Physical activity levels, perceived barriers, and facilitators among office-based workers in Grootfontein, Namibia

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DECLARATION

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ABSTRACT

Introduction

Physical activity is known to reduce the risk of non-communicable diseases (NCDs), mortality, and healthcare costs. However, physical inactivity remains high worldwide, increasing the NCD disease burden risk. Office workers have reported high physical inactivity levels during and after working hours. Previous studies have investigated the efficacy of various physical activity interventions to break sedentary behaviour in this population. There is limited data on physical activity among office-based workers in Namibia. Understanding their perceptions of physical activity will help inform interventions and policies to enhance participation.

Aim

The aim of this study was to assess physical activity levels, barriers, and facilitators among office-based workers in Grootfontein, Namibia.

Methods

A An explanatory-sequential mixed-methods study was conducted, and 217 office workers were surveyed using the Global Physical Activity Questionnaire to assess their physical activity levels. The questionnaire included sections on demographic details, work, travel, leisure-based physical activity, and daily sitting time. Semi-structured interviews were carried out with 26 participants from the surveyed sample to understand their barriers and facilitators of physical activity.

Results

The mean age of the participants was 38 years. Female participants made up 63% of the surveyed sample. The majority of the participants had over five years of employment experience, and the average daily sitting time was 8 hours. Sixty-four percent of office workers were physically active, and 65% of them were either overweight or obese. The mean BMI of the participants was 28.2 kg/m². Four themes were generated from the thematic analysis of qualitative data. Office workers were aware of what physical activity entails but had varied opinions on the recommended guidelines. Time constraints were cited as the main barrier while they

were motivated to participate in physical activity for health and self-care reasons. Office workers suggested the provision of more facilities and support in the workplace and community for increased participation in physical activity.

Conclusion

The majority of participants in the study were physically active, but they were either overweight or obese. A multi-factorial approach to a healthy lifestyle is necessary in addition to physical activity.

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LIST OF ABBREVIATIONS

BMI	Body Mass Index
GPAQ	Global Physical Activity Questionnaire
HREC	Human Research Ethics Committee
ISCO	International Standard Classification of Occupations
MET	Metabolic equivalent
MOHSS	Ministry of Health and Social Services
NCDs	Non-communicable diseases
PA	Physical activity
RCTs	Randomised control trials
WHO	World Health Organization

DEFINITION OF TERMS

"Physical activity is defined as any bodily movement produced by the contraction of skeletal muscles that results in an increase in caloric requirements over resting energy expenditure" (Liguori et al., 2021:1).

"Exercise is a subcategory of physical activity that is planned, structured, repetitive, and purposefully focused on improvement or maintenance of one or more components of physical fitness" (Dasso, 2019:46).

"Metabolic equivalent is defined as the ratio of a person's working metabolic rate relative to the resting metabolic rate. One MET is defined as the energy cost of sitting quietly and is equivalent to a caloric consumption of 1 kcal.kg-1.hr-1" (World Health Organization, 2008:3).

Leisure time physical activity refers to all physical activities performed in people’s spare time (Steinbach & Graf, 2008).

CHAPTER 1 INTRODUCTION AND SCOPE OF THE THESIS

1.1 Introduction

In an era where technological developments and modern comforts have made many areas of our lives easier, there has been an unforeseen consequence: a global rise in physical inactivity (Althoff et al., 2017; Guthold et al., 2018). The physical inactivity pandemic has affected low-,middle-, and high-income countries (Althoff et al., 2017; Guthold et al., 2018). In 2022 over 50% of deaths have been attributed to physical inactivity in South Africa (Prinsloo et al., 2022).

Physical inactivity increases the risk of several non-communicable diseases (NCDs) (Lee et al., 2012; Katzmarzyk, 2023). Non-communicable diseases are linked to an increased disease burden and mortality worldwide (Gouda et al., 2019; Katzmarzyk, 2023). In Namibia, NCDs remain the second leading cause of mortality, accounting for 43% of all deaths in 2019 (Trading Economics, 2022; Namibia Statistics Agency, 2023). This trend is attributed to growing levels of sedentary lifestyles, poor diet, smoking and substance abuse (WHO, 2018). While efforts to combat infectious diseases in Sub-Saharan Africa remain in action, there is a need for preventative measures to address the physical inactivity pandemic, NCD burden, and its associated healthcare costs (Gouda et al., 2019; Mudie et al., 2019; Prinsloo et al., 2022; Katzmarzyk, 2023).

Evidence supports physical activity (PA) as a cost-effective intervention for preventing and managing NCDs (Igwesi-Chidobe, Godfrey & Kengne, 2015; Warburton & Bredin, 2017; Chastin et al., 2019). At least 150 minutes of moderate-intensity PA (weekly) is associated with health benefits (World Health Organization [WHO] Africa, 2019). While recommended levels of PA are known to reduce the risk of mortality and disease by 20-30%, some form of PA should be encouraged as it is superior to no PA at all (Warburton & Bredin, 2017; Chastin et al., 2019; Posadzki et al., 2020). Despite the known benefits, PA levels remain low worldwide, with the majority of Namibians being physically inactive (80% of women and 57% of men) (Althoff et al., 2017; Ministry of Health and Social Services [MOHSS], 2017; Guthold

et al., 2018). Socioeconomic factors, high crime rates, unsafe neighbourhoods, and lack of awareness have been associated not only with reduced PA but with poor dietary choices as well (Ashton et al., 2015; Atkinson, Lowe & Moore, 2015; Malambo et al., 2017; Chikafu & Chimbari, 2020; Prioreschi, Wrottesley & Norris, 2021; Siefken et al., 2022).

A similar trend of physical inactivity has been reported among office workers (Dhurata, Gent & Robert, 2013; Kolbe-Alexander, Conradie & Lambert, 2013; Almuzaini & Jradi, 2019; Hene et al., 2021; Bansie & Sarpong, 2022). In 2021, over 75% of office workers in South Africa were physically inactive (Hene et al., 2021). In addition, this population experiences high rates of obesity, NCDs and other risk factors (Addo et al., 2015; Msopa & Mwanakasale, 2018; Almuzaini & Jradi, 2019; Hene et al., 2021). Office-based workers are at high risk of developing NCDs as they sit for long periods of time and experience a lot of stress in their work environment (Clemes, Oêconnell & Edwardson, 2014; Addo et al., 2015; Msopa & Mwanakasale, 2018; Hene et al., 2021). While sedentary behaviours are high during working hours, they have also been reported during non-working days (Clemes, Oêconnell & Edwardson, 2014).

The International Labor Organization advocates for programs that address modifiable risk factors (e.g. nutrition, PA, tobacco, and alcohol use) as well as creating themes every year to address health and work issues related to NCDs (International Labour Organization, 2020). Promotion of PA globally can be implemented through policies that carefully consider culture, different interventions, stakeholders and sociodemographic status (WHO Africa, 2019). A community-centred approach to increasing PA has always been suggested to foster long-term adherence (Igwesi-Chidobe, Godfrey & Kengne, 2015; Siefken et al., 2022). Through the Government NCDs Program, the Ministry of Health of Namibia aims to relatively reduce insufficient PA by 7% in 2022 and 10% in 2025 (MOHSS, 2017). Exploring people's thoughts regarding PA helps guide the various stakeholders on the direction and identify the gaps in knowledge when trying to implement PA awareness campaigns and interventions (Chikafu & Chimbari, 2020).

Previous studies have investigated the efficacy of various work-related PA interventions among office workers (Dunstan et al., 2013; Straker et al., 2013; Gremaud et al., 2018; Hallam, Bilsborough & de Courten, 2018; Lock et al., 2021; Nelson-Wong et al., 2022). Walking in the workplace increases PA levels and improves mental health and performance (Gremaud et al., 2018; Hallam, Bilsborough & de Courten, 2018). There were mixed findings regarding using sit-to-stand desks to increase work-related PA (Nelson-Wong et al., 2022; Dabkowski et al., 2023). There is limited literature on transport-related and leisure-time PA interventions in this population. However, previous studies highlighted the reduced transport and leisure-time PA among office workers, indicating the need to explore their perceptions in order to create effective interventions (Dhurata, Gent & Robert, 2013; Bansie & Sarpong, 2022; Nketiah et al., 2022).

Office workers perceived PA as a way of maintaining general health by reducing susceptibility to sickness and promoting mental wellness (George et al., 2014; Ryde et al., 2020; Gradidge et al., 2021; Landais et al., 2022). They are motivated to participate in PA to relieve stress, increase life expectancy, improve health and prevent disease. At the same time, family responsibilities, lack of motivation, household tasks, time constraints, longer travel distances, unsafe environments, expensive gym fees and unavailability of facilities were perceived as barriers to PA (George et al., 2014; Ryde et al., 2020; Gradidge et al., 2021; Landais et al., 2022).

There is a need for more research on PA targeting office-based workers as they are at risk of developing NCDs secondary to increased levels of physical inactivity and other modifiable risk factors (Addo et al., 2015; Msopa & Mwanakasale, 2018; Hene et al., 2021). Addressing PA in this population will help to reduce obesity and promote interventions that reduce sedentary behaviour and its harmful effects (Addo et al., 2015; Msopa & Mwanakasale, 2018; Hene et al., 2021). A clear gap in research exists when addressing PA in Namibia; hence, little is known when trying to address PA behaviours among office-based workers. Therefore, this study aims to investigate their level of PA, perceptions of PA, and the facilitators and barriers that will assist in informing the interventions that target this specific group of people.

