your left arm at the elbow. Your elbow was pointing upward. With your palm facing out and your fingers reaching up, place your right hand behind your back. Reach as high as you can and try to touch your two hands' fingers together. While some people's fingers may overlap, others cannot touch at all. With each arm, perform two practice stretches to see which side is more flexible. You will only be measuring and recording your side that is the most flexible. You are now prepared for measurement. Follow the directions above to do the stretch. Your test partner will place your fingers such that they are pointing in the same direction without moving your hands. To the nearest half inch, measure the space between the fingertips of one hand and the other. Your fingers' degree of overlap will be determined if they do. Fingertips that barely touch obtain a "0" score. If your fingertips don't contact, you get a bad grade for the nearest-measured distance between your fingers. 5 or 0.5 inches. If your fingertips touch, measuring the overlap to the nearest degree, you will obtain a favorable score. 5 or 0.5 inches. Do not grasp your fingers together and pull if you can touch them; doing so will reduce the precision of your score. Record your greatest score after completing the stretch twice, being sure to note whether it was positive or negative. (Rikli, & Jones, 2013, pp.181-182).

Per protocol instructions

Since there aren't really any adjustments to this exam, it should be graded as "Followed Protocol" for all trials that are taken. If any alterations are made, mark the test as "Did Not Follow Protocol" and include a remark about the alterations.

Body Composition

Instruments: Weighing scale, meter measuring tape, pen and booklet.

Test steps

Weight in kg was obtained using the weighing scale, costume that could alter the results were removed before mounting on the scale. Height in meters was obtained using tape measure. Measurement started from the base of the feet to the end of the head. The results were computed (Weight/height^2) and compared to the BMI norm as seen below.

< 18.5kg/m^2	= underweight
18.5 to 24.9kg/m^2	= healthy weight
25 o 29.9 kg/m^2	= above ideal range
> 30 kg/m^2	= Obese

IPAQ Elderly Short form

Two pieces make up this instrument. Part "A" requested for bio data (Name, age, and gender). Four broad inquiries make up Part "B," which inquiries into the kind of everyday physical activities that people partake in. Participants were asked how much time they had spent working out over the course of the previous seven days. The researcher asked participants the questions on the questionnaire and base on their responses, fill the questionnaire for the participant. Those who can read and write were given the questionnaire to fill with the help of the researcher or the research assistant in the local dialect.

Data Processing and Analysis

Statistical Package for Social Sciences (SPSS) was used for data process. Variables were coded, data entered and screened before running analysis. The research questions were analyzed using the appropriate statistical tool as indicated below.

Research Question 1: What is the physical activity level of older adults in Navrongo?

This research question sought to explore the PA levels of older adults in Navrongo. Descriptive statistics involving frequency and percentages was the tool used to analyse this question. This tool is appropriate if you want to describe the portion of respondents measure on a categorical scale (Mishra et al., 2019). PA levels was categorized into inactive, minimally active and HEPA. Frequency and percentage therefore used were used to indicates the proportion of older adults who are inactive, minimally active and HEPA.

Research Question 2: What is the gender difference in body composition and cardiorespiratory endurance measurements, physical functional capacity and physical activity levels?

Research question two seeks to explore how the male and female adults vary in their body composition and cardiorespiratory endurance. Independent sample t-test was used to analyse this research question. An independent samples t-test is appropriate whenever you have two groups that are independent of each other and you want to determine whether there is a significant difference between an outcome variable measured on a continuous scale and some independent categorical variables that has two levels (Mishra, Singh, Pandey, Mishra, & Pandey, 2019).

Gender a categorical variable, and BC, CRE, PFC and PA in this study were measured on a continuous scale. The independent t-test was considered the appropriate statistical tool to analyze this data. The data were properly checked to ensure that it meets all the assumptions necessary to run an independent t-test. To analyse this data, a confidence level of 95% and a margin of error of 5% (0.05) was set before the analysis were made. Since nothing is perfect or 100%, the researcher has made room for an error margin of 0.05. which statistically will not affect the results.

A p-value of 0.05 or less indicated, therefore, that there was a statistically significant difference between the male and female in terms of their BMI and CRE measurements after the analysis. In addition, the means and standard deviations for each sub-group (male and female) were also reported to provide a better understanding of the distinction. All sub-degree's groups of freedom were also estimated. Inferential statistical analysis, which estimates or draws conclusions about population parameters based on sample data, uses degrees of freedom as a fundamental component. The number of values that can vary freely is represented by the degrees of freedom. As a result, it was calculated that each subgroup had n-1 degrees of freedom where "N" is the number of cases that were filed.

Research Question 3: What is the correlation between body composition, cardiorespiratory endurance, physical functional capacity and physical activity levels of adults in Navrongo?

Research question three sought to find the relationship between body composition, cardiorespiratory endurance and functional capacity among the aged. Perason's correlation was used to analyse this research question. According to Akoglu, (2018), Pearson's correlation is appropriate whenever you have two continuous variables and you want to determine whether there is a significant linear relationship between them. All the variables in research question three are measured on a continuous scale, and thus, Pearson correlation becomes the best fit statistical tool for the analysis.

This analysis helped us to understand the strength and direction of the relationship between body composition, cardiorespiratory endurance and functional capacity among the aged. The data was checked to ensure it met all the assumptions (variables are continuous, related pair variables, absences of outliers and linearity and homoscedasticity) necessary for Pearson correlation.