1.2 Aim and Objectives

1.2.1 Aim

The aim of this study was to assess physical activity levels, barriers, and facilitators among office-based workers in Grootfontein, Namibia.

1.2.2 Objectives

1. To determine the PA levels, body mass index (BMI), and average daily sitting time of Grootfontein office-based workers.
2. To determine Grootfontein office-based workers' perceptions about PA.
3. To explore and describe the barriers and facilitators of Grootfontein office-based workers to PA.
4. To explore and describe the personal preferences of Grootfontein office-based workers for future interventions to promote PA participation.

1.3 Significance of this Study

There is limited literature about PA in Namibia, and little is known about PA among office workers in Namibia. However, physical inactivity remains high in Southern Africa, with over 75% of office workers in South Africa being physically inactive (Althoff et al., 2017; Guthold et al., 2018; Umuhoza & Ataguba, 2018; Hene et al., 2021; Onagbiye & Bester, 2022; Manyanga et al., 2023). According to the WHO, PA levels below 150 minutes of weekly moderate-intensity PA are considered insufficient (WHO, 2018). Physical inactivity, among other factors, has been associated with the risk of NCDs and mortality worldwide (Lear et al., 2017; Gouda et al., 2019; Katzmarzyk, 2023). NCDs are the second leading cause of death in Namibia (Namibia Statistics Agency, 2023). Office workers are at great risk of NCDs as they have high daily sedentary time during and after working hours (Clemes, Oêconnell & Edwardson, 2014). Previous studies have highlighted high levels of physical inactivity and obesity in this population (Addo et al., 2015; Mukaruzima, Adeniyi & Frantz, 2020; Hene et al., 2021).

Physical activity patterns and adherence to PA interventions are influenced by perceived barriers and facilitators to PA (Dhurata, Gent & Robert, 2013; Bansie & Sarpong, 2022; Nketiah et al., 2022). However, there is limited data investigating the perceptions of office workers in Namibia and preferred PA interventions for PA

promotion. Exploring the barriers and facilitating factors to PA will greatly assist in identifying areas to be improved and help with policymaking to encourage PA. This will help to bring behavioural change, thereby improving long-term reduction in NCDs.

1.4 Outline of the Research

Chapter 1 discusses the background of the study, aims and objectives, and the significance of the study.

Chapter 2 provides a review of relevant current literature on PA levels, barriers, and facilitators among office workers.

Chapter 3 discusses the overview of the study methodology.

Chapter 4 presents the outcomes from the quantitative and qualitative methods utilised.

Chapter 5 discusses the results of the quantitative and findings of the qualitative portion of the study.

Chapter 6 provides the summary and conclusion.

CHAPTER 2 LITERATURE REVIEW

2.1 Introduction

This narrative literature review seeks to analyse current evidence on PA and its associated factors among office workers. We first define PA and discuss the impact of physical inactivity, the benefits of PA, and current trends of PA levels. We also review the literature on PA interventions, barriers, and facilitators among office workers from different occupational settings. This narrative literature review was conducted using the following databases: PubMed, Cochrane, Primo and Google Scholar. Full-text peer-reviewed articles published in English from 01/01/2010 to 31/12/2023 were included in this review for more recent evidence. Search terms used included 'global PA levels', 'PA levels and bank/office workers', 'PA barriers and bank/office workers', 'benefits of PA', 'PA interventions', and 'PA interventions and bank/office workers'.

2.1.1 Physical Activity

"Physical activity (PA) is defined as any bodily movement produced by the contraction of skeletal muscles that results in an increase in caloric requirements over resting energy expenditure" (Liguori et al., 2021:1). It can be classified as work-related, transport-related, and leisure-time PA (WHO, 2018). It is commonly measured using questionnaires, heart rate monitors, accelerometers, and pedometers (WHO, 2018). At least 150 minutes per week of moderate-intensity PA is recommended for health benefits (WHO, 2018). This review considered PA below this level of physical inactivity (Maimela et al., 2016).

2.1.2 Impact of Physical Inactivity

Physical inactivity increases the risk of coronary heart disease, type-2 diabetes, and breast and colon cancer (Lee et al., 2012; Katzmarzyk, 2023). It has a similar impact on mortality and life expectancy when compared to other modifiable risk factors like smoking (Lee et al., 2012). It is also associated with a high prevalence of obesity and insulin insensitivity across all age groups, with childhood obesity being linked to adulthood obesity (Lee et al., 2012; Simmonds et al., 2016; Katzmarzyk, 2023).

Physical inactivity is responsible for over 5.3 million deaths and close to 500 million new cases of NCDs globally (Lee et al., 2012; Katzmarzyk, 2023). Middle-income countries have been linked with a greater risk of disease burden (Katzmarzyk, 2023).

Physical inactivity accounts for over US$50 billion in healthcare costs worldwide, with high-income countries reporting higher healthcare costs (Katzmarzyk, 2023). WHO Global Action Plan on Physical Activity aims to reduce physical inactivity by 15% by 2030, and failure to do so will lead to US$520 billion in healthcare costs between 2020 and 2030 (Katzmarzyk, 2023).

While the burden of infectious diseases remains high in Southern Africa, the NCD burden is on the rise (Gouda et al., 2019; Mudie et al., 2019; Ellapen et al., 2021). Dawson et al., (2022) reported a 5% of diabetes burden in Namibia. Nearly $60 billion in healthcare costs have been projected by 2030 in managing diabetes alone (Dawson et al., 2022). Physical inactivity, among other modifiable risk factors, contributes to the disease burden (Umuhoza & Ataguba, 2018; Gouda et al., 2019; Mudie et al., 2019; Letamo, 2020; Ellapen et al., 2021; Dawson et al., 2022). Several studies report that urban populations are at greater risk (Gouda et al., 2019; Dawson et al., 2022).

Over 40% of NCDs associated deaths have been reported in Southern Africa with Namibia among the countries with the highest number of deaths (Ellapen et al., 2021). In South Africa, over 50% of deaths have been attributed to physical inactivity in both males and females over the age of 25 (Prinsloo et al., 2022). The rise of physical inactivity in Southern Africa has seen an increase in obesity, disability-adjusted life years, type 2 diabetes, ischemic stroke, heart disease, and other NCDs across all age groups (Umuhoza & Ataguba, 2018; Letamo, 2020; Ellapen et al., 2021; Onagbiye & Bester, 2022; Prinsloo et al., 2022). There is a need for more implementation of PA policies in Southern Africa to address the growing burden of disease, death, and healthcare costs attributed to physical inactivity (Umuhoza & Ataguba, 2018; Letamo, 2020; Ellapen et al., 2021; Onagbiye & Bester, 2022; Prinsloo et al., 2022).

Physical inactivity among office workers increases the risk of obesity, heart disease, mental health conditions, and work absenteeism (Kim & Jeon, 2011; Msopa & Mwanakasale, 2018; Torres et al., 2021). Office workers with low PA levels have been associated with lower health-related quality of life scores (Gómez-Redondo et al., 2022). However, Ribas et al. (2020) reported conflicting evidence on the effect of higher PA levels on musculoskeletal symptoms and work absenteeism between office and production workers. Higher occupational PA levels among production workers place them at higher risk of musculoskeletal conditions and work absenteeism because of repetitive stress (Ribas et al., 2020).

2.1.3 Benefits of Physical Activity

Several benefits of PA have been documented in the literature (Cooney et al., 2014; Park, Han & Kang, 2014; Ekelund et al., 2016; Warburton & Bredin, 2017; Chastin et al., 2019; Posadzki et al., 2020). A systematic review revealed a dose-response relationship between PA and the risk of premature death and chronic disease (Warburton & Bredin, 2017). PA levels below the WHO guidelines have been linked with some significant positive outcomes in healthy individuals and those living with chronic conditions (Lear et al., 2017; Warburton & Bredin, 2017). While recommended levels of PA reduce the risk of mortality and disease significantly, some form of PA should be encouraged as it is superior to no PA at all (Lear et al., 2017; Warburton & Bredin, 2017; Chastin et al., 2019). Office-based workers often face time and other constraints to meet the recommended levels of PA, therefore breaking sitting time with light-intensity PA and introducing some form of PA should be encouraged in this population as it offers some benefit in reducing disease burden and mortality.

Randomised control trials (RCTs) have reported some benefits of PA on mental health, heart diseases, cancers, mortality, pain, and quality of life (Cooney et al., 2014; Park, Han & Kang, 2014). Prescription of PA reduced the risk of death by 13% when compared to other controls and at a greater rate in patients with cardiovascular disease (Posadzki et al., 2020). The effect was higher after a one-year period when compared to short-term follow-ups, thereby encouraging long-term adherence to PA programs (Cooney et al., 2014; Posadzki et al., 2020). PA had

the greatest improvement in quality of life in patients with cancer, heart, and mental health conditions (Posadzki et al., 2020). Structured PA had superior long-term benefits on anxiety and depression when compared to medication (Cooney et al., 2014). PA remains a cheap and easily accessible form of treatment, and it has lower adverse effects (Cooney et al., 2014; Park, Han & Kang, 2014).

Ekelund et al. (2016) found that PA significantly eliminated the effects of sedentary behaviour through a meta-analysis of over a million men and women. It is known that the combination of high sitting time and low PA increases the risk of all-cause mortality (Ekelund et al., 2016). Increased PA levels reduced the risk of mortality from prolonged sitting in a dose-response relationship (Ekelund et al., 2016). Participants who engaged in more than 60 minutes of moderate-intensity PA per day while on an 8-hour daily sitting schedule, lowered or possibly eliminated their risk of mortality significantly more than those who sat for less than 4 hours and did 5 minutes of daily PA (Ekelund et al., 2016). However, this dose failed to eliminate the risk of mortality after watching TV for more than 5 hours (Ekelund et al., 2016). TV time is thought to be more harmful than sitting at work as it is often associated with fewer breaks and more unhealthy eating behaviours (Ekelund et al., 2016). This emphasises the importance of PA promotion among office workers who are known for highly sedentary behaviours at work and after hours (Clemes, Oêconnell & Edwardson, 2014; Smith et al., 2015).

Torres et al. (2021) found that engaging in vigorous-intensity PA reduces depression and illness-related and unplanned work absenteeism. Physically active office workers reported high health-related quality of life scores even with high sedentary time (Gómez-Redondo et al., 2022). While addressing PA issues, the management of obesity and the high incidence of cardiovascular risk factors should be considered, as they are also linked to increased illness-related work absenteeism (Torres et al., 2021). Therefore, PA interventions and NCD preventative measures should be encouraged to enhance employee welfare and reduce production costs associated with illness-related work absenteeism (Torres et al., 2021).

2.2 Physical Activity Trends

A decline in PA levels has been reported in 168 countries (Guthold et al., 2018). This decline was supported by accelerometry data from 46 countries consisting of 32 high-income and 14 low-income countries (Althoff et al., 2017). Around 27% of adults were physically inactive (Guthold et al., 2018). It represents a 5% increase over the global physical inactivity estimate of 2010 (Guthold et al., 2018). High-income countries had the lowest PA levels when compared to low to middle-income countries (Althoff et al., 2017; Guthold et al., 2018).

Asia reported the highest levels of PA when compared to other continents (Guthold et al., 2018). It can partly be attributed to China's faster implementation of PA policies, which has increased leisure-time PAs (Tian et al., 2023; Tu et al., 2023). Despite the reduced availability of data from lower and middle-income countries, present data reflect the need to address physical inactivity at a faster rate (Althoff et al., 2017; Guthold et al., 2018).

In a survey comparing rural and urban populations in Cameroon, Assah et al. (2011) found that the urban population had significantly higher levels of physical inactivity. The study utilised heart rate and PA sensors over a period of seven days (Assah et al., 2011). Diet, smoking status, drinking profile, blood lipids, and glucose were also assessed (Assah et al., 2011). The urban population had a significantly higher risk of metabolic syndrome (Assah et al., 2011). The risk of metabolic syndrome was reduced with increasing PA levels even after analysing confounding factors like diet, smoking and alcohol consumption (Assah et al., 2011). However, the design of this study fails to establish causation. Future studies should assess the effect of PA on people living with metabolic conditions.

2.2.1 Physical Activity, Socioeconomic Status, and Built Environment in Southern Africa

High levels of physical inactivity have been reported in Southern African countries (Umuhoza & Ataguba, 2018; Letamo, 2020; Onagbiye & Bester, 2022; Prinsloo et al., 2022). Several studies have highlighted the impact of socioeconomic factors and access to the built environment on PA in Southern Africa (Prioreschi et al., 2017;

Umuhoza & Ataguba, 2018; Chikafu & Chimbari, 2020; Letamo, 2020; Onagbiye & Bester, 2022; Prinsloo et al., 2022). High rates of unemployment, crime, and socioeconomic inequalities possibly limit the accessibility and availability of built environments that promote PA participation (Prioreschi et al., 2017; Chikafu & Chimbari, 2020; Isiagi et al., 2021; Prinsloo et al., 2022).

High and low socioeconomic status have been associated with increased leisure-time PA and work-related PA respectively (Umuhoza & Ataguba, 2018). Residents from low socioeconomic environments reported higher transport-related PA secondary to low vehicle ownership when compared to their counterparts (Prioreschi et al., 2017; Chikafu & Chimbari, 2020; Prinsloo et al., 2022). Residents from high socioeconomic environments had higher leisure-time PA, attributed to the availability of better recreational facilities and built environments (Prioreschi et al., 2017; Chikafu & Chimbari, 2020; Prinsloo et al., 2022). However, a decline in leisure-time PA among urban residents has been reported because of crime and safety concerns as well as the design of the parks (Prinsloo et al., 2022; Bartels et al., 2023). Umuhoza & Ataguba, (2018) also reported mixed findings on the impact of socioeconomic inequalities on PA and other NCD risk factors between poor and rich households. This highlights that the provision of recreational facilities and built environment does not guarantee more participation if other factors like design, crime and safety are not addressed (Isiagi et al., 2021; Prinsloo et al., 2022; Bartels et al., 2023).

Prioreschi et al. (2017) reported higher self-reported levels of PA among rural residents when compared to urban residents. While PA was within normal limits, both groups were reported to be overweight, indicating the effect of urbanisation characterised by physical inactivity, poor dietary choices, and eating habits (Prioreschi et al., 2017; Umuhoza & Ataguba, 2018; Gradidge & Kruger, 2020). In contrast, other studies reported low levels of PA and obesity in the rural population (Prioreschi et al., 2017; Chikafu & Chimbari, 2020; Gradidge & Kruger, 2020). Prescription of PA at the primary healthcare level has been recommended to increase PA levels and to manage cardiovascular disease and other conditions in this population (Chikafu & Chimbari, 2020). In the midst of the various socioeconomic inequalities, Southern Africa needs to create and implement better

PA polices to address physical inactivity and the growing NCD burden (Umuhoza & Ataguba, 2018).

2.2.2 Physical Activity and Gender

A trend of high physical inactivity among females when compared to males has been reported worldwide (Althoff et al., 2017; Guthold et al., 2018; Mielke et al., 2018). Mielke et al. (2018) confirmed the gender gap in 22 African countries, with females reporting low leisure-time PA. Prinsloo et al. (2022) found that 49.9% of females in South Africa were physically inactive compared to 43.1% of males. The promotion of leisure-time PAs and active transportation among the female population has been advocated to close the gender gap (Guthold et al., 2018; Mielke et al., 2018). Interestingly, men from Sub-Saharan Africa, some parts of South America and Eastern Asia had the lowest levels of PA in a global survey (Guthold et al., 2018).

Male bank workers reported superior levels of PA when compared to their female counterparts (Bansie & Sarpong, 2022). Dhurata et al. (2013) had similar findings, though their sample had more female participants. In Ethiopia and Kenya, being a female office worker between 30-49 years of age is linked to physical inactivity (Gichu et al., 2018; Mengesha et al., 2019). In contrast, male office workers in a Saudi Arabian survey had lower levels of PA (Almuzaini & Jradi, 2019). Nketiah et al. (2022) reported insignificant gender differences in PA levels and average BMI. Women tend to participate less in leisure-time PA, associated with culture, traditional roles, lack of safety, built environments, and social and community support (Torres et al., 2013; Guthold et al., 2018).

2.3 Physical Activity Levels of Office Workers

High-intensity occupational PA in blue-collar jobs has been associated with increased mortality, and the same can be said for sedentary workers (Coenen et al., 2018). Office workers are at a high risk of physical inactivity because of the sedentary nature of their work and long working hours (Addo et al., 2015; Hene et al., 2021; Bansie & Sarpong, 2022). Some studies found no difference in accelerometry data during and after working hours (Clemes, Oêconnell & Edwardson, 2014; Smith et al., 2015). Low levels of PA were reported in this

population, and those with the highest sedentary time during working hours exhibited the same behaviour during non-working hours (Clemes, Oêconnell & Edwardson, 2014). While they have high sedentary time at work, they do not compensate by engaging in leisure-time PA or reducing sedentary behaviour at home (Smith et al., 2015; Hene et al., 2021; Bansie & Sarpong, 2022). There is a need for workplace and leisure-time PA interventions to address physical inactivity in office workers.

There is limited data on PA levels among office-based workers in Southern Africa but studies done in South Africa reported low levels of PA in this population (Kolbe-Alexander, Conradie & Lambert, 2013; Hene et al., 2021). This is supported by studies done on office-based workers in Rwanda, Ghana, Albania, and Saudi Arabia (Dhurata, Gent & Robert, 2013; Addo et al., 2015; Almuzaini & Jradi, 2019; Mukaruzima, Adeniyi & Frantz, 2020; Bansie & Sarpong, 2022; Nketiah et al., 2022). High BMI values and sitting time, reduced vegetable and fruit intake, unhealthy diets, and high alcohol intake were also reported in this population placing them at great risk of NCDs (Dhurata, Gent & Robert, 2013; Kolbe-Alexander, Conradie & Lambert, 2013; Addo et al., 2015; Almuzaini & Jradi, 2019; Mukaruzima, Adeniyi & Frantz, 2020; Hene et al., 2021; Bansie & Sarpong, 2022; Nketiah et al., 2022). NCD risk factors and frequent hospital visits were more prevalent among physically inactive office-based workers (Kolbe-Alexander, Conradie & Lambert, 2013; Addo et al., 2015; Hene et al., 2021). While there is need for more PA interventions, other risk factors need to be addressed to reduce the NCD burden and healthcare expenditure in this population (Kolbe-Alexander, Conradie & Lambert, 2013; Hene et al., 2021).