The results were reported on the r-value, df, p-value, the direction (negative or positive) and strength can be categorized as weak, moderate and high. The number of free-floating values is shown by the df values, while the r-value indicates the strength of the association. Directional indicators (-/+) show which way the correlation is going. The correlation's statistical significance is shown by the correlation's p-value. A correlation is regarded statistically significant when the p-value is .05 or lower, while values higher than.05 are not considered statistically significant.

Research Question 4: What are the effects of body composition and cardiorespiratory endurance on functional capacity of older adults?

This question was out to find the influence of body composition and cardiorespiratory endurance on physical functioning among the aged in the Navrongo township. Multiple regression was considered as an appropriate statistical tool for analyzing this research question. Chatfield, (2018) espoused that, multiple linear regression is appropriate when you have a dependent variable and two or more independent variables, and you want to determine how much variation in the dependent variable can be explained by the independent variables. The data was checked to ensure that all the assumptions (no significant outliers, existence of a linear relationship between IVs and DVs, absence of multicollinearity, independent residual values, constancy in variance of the residuals, and normal distribution of data) of multiple regression are met.

Results were reported on correlation, R, R^2, ANOVA analysis (regression df and residual df, F-ratio and p-value) and the coefficients (beta-values and p-values). The correlation was to ensure that the IVs are not highly correlated with one another. The p-value in the correlation showed if the correlation was statistically significant. A p-value of less than.05 was therefore considered significant. The value of R can be used to interpret any normal correlation coefficient because it is a statistic that is extremely comparable to r. However, it describes the strength of the association between the outcome variable (DV) and every single predictor variable (or IV) instead of the relationship between two variables. Therefore, a strong association between the IVs and the DV will be deemed to exist when the R-value is 0.6 or above.

The percentage of variation in the outcome variable (physical functional ability) that can be explained by the model is shown by the R square (R^2) value (i.e., CRE and BC). The percentage (x%) of the variance in the data that can be explained by the predictor variables can be obtained by multiplying this by 100 or reporting it as R^2=. xx.

The results of the ANOVA analysis indicate whether or not the model which takes into account body composition and cardiorespiratory endurance is a reliable indicator of the dependent variables (physical functional capacity). Utilizing analysis of variance, this is evaluated. The regression model significantly predicts older people' physical functional ability if the significance value is smaller than p=0.05. A test to determine whether there is a substantial difference in the means of two populations (body composition and cardiorespiratory endurance) is the F-ratio. A group of variables' combined significance can be determined by the F-value. Simply put, the F statistic contrasts the combined effects of all the variables.

When determining if the outcomes are significant enough to reject the null hypothesis, the F-value and p-value should always be used together. If the test shows a larger f-value, it means something is significant. Additionally, the regression df in the ANOVA analysis represents the number of independent variables (body composition-BC and cardiorespiratory endurance- CRE) in the regression model. In this case, the regression df will be 2 (df =2). The residual df represents the total number of observations of the dataset subtracted by the number variables being estimated. In this case, the number of observations (988) and the number estimated variables (CRE, BC and PFC). Therefore, residual df = 988-3.

Therefore, the F (Regression df, Residual df) = f-ratio, p=sig will be used to describe the results of the ANOVA analysis. Last but not least, while the ANOVA table indicates if the overall model is a reliable predictor of the outcome variable, the coefficient output table indicates the relative importance of the various predictor factors. If a predictor variable's p-value is less than.05. it is substantially related to the outcome variable. The model's standardized beta coefficients will be the next set of data to watch for (the β values). The associations between the outcome (physical functional abilities) and both predictor factors are explained by these values (body composition and cardiorespiratory endurance). Relationships will also be beneficial if both values are high. This means that, as cardiorespiratory fitness goes up or body composition, physical functional capacity also gets higher. Additionally, these β values provide a sense of the impact each predictor will have on the result if the other factors' impacts are kept constant.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

The purpose of this study was to determine the extent to which BC and CRE predict physical functional capacity of older adults in Navrongo. This chapter focuses on the results and the discussion.

Research Question 1: What is the Physical Activity Level of Older Adults in Navrongo?

To determine the PA levels of older adults in Navrongo, frequency and percentages were estimated, and the results are shown in Table 1. The results indicate that 470 (47%) participants were physically inactive while 528 (53%) were minimally active. Unfortunately, health-enhancing physical activity levels were 0 or 0% among this category of adults. Therefore, the older adults in Navrongo are physically inactive, which may have consequences on their health and well-being.

Table 1: Physical Activity Levels of Older Adults in Navrongo

MET Range	Description	Frequency	Percentage
< 600MET/week	Inactive	470	47%
600 – 1500MET/week	Minimally active	528	53%
> 1500MET/week	HEPA	0	0%

Source: Field Survey (2022)

The finding from this study revealed that older adults in Navrongo are minimally active. However, 47% of older adults being inactive and none engaging in health enhancing PA is very worrying and alarming. Therefore, the population of adults in Navrongo is in danger as they may be predisposed to metabolic disorders, and other chronic non-communicable diseases such as cancer, diabetes, cerebrovascular, and cardiovascular diseases (WHO, 2014).