Age-related and gender differences in PA were consistently reported across the studies with physical inactivity increasing with age and level of experience, and high among female office workers (Addo et al., 2015; Almuzaini & Jradi, 2019; Mukaruzima, Adeniyi & Frantz, 2020; Hene et al., 2021; Nketiah et al., 2022). There were mixed findings on the preferred domain of PA (Biernat, 2012; Mukaruzima, Adeniyi & Frantz, 2020; Bansie & Sarpong, 2022; Nketiah et al., 2022). Therefore, there is a need for increased PA awareness programs and the provision of PA

facilities sensitive to age and gender in this population, which was discussed in detail under the PA interventions section (Bansie & Sarpong, 2022).

2.4 Barriers and Facilitators to Physical Activity

Connecting interventions to people's perspectives allows them to make independent decisions that prioritise better health outcomes (Donnelly et al., 2018; Landais et al., 2022). People's beliefs influence their behaviour; therefore, altering people's beliefs reinforces better health behaviours (Donnelly et al., 2018; Landais et al., 2022). Interventions tailored to individuals' needs can influence better participation (Donnelly et al., 2018; Landais et al., 2022). Motivating an individual to change while surrounded by barriers has reduced efficacy (Sallis et al., 2012). The Socio-ecological model was used in this section to discuss barriers and facilitators faced by office-based workers (Mcleroy et al., 1988). This model provides a conceptual framework to analyze human behavior as it integrates various factors (individual, organisational, social and policy) with varying levels of impact on human behaviour (Mcleroy et al., 1988; Van Kasteren, Lewis & Maeder, 2020; Lee & Park, 2021). There is limited literature on PA barriers and facilitators among office workers.

2.4.1 Individual Barriers and Facilitators

Lack of time, knowledge, motivation, financial constraints, and presence of physical limitations were highlighted as individual barriers to PA while health benefits were facilitators (Isiagi et al., 2021; Mejia-Arbelaez et al., 2021).

2.4.1.1 Lack of Time

Office-based workers reported that family responsibilities, hectic work schedules, and extracurricular activities at school were among the factors that reduced time availability for PA (Paguntalan & Gregoski, 2016). Increased family responsibilities and adverse weather conditions reduced PA participation among previously active workers (Gradidge et al., 2021). Similar findings were reported on female office workers who highlighted the impact of gender roles on participation in PA (Gradidge et al., 2021; Landais et al., 2022). Other studies recommended prioritising PA around family, work and social responsibilities for better participation (Donnelly et

al., 2018; Gradidge et al., 2021; Landais et al., 2022). Encouraging walking to work or bus stations is thought to increase transport-related PA (Gradidge et al., 2021).

2.4.1.2 Financial Constraints

Low-income residents highlighted limited leisure-time PAs because of few to absent recreational parks and facilities (Isiagi et al., 2021). The same was highlighted in rural environments (Malambo et al., 2017; Chikafu & Chimbari, 2020). According to Sallis et al. (2012), individuals with access to these facilities are twice as likely to meet recommended levels of PA. However, financial challenges restricted individuals from accessing the available facilities (Isiagi et al., 2021; Mejia-Arbelaez et al., 2021).

2.4.1.3 Lack of Knowledge

Lack of knowledge about sitting guidelines and limited information on PA guidelines to achieve the associated health benefits and the amount of PA to alleviate the harmful effect of prolonged sitting harmful effects of prolonged sitting were highlighted (Ojo, Bailey, Brierley et al., 2019; Ojo et al., 2019). They were willing to break up their sitting patterns depending on the activity that they would be doing (Ojo, Bailey, Brierley et al., 2019; Ojo et al., 2019). Office workers highlighted the difficulty of doing so during meetings or presentations or when they were exhausted (Ojo, Bailey, Brierley et al., 2019; Ojo et al., 2019). They were also willing to break prolonged sitting for health reasons and for improved concentration and productivity (Ojo, Bailey, Brierley et al., 2019; Ojo et al., 2019). In contrast, bank workers in Nigeria had full knowledge of the PA guidelines, benefits of PA and good dietary practices (Okafor et al., 2020). However, they were physically inactive, citing a lack of time (Okafor et al., 2020).

2.4.1.4 Presence of Physical Limitations

In a qualitative study among highly sedentary workers, chronic conditions were cited as a barrier to participation in PA (Paguntalan & Gregoski, 2016). Their conditions ranged from depression, diabetes mellitus, and cardiovascular and musculoskeletal conditions (Paguntalan & Gregoski, 2016). This is not surprising as this population is at high risk and has a high prevalence of chronic conditions (Ekelund et al., 2016;

Msopa & Mwanakasale, 2018). The fear of encountering adverse health reactions stopped them from taking part in PA (Paguntalan & Gregoski, 2016). In a study on pharmaceutical workers, lower back pain and exhaustion after work were reported as barriers (Gradidge et al., 2022). The knowledge on the topic of PA remains vital as not all types and intensities of PA can lead to adverse reactions, and PA has known benefits in chronic conditions (Posadzki et al., 2020).

2.4.1.5 Lack of Motivation

A study on highly sedentary workers highlighted that lack of motivation was among some of the greatest barriers to PA (Paguntalan & Gregoski, 2016). They had a high lack of drive and desire to participate either through laziness or hate of PA (Edmunds, Hurst & Harvey, 2013; Paguntalan & Gregoski, 2016). They also encountered difficulty initiating PA lack of organisational support and encouragement from colleagues (Edmunds, Hurst & Harvey, 2013; Paguntalan & Gregoski, 2016). The study also emphasised that physical and mental stress, long shifts and working long hours deprived them of the energy and desire to engage in PA (Paguntalan & Gregoski, 2016; Landais et al., 2022). Landais et al. (2022) indicated that an increase in perceived barriers was possible because of a lack of motivation, and motivational interviewing was recommended to widen knowledge of the benefits of PA.

2.4.1.6 Health Benefits

Several health benefits associated with PA have been perceived to improve PA participation (Paguntalan & Gregoski, 2016; Landais et al., 2022). Office workers perceived PA to improve body composition, mental health, pain, energy levels, and endurance (Paguntalan & Gregoski, 2016; Landais et al., 2022). Female office workers in America and Europe were motivated to participate in PA because of societal pressures portraying a slimmer body frame to be more attractive and avoid stigma (Paguntalan & Gregoski, 2016; Landais et al., 2022). Apart from enhancing attractiveness, losing weight was thought to improve clothing fit (Paguntalan & Gregoski, 2016).

Office workers believe that taking part in PA makes them better role models for their families and relatives (Paguntalan & Gregoski, 2016). Engaging in PA with family

was thought to strengthen their relations while spending quality time together (Paguntalan & Gregoski, 2016). It was also associated with the prevention of disease as some participants had unpleasant past experiences of chronic disease with family members (Paguntalan & Gregoski, 2016).

2.4.2 Social Barriers and Facilitators

2.4.2.1 Lack of Safety and Security

Several studies have highlighted safety concerns that impact PA participation (Torres et al., 2013; Chikafu & Chimbari, 2020; Isiagi et al., 2021; Mejia-Arbelaez et al., 2021). High rates of crime and violence, especially in low-income neighbourhoods, reduce outdoor PA opportunities (Torres et al., 2013; Chikafu & Chimbari, 2020; Isiagi et al., 2021; Mejia-Arbelaez et al., 2021). Poor lighting and lack of police presence reduce safety perceptions, thereby hindering PA participation (Torres et al., 2013; Chikafu & Chimbari, 2020; Isiagi et al., 2021; Mejia-Arbelaez et al., 2021). Adequate traffic control measures and mutual respect from other road users have been recommended to reduce accidents while engaging in PA (Torres et al., 2013; Chikafu & Chimbari, 2020; Isiagi et al., 2021; Mejia-Arbelaez et al., 2021). High crime rates and deaths of cyclists and pedestrians at the hands of reckless motor vehicle drivers have also been reported in Namibia (Chatukuta et al., 2021; Shaahama, 2022).

2.4.2.2 Lack of built-environment

Lack of facilities at the workplace and community level were cited as barriers to participation in PA (Sallis et al., 2012; Malambo et al., 2017; Isiagi et al., 2021; Mejia-Arbelaez et al., 2021). Some office-based workers saw the lack of PA programs and facilities as a barrier by some office-based workers (Lock et al., 2021; Dabkowski et al., 2023). The cost of active workstations like sit-to-stand desks and workstation treadmills makes it impossible for most institutions to secure them (Lock et al., 2021; Dabkowski et al., 2023). Low-income residents highlighted limited leisure-time PAs because of few to absent recreational parks and facilities (Isiagi et al., 2021). The same was highlighted in rural environments (Malambo et al., 2017; Chikafu & Chimbari, 2020). According to Sallis et al. (2012), individuals with access to these facilities are twice as likely to meet recommended levels of PA. However, financial

challenges restricted individuals from accessing the available facilities (Isiagi et al., 2021; Mejia-Arbelaez et al., 2021).

2.4.2.3 Presence of Social Support

Office workers recognise the value of receiving encouragement from others to maintain an active lifestyle (Paguntalan & Gregoski, 2016). Support from friends, family, and coworkers was cited as a key factor in encouraging them to engage in PA (Paguntalan & Gregoski, 2016). Office workers had positive attitudes toward PA when they connected it to previous pleasant PA experiences like social interactions (Landais et al., 2022). They emphasised the need for input and guidance from health professionals (Paguntalan & Gregoski, 2016).