Physical inactivity among adults could be attributed to a decrease in physical activity participation levels because of age (Magyari et al., 2018). Additionally, there seems to be no conscious effort by these older adults to carry out daily activities. McPhee et al. (2016) found that age-related declines in physical activity are caused by both social and physiological factors. The avoidance of meaningful physical activity among the elderly is also influenced by physical limitations, disease, and discomfort, as well as retirement coupled with a loss of interest in social activities (including physical activity). Furthermore, despite being aware of the advantages of greater physical exercise, many older persons continue to be sedentary and engage in very little physical activity. The 53% who were minimally active might have been very active in their youthful days. This might have helped them to transit into healthy active aging. Furthermore, others who were not previously active, may get to understand the numerous benefits of being physically active and took to participating in it through keep fit clubs (Thompson, 2018).

As individuals grow, their energy requirements and relative increase in fat mass at the expense of muscle mass contribute to increased insulin resistance and impaired muscle protein turnover (Calonne et al., 2019). This creates a difficulty in engaging in meaningful physical activity (Mendes De Leon et al. 2005). Hence, the incapacity to engage in physical activities that promotes health.

A person needs to perform moderate-to-vigorous physical activity for at least 30 to 60 minutes, three times a week, in order to reach the health-enhancing physical activity levels (1500MET/week-3000MET/week) (WHO, 2012). This, therefore, requires extra physical efforts from older adults, which may lead to few or no adult meeting such levels of physical activity, as may be the case with the elderly population in Navrongo (Carbone et al., 2017).

Age-related health issues might lead to a decline in social interaction, including participation in physical exercise (Bernard, 2019). This justification is consistent with the Cumming and Henry, (1961). For instance, the DTA theory contends that as one ages, their talents, particularly their capacity to interact with friends and family decline. Consequently, in comparison to their younger counterparts, persons who are older increasingly reserve their relationships to others in their society and become more physically inactive and lonely. However, it is worth indicating that physical activity, even if initiated later in life, might delay the onset of impairment in the elderly once it is initiated. (Lafortune et al., 2016). Additionally, a preventive effect against disability among the elderly can be achieved by lifestyle factors like intense physical activity. (Moody-Ayers et al., 2005*)*. In addition, adults in the neighborhood may participate in less physical activity due to a poor constructed environment. Most of the built environment in Ghana is not exercise-friendly (Van den Berg, Wendel-Vos, van Poppel, Kemper, van Mechelen, & Maas, 2015). The environment plays a crucial role in promoting engagement in physical activity. For instance, WHO (2019) made the case that incorporating physical exercise into daily life, such as walking and cycling, may help people meet recommended levels of physical activity, which calls for a supportive built environment. Despite the fact that social and individual factors influence physical activity (Sullivan, & Lachman, 2017), evidence suggests that a well-designed setting is important (Smith et al., 2017). The importance of the built environment must be highlighted since it motivates people to engage in greater physical activity than a setting that is badly designed and does not support an active lifestyle. (Smith et al., 2017). The low levels of physical activity among the aged in Navrongo can be attributed to a lack of a supportive built environment, such as a well-designed walkable path, recreational parks, cycling paths among others. Unfortunately, this could increase the risk of cardiovascular diseases (CVD), obesity, and other disabilities and lead to a loss of physical functioning among these adults (Magyari et al., 2018).

Research Question 2: What is the Gender Difference in Cardiorespiratory Endurance, Body Composition, Physical Functional Capacity and Physical Activity Levels among Adults in Navrongo?

To determine the differences in CRE, BC, PA levels and PFC by gender, four different independent sample t-test analyses were calculated. The findings revealed a statistically significant difference in CRE between male and female, t = (812) = 19.27, p < .0125, with women recording a lower CRE (M = 53.22, SD = 12.51) than Men (M = 70.87, SD = 15.60). Levene's test indicated unequal variance (F = 19.97, p = .00). Again, there was statistically significant difference in BMI by gender, t (996) = -26.00, p < .0125, with women having a higher BMI (M = 27.85, SD = 4.14) than men (M = 21.28, SD = 3.22). Levene's test indicated unequal variance (F = 16.81, p=.000). Hence, the females in this group are overweight and on the borderline of crossing into to obesity class 1. Additionally, there was a statistically significant difference between males and females' levels of physical exercise, t (912) = 3.85, p < .0125, with men (M = 682.82, SD = 214.08) higher than women (M = 631.02, SD = 206.21). Levene's test indicated unequal variance (F = 4.20, p = .000). Hence, the women in this group are less physically active.

Finally, the results showed a statistically significantly difference in physical function by gender, t (833) = 21.92, p < .0125, higher functional capacity for men (M = 101.79, SD = 15.95), than women (M = 81.02, SD = 13.25). Levene's test indicated unequal variance (F = 15.26, p = .000). Hence, the women in this group may suffer functional limitations.

The findings showed that Navrongo elderly women have low CRF. This decline in CRE levels may as a result of several factors such as changes in body composition due to the fact that women lose muscle mass and gain fat as they age, which can contribute to decreased fitness levels (Al-Sofiani, Ganji, & Kalyani, 2019), hormonal changes pointing to the fact that, menopause can lead to changes in body composition and a decrease in estrogen levels, which can impact cardiovascular health (El Khoudary et al., 2020) and as well as medications, since certain medications used to treat chronic health conditions can also impact cardiovascular health and fitness levels (Calderón-Larrañaga et al., 2019).