2.4.3 Organizational barriers and facilitators

Office-based workers highlighted that work-based PA was mostly inhibited by work roles (Ojo et al., 2019). The same was reported by a systematic literature review on barriers and facilitators of workplace PA programs (Dabkowski et al., 2023). High workloads, especially on the computer, made it difficult to break up sitting time (Ojo et al., 2019; Landais et al., 2022; Dabkowski et al., 2023). Some believed that alternating between sitting and standing while working and stair climbing could be possible (Ojo et al., 2019; Landais et al., 2022; Dabkowski et al., 2023). However, when asked about the introduction of sit-to-stand desks, they had mixed feelings because of the cost of acquiring the desks and creating separate offices instead of the cheaper open-plan design (Ojo et al., 2019). Alternating job roles and engaging in leisure-time PAs to compensate for reduced PA opportunities during working hours can encourage participation (Ojo, Bailey, Brierley et al., 2019; Gradidge et al., 2022).

Workplace PA programs and facilities were cited as motivators (Paguntalan & Gregoski, 2016; Gradidge et al., 2022; Landais et al., 2022; Dabkowski et al., 2023). This includes active workstations, sports, team-building sessions, weight-loss competitions, group exercises, and awareness programs (Paguntalan & Gregoski, 2016; Gradidge et al., 2022; Landais et al., 2022; Dabkowski et al., 2023). Additionally, corporate-sponsored incentives, including paid time off, cash incentives, and workplace exercise facilities, were viewed as ways to encourage PA

engagement (Paguntalan & Gregoski, 2016; Lock et al., 2021; Gradidge et al., 2022; Dabkowski et al., 2023). While workplace PA programs and facilities address financial constraints, they also promote social interactions between workers (Gradidge et al., 2022). Accountability programs have been associated with adherence to workplace PA programs, as the presence of workplace facilities does not always translate to consistent participation (Landais et al., 2022; Dabkowski et al., 2023). Family support has also been associated with program adherence (Dabkowski et al., 2023).

Institutional support is key as some workers might be afraid of getting penalised for not breaking up sitting time and at the same time being viewed as not being productive when they move around to break sitting time (Ojo, Bailey, Brierley et al., 2019; Ojo et al., 2019). Although institutional support and policies are important, the willingness of workers to break up sitting time will be vital to address sedentary behaviour (Ojo, Bailey, Brierley et al., 2019; Ojo et al., 2019; Dabkowski et al., 2023). Learned habits during structured breaks, like being on social media or working through lunch, are thought to inhibit the intent to break sitting habits (Ojo, Bailey, Brierley et al., 2019; Ojo et al., 2019). Some highlighted the need for rewarding good behaviour to break such habits (Ojo, Bailey, Brierley et al., 2019; Ojo et al., 2019). Half of the participants expressed mental discipline and a change of mindset as vital in breaking sedentary behaviour as computer notifications and prompts can easily be ignored (Ojo, Bailey, Brierley et al., 2019; Ojo et al., 2019). There was a disagreement on the emotional influence on sitting behaviour as some participants thought that their roles restricted movement rather than their mood (Ojo, Bailey, Brierley et al., 2019; Ojo et al., 2019).

2.4.4 Policy level barriers and facilitators for Physical Activity

National policies are key in the promotion of PA (Bull et al., 2020; World Health Organization, 2020). The World Health Organization has set out policies and guidelines on PA and sedentary behaviour to be implemented by its member states (Bull et al., 2020; World Health Organization, 2020). Its framework outlines the recommended levels of PA and sitting guidelines for all age groups and advocates for education, investment on built-environment, addressing socioeconomic inequalities, and mass media campaign and awareness programs (Bull et al., 2020;

World Health Organization, 2020). In Namibia, the government created a NCD policy document to address physical inactivity among other risk factors through public health education, community integration, improved access and design of built-environment, promotion of sport, and workplace interventions (MOHSS, 2017). Research is needed to investigate the implementation and success of the Namibian policy document.

Lack of infrastructure and resources allocated to PA promotion in low to middle-income countries pose significant barriers to the working population (Siefken et al., 2022). The lack of government initiatives to incentivize employers to prioritize employee health and well-being contributes to a sedentary workplace culture and reduced leisure-time PA (Sallis et al., 2012; Garne-Dalgaard et al., 2019; Mukhtar et al., 2019; Gelius et al., 2020; Mejia-Arbelaez et al., 2021; Bartels et al., 2023). Investing in employee health and well-being yields increased productivity, reduced absenteeism, and improved organizational culture (Sallis et al., 2012; Garne-Dalgaard et al., 2019; Gelius et al., 2020; Bartels et al., 2023; Dabkowski et al., 2023). National policies on transport, housing, safety, and town planning are known to improve all domains of PA which possibly facilitates participation among office-based workers (Garne-Dalgaard et al., 2019; Mukhtar et al., 2019; Gelius et al., 2020; Bartels et al., 2023). However, low to middle-income countries are often faced with limited infrastructure, resources, and poor implementation of policies (Sallis et al., 2012; Garne-Dalgaard et al., 2019; Mukhtar et al., 2019; Gelius et al., 2020; Mejia-Arbelaez et al., 2021; Bartels et al., 2023).

Community-wide mass media campaigns can be utilized to develop PA education, awareness, and motivation among the working population (Knox, Musson & Adams, 2017; Mukhtar et al., 2019; Gelius et al., 2020). Previous studies have shown that the use of social, visual, and print media increases short-term participation among workers (Kamada et al., 2013; Knox, Musson & Adams, 2017; Mukhtar et al., 2019). Communicating the WHO guidelines on these platforms can increase awareness among employers and employees (Kamada et al., 2013; Mukhtar et al., 2019; Bull et al., 2020; Gelius et al., 2020).

2.5 Physical Activity Interventions

Reversing the rising global rates of physical inactivity requires a multidimensional approach that targets individual, interpersonal, organisational, environmental, and policy (Ozemek, Lavie & Rognmo, 2019). A systematic review of worldwide PA interventions indicated that PA was mainly promoted through primary health care, community-based programs and public and private health sector education programs (Reis et al., 2016). We will discuss the various interventions under their respective PA domains.

2.5.1 Work-related PA Interventions

Studies have shown that breaking sedentary behaviour with standing and light PA can lower risk markers associated with cardiovascular disease (Parry et al., 2013; Straker et al., 2013; Bailey et al., 2017; Ojo, Bailey, Brierley et al., 2019). Interventions designed to reduce sitting time, like sit-to-stand desks, have produced conflicting results in terms of efficacy in addressing sedentary behaviour (Parry et al., 2013; Straker et al., 2013). More studies should investigate long-term adherence to these interventions, as most participants stopped using these devices within a month (Parry et al., 2013; Straker et al., 2013). Availability of these specialised devices does not always result in their consistent utilisation, hence the need for the involvement of individuals when designing these interventions (Parry et al., 2013; Straker et al., 2013; Ojo, Bailey, Brierley et al., 2019).

Nelson-Wong et al. (2022) reported that overall sitting time decreased by 30-50% with the use of sit to stand desks after a two-year follow-up. However, there were no differences in PA between sit-to-stand desk users when compared to normal desk users (Nelson-Wong et al., 2022). This supports findings from other studies that provision of these expensive workstation set ups are not superior to cheaper alternative interventions (Parry et al., 2013; Straker et al., 2013). There were reports of lower back pain associated with prolonged standing when using these desks (Nelson-Wong et al., 2022). There is a need for studies with larger sample sizes to investigate the efficacy of sit-to-stand desks further (Nelson-Wong et al., 2022).

Gradidge and Golele (2018) found that 30 minutes of moderate pace significantly reduced BMI, body fat, and blood pressure when done for at least three times per week. Similar results were reported in a 10-week walking intervention program for office workers (Rodriguez-Hernandez & Wadsworth, 2019). While walking increased the PA levels, the overall sitting time remained the same (Gradidge & Golele, 2018). The studies highlighted limitations in measuring walking intensity accurately as they relied on the rate of perceived exertion scales (Gradidge & Golele, 2018; Rodriguez-Hernandez & Wadsworth, 2019). Office workers should be encouraged to walk as part of wellness programs as it alleviates physical inactivity while improving metabolic disease markers (Gradidge & Golele, 2018; Rodriguez-Hernandez & Wadsworth, 2019).

Hallam, Bilsborough and de Courten (2018) reported that 10 000 steps a day workplace intervention offered significant reductions in stress levels, anxiety, and depression. Similar results, as well as improved work performance and productivity, were also reported with work-based group exercises (Lock et al., 2021; Dabkowski et al., 2023). Physical activity trackers significantly increased PA levels of office-based workers (Gremaud et al., 2018). The provision of pedometers to workers is recommended to increase self-accountability and motivation to increase PA levels (Gremaud et al., 2018; Hallam, Bilsborough & de Courten, 2018; Dabkowski et al., 2023). These studies highlight the efficacy of inexpensive interventions that can be implemented in low to middle-income countries.

2.5.2 Transport-related PA Interventions

Evans et al. (2022) found that transport-related PA was influenced by socioeconomic status, self-efficacy, travel distance, street lighting presence, and proximity to several destinations. High transport-related PA has been associated with low socioeconomic status because of the necessity of active commuting and the cost of car ownership (Evans et al., 2022). Independent of socioeconomic status, high self-efficacy for active commuting, which involves planning and integrating transport-related PA into daily routines, significantly promotes transport-related PA (Evans et al., 2022). Close proximity to several destinations (i.e. work, shops, public transport terminus, and recreational facilities) and a lower distance of travel to these

destinations were associated with higher levels of transport-related PA (Evans et al., 2022). The presence of street lighting significantly improved active commuting during dark hours and enhanced perceived safety (Evans et al., 2022). Policymakers should engage and encourage individuals before providing infrastructure to ensure that the provided infrastructure will be utilised (Evans et al., 2022).