Age is a significant independent risk factor for CVD due to the increased likelihood of developing additional cardiac risk factors, such as diabetes and obesity (Rodgers et al., 2019). Older people have a substantially higher frequency of the majority of CVDs than the general population. Malmborg et al. (2021) state that, 77.8% of females and 70.8% of males between 2013 and 2017 within the ages of 65 and 74 received a diagnosis of high blood pressure or hypertension. Furthermore, the prevalence of diagnosed hypertension rose sharply, reaching 80.0% for men and 85.6% for women over 75. Hypertension is one of the major risk factors for CVD and has been linked to a number of risk variables, including as obesity, smoking, alcohol use, poor diet, and inactivity. Additionally, among older adults, obesity, gender, and age are particularly linked to high blood pressure. (Hajar, 2016). Elderly women in Navrongo having low CRF coupled with being overweight may lead to more hypertensive cases among this population sooner or later.

Gender differences in physical and physiological characteristics are established (Hands, et al., 2016). The lower stroke volumes of women and the slower increase in stroke volumes from rest to exercise are also the most constant gender differences in the cardiovascular responses to endurance or "dynamic" exercise. Women's lower peak oxygen consumption (VO2peak) and smaller stroke volumes at rest and during exercise may be related to gender-specific variations in heart size/mass and blood volume. Jakovljevic (2018) also confirms that the lower heart size of females compared to males is another morphological trait that appears to affect VO2 max. The smaller maximum systolic volume and thus reduced cardiac output in females can be attributed to their smaller hearts. They also stated that when the same training level is applied to men and women, the variation in VO2 max levels between the sexes is 68.3% due to heart size (i.e., left ventricular mass). The heart rate response to exercise at the same absolute exertion is influenced by gender and physical fitness. There are considerable disparities between the sexes during maximal activity in heart rate, blood pressure, and arterial blood oxygen levels. As seen in Navrongo, normal ageing is associated with a decline in VO2peak while the rate of decline appears to be high in women and low among men, as seen in Navrongo.

The haemoglobin levels are another element influencing the VO2 max disparity between sexes. In reality, research involving professional crosscountry skiers showed that female athletes' hemoglobin levels were 10% lower than those of male athletes, which led to lower VO2 max values (Hands, et al., 2016). Furthermore, Sharma and Kailashiya, (2016) showed that a lower hemoglobin content in female's accounts for about 10% of the variation in VO2 max between the sexes. Therefore, when considered as a whole, gender influences both the cardiovascular reactions to exercise and the age-related reduction in exercise capacity in people. It's important to note that regular physical activity can help improve cardiorespiratory fitness and overall health in older women, even if they have some of these risk factors.

The finding again indicates that the female older adults in Navrongo are overweighed and on the borderline of crossing into obesity class 1 that predisposes them to the risk of non-communicable diseases such as coronary heart disease, strokes, and hypertension among others. About 47% of older being inactive in Navrongo could possibly have an influence on high BMI's among older women in Navrongo. Also, poor dietary choices among these older women could also contribute the high BMI values (McCuen-Wurst, Ruggieri, & Allison, 2018). Additionally, certain medications used to treat chronic health conditions such as diabetes, hypertension, and depression can contribute to weight gain and a higher BMI among older women in Navrongo (Tauqeer, Gomez, & Stanford, 2018). Dogra (2017) claims that because there are disparities in BMI between the sexes, females are frequently regarded as having a higher risk of experiencing negative health effects and are designated as a high priority category for physical activity interventions. Additionally, this may result in excess body fat, and more cholesterol deposits in the blood. Furthermore, these substances have a high tendency to build up and block the flow of blood to the brain, to-and-fro the heart and other organs, resulting in a compromised cardiovascular system (Elagizi et al., 2018). Additionally, obesity, feminine gender, and advanced age are all risk factors for hypertension in older persons. It's important to note that a high BMI can increase the risk of various health problems, including diabetes, heart disease, and certain cancers. Maintaining a healthy weight through regular physical activity and a balanced diet can help prevent these health problems and improve overall health

Further findings reveal that the women in Navrongo are less physically active compared to the men. Older women in Navrongo reported to be overweight, may have physical limitations such as chronic pain, mobility issues, or arthritis, which can make it difficult to participate in physical activity (Agyeman, 2019). Also, lack of access to facilities and knowledge of the health benefits of regular participation in PA might have resulted in the low PA participation levels among older women in Navrongo (Muti et al., 2023).

PA participation is fundamental to the health and well-being of individuals, with benefits like improved health-related fitness, decreased levels of depression, and a decreased risk of non-communicable diseases (McPhee et al., 2016). This is predominantly found among the aged because of the decline in cardiovascular function, muscle mass (sarcopenia), increase in adiposity, and muscle fat infiltration (Carbone, Lavie, & Arena, 2017). Physical activity is also proven to be crucial for maintaining independence, preventing chronic health issues, and improving quality of life. Although functional losses (such as difficulty walking, carrying packages, and climbing stairs) are related to aging, this may be exacerbated by a lack of exercise, which can reduce cardiovascular fitness and exercise capacity, cause disuse atrophy, and occasionally result in cellular loss. (Bolton, & Rajkumar, 2019). For instance, reports have shown that younger and older people have the same ability to build muscle mass and have relative strength gains after strength exercise (Fragala et al., 2019). However, the impact, especially for women and elderly persons, may be lessened. Particularly for elderly women who have less muscular mass, strength, and power than males do, inactivity should be avoided. It is crucial to take into account the various demands and preferences according to gender, mode, and setting in order to motivate everyone to engage in adequate and meaningful physical activity.

Finally, it was found that older women in Navrongo have some functional limitations. This reduced physical functional capacity may be attributed to the high BMI values of older women in Navrongo with reduced PA and CRE levels. This is in line with Poggiogalle et al. (2019), when they said as people age, their functional capacity (strength, endurance, agility, and flexibility) declines, making daily activities more challenging. among the aged especially women. Therefore, when physical inactivity becomes prevalent among women, health-related fitness components, especially body composition and cardiorespiratory fitness are compromised. This can lead to a decline in physical functioning, thereby, predisposing women to high risk of non-communicable disease and other related illnesses. It's important to address these factors and promote physical activity, proper nutrition, and social engagement to help maintain and improve physical function in older women.

A healthcare provider or physical therapist can also provide recommendations and interventions to improve physical function and prevent further decline.

Research Question 3: What is the Correlation between Body Composition, Cardiorespiratory Endurance, Functional Capacity and Physical Activity Levels of Adults in Navrongo?

To determine the relationships among CRE, BMI, PFC, and PA levels, Pearson's correlation was computed. The results showed that PFC correlated strongly and positively with CRE, r (996) = 0.81, p = .000, moderate and negatively with BMI, r (996) = -0.37, p = .000., and a weak and positive with PA levels, r (996) = 0.10, p = .003. Additionally, CRE correlated moderately negatively with BMI, r (996) = -0.37, p = .000, and weakly and positive with PA levels, r (996) = 0.07, p = .037. Finally, BMI correlated weakly and negatively with PA levels, r (996) = -0.04, p = .195 of adults in Navrongo. Hence, PA was found to correlate poorly with BMI, CRE, and PFC due to difference in units of measurement. BMI and CRE were found to correlate moderately, whereas PFC and CRE correlated highly.

Table 2: Correlation between BMI, CRE, PFC and PA Levels

	BMI	CRE	PFC	PA
BMI				-.04
CRE	-.37**		.81**	.07**
PFC	-.37**			.10**
PA				

Note: **correlation is significant at the .01 level (two tailed).

Source: Field Survey (2022)

The finding indicates a strong positive correlation between PFC and CRE of the adults in Navrongo. It is not surprising that as CRE levels decrease with age, so does PFC (McPhee et al., 2016). Physical function reduction with aging is a serious health issue that may have an impact on older people's quality of life. Loss of freedom and a bad quality of life can result from physical decline. Therefore, there is a need for endurance training, but this study recorded otherwise among this group of adults. Engaging in endurance training or activities have shown to improve heart function as well as muscular function among older community-dwelling men and women in US (Jin et al., 2017). Thus, older individuals who have transited into healthy ageing and/or meet WHO physical activity recommendations, are likely to carry out activities of daily living without undue difficulty (McPhee et al., 2016).

The finding also revealed that, BMI correlated moderately and negatively with CRE and PFC. Numerous studies have demonstrated a significant association between BMI, PFC and CRE (Ng et al., 2013; Smith et al., 2017). The finding again showed that the minimal PA levels of older adults in Navrongo correlated weakly and negatively with their BMI, weakly and positively with their CRE, and weakly and positively with their PFC. These findings reflect the premise that, PA participation improves physical functioning and healthy weight among individuals of all ages. According to Chakravarthy et al. (2012), aging adults' physical function is influenced by their lifestyle and health. Unfortunately, there is a larger chance of mobility impairments and physical performance when there is a lack of PA causing obesity or being overweight (Schoufour et al., 2021).

A part of physiologic fitness called cardiorespiratory fitness has to do with how during extended periods of physical exercise, the circulatory and respiratory systems can supply oxygen (Kohzuki et al., 2018). Body composition represents the proportion of fat and non-fat mass in the body (Ponti et al., 2020), and has a direct link with the cardiovascular system. Molnar and Gair (2020) explained that the cardiovascular system offers a number of vital life-sustaining activities, including the movement of nutrients and oxygen, the removal of wastes and carbon dioxide, the prevention of disease, and the maintenance of body temperature. Heart disease, obesity, and overweight are public health problems globally (Roth et al., 2017; Hamid et al., 2019).

Individuals with higher BMI values or high body fat compared to lean muscles like the case of older female adults in Navrongo are at a higher risk of hypertension and strokes due to the fatty accumulation on the inner walls of the coronary arteries supplying the brain (Ortega-Loubon, et. al., 2019). According to Nowbar et al. (2019), for the past 20 years, heart disease has continued to be the top cause of mortality worldwide. Obesity, one of several risk factors, has drawn special attention because it is now understood to be an epidemic on a global scale (GBD 2015 Obesity Collaborators, 2017).

According to Moreno et al. (2016), 39% of adults worldwide were considered overweight, which is an increase from 1975. Obesity rates increased from 6.4% for women and 3.2% for men in 1975 to 14.9% and 10.8%, respectively, in 2016. The findings by Cheng (2016) reflect those of the current study that, women in this study are overweight and demonstrated a compromised cardiorespiratory fitness.

In Africa's metropolitan centres, overweight and obesity are now becoming a health issue, especially for the lower- and middle-income earners

(Haggblade et al., 2016). This call for increase in PA participation. Maintaining a healthy body composition is made easier by cardiovascular exercise (Chiu et al., 2017). Additionally, by putting the cardiovascular system through high-intensity interval training, certain hormones that stimulate fat burning, such growth hormone and testosterone, become more active.