Walsh et al. (2021) reported significant improvement in PA levels after six weeks of the Commuter Choices intervention. Participants were paired according to age, sex, and mode of active commuting (Walsh et al., 2021). Weekly meetings were held between the pairs as encouragement to attain their goals (Walsh et al., 2021). Participants were encouraged to approach family members or relatives for support during the active commuting journey (Walsh et al., 2021). After six weeks, the majority of the participants from the intervention group met the recommended levels of PA through active commuting (Walsh et al., 2021). While the study was done over a short period of time, it highlights the positive effect of active commuting on PA levels (Walsh et al., 2021).

2.5.3 Leisure-time PA Interventions

Colombia has been a success story for middle- to low-income countries in implementing PA policies (Torres et al., 2013). In a survey of Colombians in La Guajira, 78% of adults were physically active (Panciera-di-Zoppola et al., 2021). Bogota, other Colombian cities, and some American countries have implemented PA policies through social and built environments that encourage leisure-time PA and active transportation (Torres et al., 2013). This has seen the introduction of temporary closure of roads to motor vehicles through the Ciclova program for safe PA participation, as well as the construction of bicycle paths through the Cicloruta program (Torres et al., 2013; Mejia-Arbelaez et al., 2021). This has greatly encouraged walking and cycling for transport PA and as part of PA interventions (Torres et al., 2013; Mejia-Arbelaez et al., 2021).

Torres et al. (2013) carried out a survey on these two programs and found that the Ciclova program attracted more low- to middle-income participants while the

Cicloruta program attracted more high-income participants. Over 50% of Ciclova users felt safe with respect to traffic and accidents, and 42% in terms of crime (Torres et al., 2013). The increased safety perceptions have been attributed to the high presence of people on the streets during the leisure program (Torres et al., 2013). In contrast, 29% of Cicloruta users felt safe with respect to traffic, especially during weekdays, and 45% felt safe with respect to crime (Torres et al., 2013). Police presence, improved lighting, and traffic control have been recommended to address the challenge (Torres et al., 2013). Despite the safety concerns, both programs have contributed immensely towards increasing PA, though there is significantly more male participation (Torres et al., 2013).

Mejia-Arbelaez et al. (2021) assessed the Ciclova program across cities in Colombia, Chile and Mexico. The majority of the participants were male, single, of middle socioeconomic status, between 30-49 years, had normal BMI, and had tertiary qualifications (Mejia-Arbelaez et al., 2021). Over 80% of Bogota and Mexico City participants were physically active (Mejia-Arbelaez et al., 2021). 65% of participants felt safe while cycling and walking (Mejia-Arbelaez et al., 2021). There were no differences in PA levels with respect to gender (Mejia-Arbelaez et al., 2021). The Ciclova program provided equal participation from all socioeconomic backgrounds and environments, encouraging social connections (Mejia-Arbelaez et al., 2021). The Ciclova program has been associated with promoting active lifestyles in a safe and cost-effective manner (Mejia-Arbelaez et al., 2021).

A cohort study of 360,000 participants analysed the association between the weekend warrior pattern and regular PA participation on all-cause mortality (Dos Santos et al., 2022). Weekend warrior refers to participation in recommended levels of PA over 1 or 2 days (Dos Santos et al., 2022). Regular PA participation was associated with reduced all-cause mortality (Dos Santos et al., 2022). High volume and intensity of PA were linked to reduced mortality (Dos Santos et al., 2022). However, there was no difference between weekend warriors and regularly active participants on all-cause mortality when performing similar volumes and intensity of PA (Dos Santos et al., 2022). This offers an opportunity for people with busy work schedules to participate in PA over the available off-days.

The use of smartphone PA programs during the COVID-19 lockdowns was also investigated for its impact on PA participation (Torres et al., 2021). Poor adherence to the PA programs was reported (Torres et al., 2021). The majority of the participants felt unmotivated to engage in PA during the lockdowns (Torres et al., 2021). Lack of support and difficulties in using the application also contributed to reduced PA participation (Torres et al., 2021). While the study had a small sample size, it highlights the need for goal setting, addressing the attitudes of the application users, and providing an accountability platform for better adherence to PA smartphone applications (Torres et al., 2021).

Mass participation events are also inexpensive interventions to increase PA participation (Chivunze et al., 2021). The Parkrun attracts a lot of participants in South Africa, Australia and the UK (Chivunze et al., 2021). It greatly impacts increasing PA levels while providing a safe environment, lasting social connections, and conveniency as it is mainly done over the weekends (Chivunze et al., 2021). Motivation to participate in Parkrun was hinged around the several health benefits of PA and insurance incentives gained from engaging in PA (Chivunze et al., 2021). Although individuals with stable income backgrounds dominate this intervention, it can be integrated into lower-income neighbourhoods to address physical inactivity (Chivunze et al., 2021). Office-based workers facing time and financial constraints can consider the Parkrun and engage in leisure-time PA.

2.6 Chapter Summary

This literature review has outlined the benefits of PA, the impact of physical inactivity, and the complex process associated with addressing physical inactivity.

Physical activity is a cheap and accessible intervention with various known benefits (Cooney et al., 2014; Park, Han & Kang, 2014; Ekelund et al., 2016; Warburton & Bredin, 2017; Chastin et al., 2019; Posadzki et al., 2020). Of note, PA can reduce the harmful effects of sedentary behaviour, which is a daily routine for office workers (Ekelund et al., 2016). However, physical inactivity remains high worldwide (Althoff et al., 2017; Guthold et al., 2018). Despite limited PA data in Namibia, studies have reported low levels of PA regionally (Assah et al., 2011; Isiagi et al., 2021; Prinsloo

et al., 2022). Socioeconomic status and access to the built environment, among other factors, contribute to the physical inactivity trend, which greatly affects females (Prioreschi et al., 2017; Chikafu & Chimbari, 2020; Prinsloo et al., 2022).

While several studies have reported low levels of PA among office workers, there is limited literature investigating their perceived barriers and facilitators (Kolbe-Alexander, Conradie & Lambert, 2013; Addo et al., 2015; Hene et al., 2021; Nketiah et al., 2022). This review outlined several interventions targeted at improving work, transport, and leisure-time PA (Panciera-di-Zoppola et al., 2021). Lack of time, knowledge, built environments, safety, and security were among the barriers to PA and have contributed to the mixed findings on the efficacy of these PA interventions (Paguntalan & Gregoski, 2016; Ojo, Bailey, Brierley et al., 2019; Ojo et al., 2019; Dabkowski et al., 2023). To our knowledge, there is limited literature on PA among office workers in Namibia. Understanding office workers' perceptions will address physical inactivity through interventions that are tailored to their needs (Sallis et al., 2012; Kasteren, Lewis & Maeder, 2020). Previous studies highlighted social and organisational support as some of the potential facilitators for better participation (Paguntalan & Gregoski, 2016; Lock et al., 2021; Gradidge et al., 2022; Dabkowski et al., 2023).

While this literature review outlines data from low-, middle-, and high-income countries, this study sought to address these gaps in Namibia.

CHAPTER 3 METHODOLOGY

3.1 Introduction

This chapter discusses the research design, participants, sampling methods, data analysis techniques, and processes utilised to complete this study's quantitative and qualitative parts.

3.2 Research Design

An explanatory-sequential mixed methods approach was used to analyse the PA levels, barriers, and facilitators among office workers in Grootfontein, Namibia. This approach allowed the researcher to obtain an understanding of the research problem from quantitative data analysis (Phase 1) and further explain it by exploring the participants' views and experiences from qualitative data (Phase 2) (Ivankova, Creswell & Stick, 2006; Edmonds & Kennedy, 2017). This allowed the researcher to determine the participants' levels of PA, BMI, and average daily sitting time, and explain these findings by exploring and describing their perceptions in relation to PA and explain both findings. This approach allowed the researcher to collect and analyse both quantitative (Phase 1) and qualitative (Phase 2) data in different phases (Hanson et al., 2005; Edmonds & Kennedy, 2017; Rayini, 2017). The study's first phase consisted of quantitative data collection using the GPAQ questionnaire. The second phase consisted of qualitative data collection through semi-structured interviews with the participants from the first phase. Using both sets of data allowed the researcher to understand the research problem from quantitative data analysis and further explain it by exploring the participants' views and experiences from qualitative data (Ivankova, Creswell & Stick, 2006; Edmonds & Kennedy, 2017).

3.3 Phase 1

3.3.1 Study Design

A descriptive cross-sectional study design was used to determine the PA levels, BMI, and average daily sitting time of office-based workers in Grootfontein, Namibia. This design allowed the researcher to collect data from Grootfontein office-based

workers at a single point and determine their PA levels, BMI, and average daily sitting time (Edmonds & Kennedy, 2020).

3.3.2 Population and Sampling

Two hundred seventeen participants were recruited for the quantitative survey from health, financial, education, retail, logistics, local government, information and communication technology, and public safety and service sectors. The sample for this study was derived from a population of 400 office-based workers from health, financial, education, retail, logistics, local government, information and communication technology, and public safety and service sectors in Grootfontein, Namibia. Using a population size of 400, 80% population proportion, 5% margin of error, and 95% confidence interval, a minimum sample size of 197 was required for statistical significance (Sample size calculator, 2004).

3.3.2.1 Inclusion Criteria

Permanently employed male and female office workers, over 18 years of age, with at least one year of work experience, and from health, finance, education, retail, logistics, local government, information and communication technology, and public safety and service sectors were included. An office worker was defined as any individual who worked in an office for 8 hours, for example, performing administrative or clerical duties for an organisation.