High-intensity exercise burns more calories overall and accelerates the fat-burning enzymes whereas low-intensity, steady-state cardio routines burn a greater percentage of fat (Longland et al., 2016). Studies suggest that individuals with poor body composition (overweight or obese) are likely to have cardiovascular problems (Elagizi et al., 2018). This primarily may be due to the increasing efforts required to perform PA or exercise. Therefore, an individual with an improved body composition through aerobic muscular strength and endurance training is likely to carry out activities of daily living without undue fatigue (Howie, 2020). Hence, an improved cardiovascular system has a significant positive effect on body composition (Hoeger, Hoeger, Hoeger, & Fawson, 2018).

Research Question 4: What are the Effects of Body Composition and Cardiorespiratory Endurance on Functional Capacity of Older Adults in Navrongo?

Before multiple linear regression was performed, Pearson's correlation was performed between CRE and BC to ensure multiplecollinearity doesn't exist. The results showed a moderately negative correlation between BC and CRF ($r = -.37$, $n = 998$, $p < .05$). To predict PFC from CRE and BMI, a multiple regression was performed. The results indicate statistically significantly prediction of PFC, $F(2, 995) = 956.63$, $p < .05$, $R = 0.81$, $R^2 = .658$ and adjusted $R = .657$. From CRE and BMI. Specifically, CRE significantly predict PFC, β = .774, t (995) = 38.56, p < .05) and BMI significantly predict PFC, β = - .089, t (995) = - 4.44, p < .05). Therefore, CRE and BMI are found to be significant predictors of PFC among older adults in Navrongo

Table 3: Predicting PFC from BC and CRE

VARIABLE	B	BETA	T	P
Constant	47.349	.	17.830	.001
Cardiorespiratory fitness	.837	.774	38.857	.001
Body mass index	-.327	.089	-4.443	.001
R	.811			
R^2	.658			
Adjusted R	.657			

Source: Field Survey (2022) F-ratio = 956.63, df = (2, 995), p < .05

Table 1 above shows that CRE and BC are predictors of PFC among older adults in Navrongo. Therefore, for every unit increase in CRE will result in .837 change in PFC and vice versa. Also, for every 1kg/m^2 increase in BMI will result in a reduction in PFC by -.327 and verse versa. It is also noted that, CRE contributes 77.4% to PFC whereas BC contributes about 1% to PFC of older adults in Navrongo. Despite the fact that CRE and BC predicted PFC, CRE contributed more to PFC than BC.

Findings from this study showed that, older adults in Navrongo are minimally active is an indication that, they were engaged in some moderate levels of PA which could have been aerobic in nature resulting in improved CRE levels leading to 77.4% contribution of CRE to PFC. Also, since no body part or fitness component is developed in isolation, BC predicting PFC and contributing about 1% to PFC suggest that, the nature of PA undertaking by older adults in Navrongo did not focus on weight reduction.

This finding reflects the statement by Magyari, Lite, Kilpatrick, and Schoffstall (2018) that body composition and CRE are two health-related fitness components known to predict PFC among older adults. The physical functioning capacity of individuals is key to their health, but this could be compromised by being overweight or obese, or with a poor cardiovascular fitness level. As body fat levels increase with age, both muscle and bone tissues also decrease Ponti et al. (2020).

It has been demonstrated that obesity in the elderly, as measured by a high BMI, is substantially associated with a deterioration in functional performance, which could result in disability. (Poggiogalle et al., 2019). As a result, older adults especially among women in Navrongo are likely to suffer from physical functional limitation due to their high BMI value. Ponti et al. (2020) stated that, the risk of disability and functional limits should be taken into account together with an individual's historical antecedents of being overweight or obese.

The functional condition of older people is not solely influenced by adiposity. They concluded that older men and women who had been overweight or obese since the age of 25 were almost three times more likely to have mobility problems. On the other hand, there was a 1.7-fold increased risk for persons who only became overweight or obese in old age. For more information, see (Ponti et al., 2020; Ansari-Moghaddam et al., 2016). So, it seems that a longer history of high body fatness increases the chance of functional failure in old life. Another important factor influencing functional performance as people age is weight increase. (Tieland, Trouwborst, & Clark, 2018). Additionally, findings from the US revealed that body composition was a predictor of physical function among individuals 60 years and over (Sunghye, Xiaoyan & Stephen, 2017). Moreover, a study from Denmark found body weight as a determinant of physical function among older adults (Perdersen, Ovesen, Schroll, Avlund, & Era, 2002).

It's crucial to remember that the aging process is firmly connected to changes in heart and vascular structure and function, which lower the functional capacity of the cardiovascular system and raise the risk of cardiovascular disease in older people (Xu et al., 2017). an increase in body weight of 10 kg is associated with a 12% increase in the risk of coronary artery disease, a 3 mmHg rise in systolic blood pressure, and a 2.3 mmHg increase in diastolic blood pressure (Piché, Poirier, Lemieux, & Després, 2018). Furthermore, large arteries dilate as people age and their walls thicken and stiffen as a result of collagen and calcium buildup and the fragmentation of elastic fibers, which reduces the heart's ability to supply muscles with oxygenated blood. (Asahara, Endo, Liang, & Matsukawa, 2018).

When working muscles do not receive sufficient oxygenated blood, muscle cramps and other muscular injuries set in during PA participation, causing the avoidance of meaningful PA participation among the aged. Similar experiences might have led to the avoidance of meaningful PA among the aged in Navrongo even though aerobic exercise and PA can lower mortality from all causes of cardiovascular disease, the risk of heart failure and myocardial infarction, as well as age-related arterial and cardiac stiffness.