3.3.2.2 Exclusion Criteria

Office workers who were absent during data collection were excluded from the study.

3.3.2.3 Sampling and Recruitment

Convenience sampling was used to recruit participants available on the day of data collection. It is the best sampling method for a small population where a sample size close to the population size increases accuracy (Evan, 2005; Edmonds & Kennedy, 2020). The researcher sent emails and written letters to managers of 25 institutions in finance, health, education, public service and security, logistics, retail, information

and communication technology, and local government in Grootfontein seeking permission to conduct the study (see Appendix E).

Once permission was granted, the managers informed the researcher about the number of office workers at the respective institutions. They emailed informed consent forms and invitation letters (see Appendices D and F). Managers distributed the informed consent forms and invitation letters to the office workers, and days for data collection were arranged between the researcher and the manager. On the day of data collection, the manager introduced the researcher to the office workers. The researcher engaged interested office workers and provided informed consent forms if they hadn't received them from their managers. The informed consent form outlined the details of the study, clarified that there were no risks involved, listed the benefits, ensured that their confidentiality was observed, and ensured that each participant had the freedom to withdraw at any point during the study.

The researcher arranged scheduled visits to the different institutions for at least two days to ensure that those unavailable on the initial visit were recruited and all participants had an equal chance of inclusion into the study. During the scheduled visits, the researcher explained the purpose of the study and collected data using the GPAQ from office workers who had signed their informed consent forms.

3.3.3 Instruments

3.3.3.1 Anthropometry

During data collection, body weight was measured to the nearest 100 grams using the Elektra body fat and hydration scale with a 180 kg maximum weight capacity. Participants removed their shoes and items in their pockets before stepping on the scale. Height was measured to the nearest 0.1 cm using a wall-mounted stature meter. Participants removed their shoes before height measurement. The researcher performed all height and weight measurements using this standardised approach to ensure internal consistency. Body mass index (kg/m²) was calculated using the weight and height measurements and presented according to WHO classification (underweight <18.5 kg/m², normal 18.5 – 24.9 kg/m², overweight 25.0 – 29.9 kg/m², and obese ≥30.0 kg/m²) (WHO, 2018).

3.3.3.2 Questionnaire

The GPAQ measured the office workers' PA levels during the study's first phase (see Appendix A). The GPAQ measures three domains of PA: occupational, transport-related, and leisure-time PA (WHO, 2018). The questionnaire comprised of 5 sections. Section 1 collected demographic information such as gender, weight, height, etc. Section 2 comprised questions on weekly work-related PA (WHO, 2018). This included the nature of activities and the amount of time spent doing these activities (WHO, 2018). Section 3 focused on the mode of transport used to get to work and other places, such as walking or cycling (WHO, 2018). Section 4 comprised questions on leisure-time physical activities like sports (WHO, 2018). The researcher asked about the amount of time and number of days spent doing moderate and vigorous intensity activities (WHO, 2018). Lastly, section 5 measured the time spent sitting in a day (WHO, 2018).

3.3.3.3 Reliability and Validity

The GPAQ is appropriate for low to middle-income countries with limited PA data and it has been used in several Southern African countries (Armstrong & Bull, 2006). It is a cheap and reliable measure of PA supported by Spearman's correlation coefficient and Kappa scores of 0.67 to 0.81 and 0.67 to 0.73, respectively, when tested in 9 different countries (Bull, Maslin & Armstrong, 2009). It also has moderate test-retest reliability and good overall PA reliability ($r = 0.58$-0.89) (Keating et al., 2019). Validity and reliability were enhanced using show-cards with PA examples for each domain, which allowed participants to remember their PAs (Cleland et al., 2014; Keating et al., 2019).

3.3.3.4 Statistical Analysis

Data was captured on an Excel spreadsheet and then cleaned to upload onto SPSS statistical software version 28.0.1.1(15) was used to analyse quantitative data with a statistical significance threshold set at $p < 0.05$. The GPAQ analysis guide was used to interpret the collected data (WHO, 2008). Calculations were made using the coding column(P1-P16) on the questionnaire (see Appendix A) (WHO, 2008). Metabolic equivalents (METs) were used to represent the intensity of PA, with 4

METs and 8 METs representing moderate and vigorous intensity PA, respectively (WHO, 2008).

During analysis, the PA domains were divided into "sub-domains", which are "vigorous work (codes P1-P3), moderate work (codes P4-P6), travel (codes P7-P9), vigorous leisure-time (codes P10-P12), moderate leisure-time (codes P13-P15) and sitting (code P16)" (WHO, 2008). Participants with less than 150 or 75 minutes of weekly moderate or vigorous PA, respectively, were classified as physically inactive (WHO, 2008).

Descriptive statistics were used to present sociodemographic variables (e.g., age, sex, height, weight, BMI, job titles, and level of work experience). The Kolmogorov-Smirnov and Shapiro-Wilk tests were used to test the normality of data before analysing associations between the variables. Chi-square tests were done to examine associations between BMI and PA levels. The Kruskal-Wallis test was used to assess differences between age and PA levels, and PA levels across the different professions. Independent-Samples Mann-Whitney U Test was used to assess gender differences in terms of BMI. Spearman's rank correlation coefficient was used to assess the relationship between BMI and daily sitting time.

3.3.4 Ethical Considerations

Ethical approval for the study was obtained from the University of Cape Town, Faculty of Health Sciences Human Research Ethics Committee (HREC) (HREC REF: 089/2023) (see Appendix G). The researcher followed the ethical principles of autonomy, non-maleficence, beneficence and justice outlined in the Declaration of Helsinki (World Medical Association, 2014).

Written permission to visit the sites was obtained from the institutional managers at the respective institutions. The researcher issued informed consent forms to the participants before they participated in the study (see Appendix D). The researcher explained the purpose of the study, procedure, risks and benefits, and confidentiality considerations. The researcher informed each participant that the survey aimed to measure their PA levels using a questionnaire. Participants were informed that

participation was voluntary, and they had the right to withdraw at any stage of the survey. The participants were informed that there were no physical risks associated with taking part in the study. The researcher was provided with a room to survey the participants separately to ensure privacy and confidentiality during anthropometric and PA collection.

The researcher explained that collected information would be kept safe in the researcher's password-protected computer, and their personal details would not be published to ensure confidentiality (University of Cape Town Research Office, 2019). Participants were informed that they would receive their personal PA reports via the emails provided. Participants were informed that only the researcher and the supervisors had access to the information. Participants' information from the survey was kept confidential and was not published. Information would be discarded at five years after publishing the study (University of Cape Town Research Office, 2019). The researcher informed the participants that there were no risks associated with participation and that they would benefit by being aware of their PA levels compared to the recommended PA levels. The participants' opinions would help shape recommendations, policies, and interventions that would benefit them and other office workers.

Once the researcher and the participant were satisfied that all the participant's questions had been answered, they signed the informed consent form, and the participant was recruited into the study. The researcher's and the supervisors' contact details were provided on the informed consent form for further enquiries about the study. Justice is the fair, equitable, and appropriate treatment of people (Varkey, 2021). The researcher recruited all participants without looking at their age, race, sex, job description, or level of work experience.

3.4 Phase 2

3.4.1 Study Design

A descriptive qualitative design was used after the first phase of the study. Qualitative research interprets the behaviour and perception of a target population with regard to a particular topic (Locke, 2002; Bradley, Curry & Devers, 2007;

Edmonds & Kennedy, 2020). It is a strategy of systematically collecting, organising, and interpreting textual information to characterise participants' perspectives and experiences in great depth (Locke, 2002; Bradley, Curry & Devers, 2007; Edmonds & Kennedy, 2020). This design allowed the researcher to explore office workers' perceptions of PA.

3.4.2 Population and Sampling

Twenty-six participants from the quantitative survey were included in the qualitative study. It was made up of 16 active and eleven inactive participants.

The researcher purposively selected participants from the surveyed population and conducted semi-structured interviews. During the quantitative survey, participants were consulted on their interest to further take part in semi-structured interviews during the qualitative phase of the study. Recruitment for interviews was to be stopped when data saturation was reached i.e. the point where no themes are discovered (Given, 2012; Saunders et al., 2018; Edmonds & Kennedy, 2020). Participants were purposely selected from the surveyed population based on their PA level and employment sector. Twenty-six interviews were conducted, made up of 15 active and 11 inactive participants. Data saturation was reached at interviews eleven and ten for physically active and inactive participants. This allowed the researcher to assess any differences in barriers and facilitators among active and inactive participants.

Participants were contacted using telephone numbers or emails provided during the survey and given details about the interview (see Appendix F). Informed consent forms were issued to the participants before face-to-face or telephone interviews were conducted, depending on the participant's preference and availability. Face-to-face interviews were recorded using Samsung Voice Recorder (Version 21.3.55.16), while telephone interviews were recorded using the ACR-Call Recorder App (Version 35.0-samsung-unChained). Participants provided consent for audio-recordings.

3.4.2.1 Inclusion Criteria

Male and female office workers from health, financial, education, retail, logistics, local government, information and communication technology, and public safety and service sectors were included in the study. Participants were purposively selected for semi-structured interviews based on their reported levels of PA from the survey and employment sector. All interviews were contacted in English.

3.4.2.2 Exclusion Criteria

Participants who were not available during the days of the interviews were excluded from the study.