They are also linked to high levels of cardiorespiratory fitness. (Žargi, Drobnič, Stražar, & Kacin, 2018).

Everybody needs to eat food to meet the body's energy requirements (Munt, Partridge, & Allman-Farinelli, 2017). Eating more (everyday) and moving less results in the accumulation of more body fat leading to excess body weight gain. This attitude of eating more and being less active could have led to the higher BMI values among older adults in Navrongo. According to Connolly, Garvey, and McKee (2017), increased body weight and a compromised cardiovascular system, combined with physical inactivity, are associated with a decline in health-related physical fitness among the elderly, making them more vulnerable to falls, disability and reduced mobility, limiting their physical activity.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The purpose of this study was to determine the extent to which BC and CRE predict physical functional capacity of older adults in Navrongo. This chapter focuses on the summary, conclusions, recommendations, and suggestions for further studies.

Summary

Aging is an inevitable part of human life, and everyone will grow and become old. This process of ageing comes with limitations in physical functional abilities (WHO, 2012). The age-related decline in PFC results from reduced mobility with the increased efforts needed to perform daily activities, and could lead to avoidance of meaningful PA and exercise resulting in sedentary living. Body composition and CRE are the two most studied HRF components known to predict PFC among older adults. For instance, findings from the US revealed that body composition was a predictor of physical function among individuals 60 years and over (Sunghye, Xiaoyan & Stephen, 2017). Moreover, a study from Denmark found body weight as a determinant of physical function among older adults (Perdersen, Ovesen, Schroll, Avlund, & Era, 2002). On the other hand, a study from Italy found that among community-dwelling men and women, cardiovascular health was a predictor of physical function. (Jin et al., 2017). However, a search through the literature revealed that, little studies have studied body weight and CRF together to determine which of them is a significant predictor of PFC among older adults. Hence, the need for this study.

Based on the research questions set to lead the study, relevant literature was reviewed. DTA was used to help gain an understanding of how and why people withdraw from social activities, including PA participation, as they get older.

The study employed a quantitative cross-sectional design to explore the role of PA, body composition, and CRE in influencing the PFC of the adults in Navrongo. The population for this study is older adults aged 60 and above. The multistage sampling technique (stratified, quota, cluster, and volunteer sampling) was used to select 998 participants for this study. The data collection instruments used to obtain data are, the senior fitness test battery, IPAQ short form for the elderly, a weighing scale and a meter tape. Data was collected on a one-time basis, at the homes of the participants without follow-up. Four research questions were formulated to guide the study and were analysed using the frequency and percentages, Pearson's correlation, independent sampled t-test and multiple linear regression.

Main Findings

The discussion of the results led to the following findings:

1. PA was found to be generally minimal among older men and women in Navrongo due to the abandonment of farming activities, lack of creational parks and poorly built environment for exercise.
2. Older females were found to be overweight with low CRE and PFC. While the older males have normal body weight, improved CRE, and PFC.
3. PA levels were found to correlate poorly with CRE, PFC and BMI due to the higher values in PA units of measurement.

4. BMI and CRE were found to be good predictors of PFC in older adults in Navrongo.

Conclusions

The following conclusions are drawn in light of the findings:

1. The older adults in Navrongo are not engaging in any health enhancing PA
2. Older women were found to be overweight, with compromised CRE, reduced PFC, and engage in minimal PA levels.
3. Minimal PA levels of older adults correlated weakly with their CRE, BC and PFC.
4. Finally, body composition and cardiorespiratory endurance are good predictors of physical functioning among older adults in Navrongo

Recommendations

Taking into consideration the findings and conclusions, the following suggestions were made:

1. Mass education on the health benefits of physical activity participation and physical activity and nutritional guidelines should be done. This will help older people, especially older women, since there are the most vulnerable to understand the need to engage in meaningful physical activity for healthy living.
2. Gym and fitness instructors should focus on improving health-related fitness especially body composition and cardiovascular endurance during their training sessions and when designing training programmes for older persons.

3. Older individuals in Navrongo should exercise for at least 150 minutes a week at a moderate to strenuous intensity, or 75 minutes at a vigorous intensity, depending on the group's level of activity. The activities to be engaged in should include those that improve strength, balance, flexibility, and aerobic endurance.
4. Older adults should reduce the amount of time spent sitting or lying down and break up the long hours or periods of inactivity.

Recommendations for Further Studies

1. Further studies should consider other methods of measuring body fat either than BMI
2. Also, similar studies on the effects of CRE and BC on PFC of older adults should take into consideration the effect of nutrition and medical conditions of the participants.

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APPENDICES

APPENDIX A

QUESTIONNAIRE

UNIVERSITY OF CAPE COAST
HPER DEPARTMENT
PHYSICAL ACTIVITY QUESTIONNAIRE FOR ELDERLY SHORT FORM

I am Eric Ayine Aloko, an MPhil Candidate in the Department of Health Physical and Recreation of the University of Cape Coast, Cape Coast. I am embarking on a research titled "Body Composition and Cardiorespiratory endurance: Predictors of Physical Functional Capacity Among Older Adults in Navrongo. The purpose of this study is to find out which among the two most studied health-related fitness component will be a good predictor of physical functional ability among older adults. If you agree to take part in this study, you will be required to go through the following activities; up and go, 2-minutes step up test, chair sit and reach, chair stand, back scratch, weight and height checking and a completion of a 4-item International physical activity questionnaire for older adults.

Participating in this study is voluntary and you are free to opt out if you so desire. I assured of secrecy and confidentiality in terms the information you provide for this study. Additionally, your names will not be needed for this study. Instead, ID numbers will be assigned (001-998) each participant to ensure confidentiality. Finally, the data you provide will be used for the purpose of this study only and nothing more.

ID……………………………………… Sex (F/M) Age………yrs

I am interested in finding out about the kinds of physical activities that people do as part of their everyday lives.

The questions will ask you about the time you spent being physically active in the last 7 days.

Please answer each question even if you do not consider yourself to be an active person.

To describe the intensity of the physical activity, two terms (Moderate and Vigorous) are used:

<u>Moderate</u> activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal.

<u>Vigorous</u> physical activities refer to activities that take hard physical effort and make you breathe much harder than normal.

The first question is about the time you spent sitting during the last 7 days. Include time spent at work, at home, while doing course work and

1. during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

During the last 7 days, how much time did you spend sitting during a day?

____ hours ___ minutes

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2. Think about the time you spent walking in the last 7 days. This includes at work and at home, walking to travel from place to place, and any other walking that you might do solely for recreation, sport, exercise, or leisure.

During the last 7 days, on how many days did you walk for at least 10 minutes at a time?

________ Days ⇒ How much time did you usually spend walking on one of those days?

Or

☐ No day

____ hours ___ minutes

---

3. During the last 7 days, on how many days did you do moderate physical activities like gardening, cleaning, bicycling at a regular pace, swimming or other fitness activities.

Think *only* about those physical activities that you did for at least 10 minutes at a time. Do not include walking.

---

4. During the last 7 days, on how many days did you do vigorous physical activities like heavy lifting, heavier garden or construction work, chopping woods, aerobics, jogging/running or fast bicycling?

Think *only* about those physical activities that you did for at least 10 minutes at a time.

________ Days ⇒ How much time did you usually spend doing vigorous physical activities on one of those days?

or

No day

____ hours ___ minutes

APPENDIX B

INTRODUCTORY LETTER

UNIVERSITY OF CAPE COAST
COLLEGE OF EDUCATION STUDIES
FACULTY OF SCIENCE AND TECHNOLOGY EDUCATION
DEPARTMENT OF HEALTH, PHYSICAL EDUCATION & RECREATION

TELEPHONE: +233 - (0)206610931 / (0)543021384 / (0)268392819

TELEX: 2552, UCC, GH.

EMAIL: **hper@ucc.edu.gh**

Cables & Telegrams:
UNIVERSITY, CAPE COAST

Our Ref: **ET/MPE/19/0013**

5 April, 2022.

The Chairman
Institutional Review Board
University of Cape Coast
Cape Coast

INTRODUCTORY LETTER: ERIC AYINE ALOKO (ET/MPE/19/0013)

The above named person is a student of the Department of Health, Physical Education and Recreation of the University of Cape Coast. He is pursuing a Master of Philosophy degree in Physical Education. In partial fulfilment of the requirements for the programme, he is conducting a research for his thesis titled **"Body Composition and Cardiorespiratory Endurance: Predictors of Physical Functional Capacity among Older Adults in Navrongo."**
He has defended his thesis proposal and has passed. I therefore kindly request that he is granted ethical clearance to enable his conduct the research.

Counting on your usual co-operation.

Thank you.

Dr. Edward Wilson Ansah
PRINCIPAL SUPERVISOR
edward.ansah@ucc.edu.gh

APPENDIX C

ETHICAL CLEARANCE LETTER

UNIVERSITY OF CAPE COAST

INSTITUTIONAL REVIEW BOARD SECRETARIAT

TEL: 0558093143 / 0508878309
E-MAIL: irb@ucc.edu.gh
OUR REF: UCC/IRB/A/2016/1474
YOUR REF:
OMB NO: 0990-0279
IORG #: IORG0009096

10TH AUGUST, 2022

Mr. Eric Ayine Aloko
Department of Health, Physical Education and Recreation
University of Cape Coast

Dear Mr. Aloko,

ETHICAL CLEARANCE – ID (UCCIRB/CES/2022/30)

The University of Cape Coast Institutional Review Board (UCCIRB) has granted Provisional Approval for the implementation of your research **Body Composition and Cardio-Respiratory Endurance: Predictors of Physical Functional Capacity among Older Adults in Navrongo, Upper East.** This approval is valid from 10th August, 2022 to 9th August, 2023. You may apply for a renewal subject to submission of all the required documents that will be prescribed by the UCCIRB.

Please note that any modification to the project must be submitted to the UCCIRB for review and approval before its implementation. You are required to submit periodic review of the protocol to the Board and a final full review to the UCCIRB on completion of the research. The UCCIRB may observe or cause to be observed procedures and records of the research during and after implementation.

You are also required to report all serious adverse events related to this study to the UCCIRB within seven days verbally and fourteen days in writing.

Always quote the protocol identification number in all future correspondence with us in relation to this protocol.

Yours faithfully,

Samuel Asiedu Owusu, PhD
UCCIRB Administrator

ADMINISTRATOR
INSTITUTIONAL REVIEW BOARD
UNIVERSITY OF CAPE COAST