3.4.3 Instruments

3.4.3.1 Interview Guide

The researcher conducted semi-structured interviews using an interview guide adopted from previous similar studies (Caperchione et al., 2012; George et al., 2014; Gradidge et al., 2021). Interviews were done telephonically or face-to-face at the researcher's office at Healing Hands Physiotherapy Grootfontein, within walking distance from the participants' workplaces. The interview guide comprised three sections (see Appendix C).

The first section comprised the introduction, the purpose of the discussion and warm-up questions to build rapport with the participants. The second section comprised four open-ended questions on barriers and facilitators of PA as well as recommendations to promote PA participation. The third section comprised of cool-down questions and closing remarks. Prompts and follow-up questions were used for each question to get more responses and clarity from participants. The researcher took some notes during the interview and allowed participants to add extra information at the end of the interview. The interviews lasted between 5-27 minutes, depending on the volume of information shared during the discussion. Interviews were recorded and transcribed using Microsoft Word 2016. The researcher de-identified the participant's details during the transcription process (University of Cape Town Research Office, 2019).

3.4.3.2 Ethical Considerations

The researcher issued informed consent forms to the participants before the interview (see Appendix D). The researcher explained the purpose of the interview, procedure, risks and benefits, and confidentiality considerations. The researcher informed each participant that the purpose of the interview was to understand their perceptions of PA and perceived barriers and facilitators to PA, as well as recommend interventions to promote PA. Participants were informed that participation was voluntary and they had the right to withdraw at any stage of the interview. The researcher explained that the interview would be audio-recorded and then transcribed for analysis. The participants provided consent for audio-recording of the interview. The participants were informed that there were no physical risks associated with participation in the study.

The interview transcripts were de-identified to ensure the confidentiality of the participant's personal details and contributions. The researcher informed the participants that there were no risks associated with participation and that their opinions would help shape recommendations and interventions that would benefit them and other office workers. Compensation was not necessary as the researcher's office was within walking distance, and no airtime charges were incurred as the researcher contacted participants for interviews. When the researcher and the participant were satisfied that all of the participant's questions had been answered, they signed the informed consent form, and the participant was recruited into the study.

3.4.3.3 Trustworthiness

Trustworthiness in qualitative research allows the findings to be credible, dependable, confirmable, and transferable (Birt et al., 2016). The interview guide was assessed by an expert panel for content and construct validity, as the initial guide was piloted in a different setting. The expert panel included my two supervisors, with vast experience in PA and qualitative research. The researcher made changes according to the feedback of the panel and resubmitted for secondary review. Open-ended questions and prompts were used to encourage an

open conversation. Trustworthiness was achieved through member checking, triangulation, and reducing researcher confirmation and participant bias.

The use of open-ended questions, clear communication, and building rapport promoted honest and truthful responses, thereby reducing participant bias. Member checking was done by allowing participants to check interview transcripts for the accuracy of the information before analysis. Triangulation was achieved by debriefing my supervisors during the thematic analysis process. Their input broadened the perspectives and insights to reduce researcher confirmation bias and validate the analysis process. Member checking and triangulation reduced researcher confirmation bias. The researcher created an audit trail through a clear recruitment strategy, maintained interview records, and documented the thematic analysis process to ensure retest reliability.

3.4.4 Data Analysis

Semi-structured interviews were conducted in English and were audio-recorded and transcribed verbatim using Microsoft Word 2016. The researcher verified the interview transcripts for accuracy by reading through the transcripts several times while listening to the audio recordings. Interview transcripts were de-identified and entered into NVIVO 14 for thematic analysis. The thematic analysis followed the six steps recommended by Braun and Clarke (2006) (see Figure 3.1).

During the first step of data familiarisation, the researcher read through the interview transcripts several times and identified patterns in the data. In the second step, the researcher generated codes through inductive coding. "Inductive coding is a ground-up approach where you derive your codes from the data" (Braun & Clarke, 2006:83).

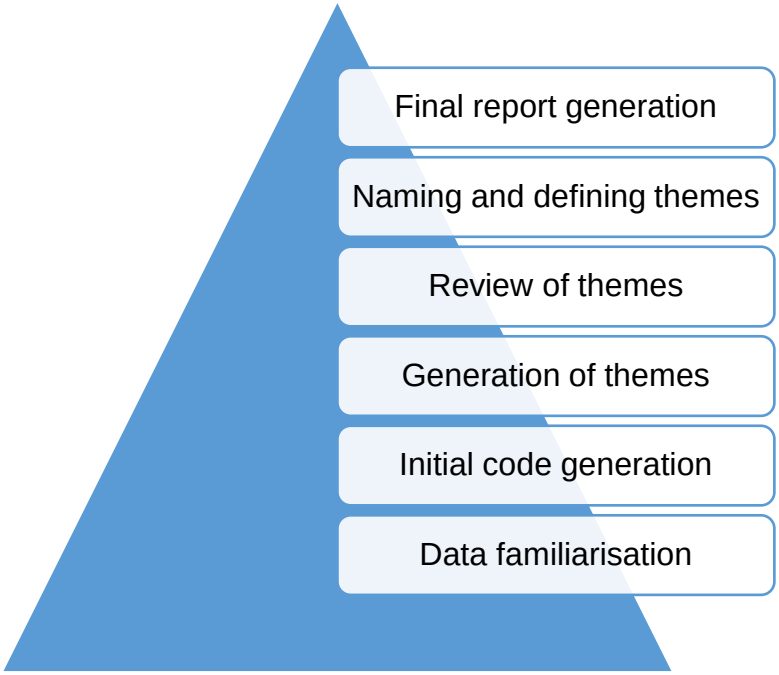

Figure 3.1: Thematic Analysis

The third step involved searching for emerging themes and sub-themes from the generated codes. During the fourth step, the researcher reviewed the themes and sub-themes. The fifth step involved naming and defining the respective themes (See Figure 2). The thematic analysis generated four themes guided by the research objectives. The generated themes were: "Knowledge of PA", "Barriers to PA", "Facilitators to PA", and "Interventions to promote participation". The Socio-ecological model was applied to these themes. The researcher generated the final report in the sixth phase using these themes and their respective sub-themes.

3.5 Dissemination of Results/Findings

The researcher endeavoured to provide individual reports for each participant's PA levels as objective feedback to address PA. The various institutions could benefit from this study's individual reports and findings when designing interventions to address PA.

3.6 Chapter Summary

This chapter outlined the methodology of the research. The mixed methods design was utilised to address the research objectives. Two hundred and seventeen participants were surveyed using the GPAQ and 26 were recruited for semi-structured interviews. The next chapter presents the results and findings of the study.

CHAPTER 4 RESULTS & FINDINGS

4.1 Introduction

This chapter outlines the overall results and findings of this research. The results are presented in two sections: the results of the quantitative analysis of data collected from the questionnaire and the findings of the qualitative data collected from the semi-structured interviews.

4.2 Quantitative Study Results

The following section presents the characteristics of the surveyed participants and the results. The questionnaire was designed to describe the PA levels of office-based workers in Grootfontein, Namibia.

4.2.1 Participant Characteristics

Office workers from health, financial, education, retail, logistics, local government, information and communication technology, and public safety and service sectors in Grootfontein, Namibia, were assessed using the GPAQ. The ISCO framework of occupational classification was used to classify office workers into the following categories: Managers, Professionals, Service and Sales Workers and Clerical Support Workers. A total of 217 subjects participated in the study (see Table 4.1). The majority of participants were female (63%). The mean age of the participants was 38.6 ± 9.1 years and ranged from 20 to 66 years, with a majority of participants lying between the 30-44 age group. The mean BMI was 28.2 ± 6.4 kg/m², and 65.4% of participants were either overweight or obese. Professionals from different sectors made up 55% of the sample, and the majority (86%) of participants had over five years of work experience. The average daily sitting time was 8.1 ± 2.2 hours.

Table 4.1: Characteristics of Participants

Variable	n (%)	Mean (±SD)
Sex		
Male	81 (37%)	
Female	136 (63%)	

Variable	n (%)	Mean (±SD)
Total	217	
Height (m)		1.7 (0.9)
Weight (kg)		79.3 (17.6)
BMI (kg/m²)		28.2 (6.4)
Underweight (< 18.5 kg/m²)	1 (0.46%)	
Normal (18.5-24.9 kg/m²)	74 (34.1%)	
Overweight (25-29.9 kg/m²)	74 (34.1%)	
Obese (≥ 30 kg/m²)	68 (31.3%)	
Total	217	
Daily sitting time (hours)		8.1 (2.2)
Age		38.6 (9.1)
18-29	34 (15.7%)	
30-44	131 (60.4%)	
45-59	47 (21.7)	
60-69	5 (0.23%)	
Total	217	
Level of work experience		
< 5 years	30 (13.8%)	
5-10 years	97 (44.7%)	
>10 years	90 (41.5%)	
Total	217	
Job Title		
Clerical support workers	41 (18.9%)	
Managers	10 (0.46%)	
Professionals	120 (55.3%)	
Service and sales workers	46 (21.2%)	
Total	217	

4.2.2 Physical Activity Levels of Office Workers

Overall, 62.7% of the participants were physically active, with 70.4% and 62.5% of males and females physically active, respectively. Table 4.2 shows the PA status of office workers in Grootfontein, Namibia.

Table 4.2: Participants' Physical Activity Levels

	Inactive: n(%)	**Active: n(%)**	Total
Sex			
Female	57 (41.9%)	79 (58.1%)	136
Male	24 (29.6%)	57 (70.4%)	81
Total	81 (37.3%)	136 (62.7%)	217
Job title			
Clerical Support Workers	18 (43.9%)	23 (56.1%)	41
Managers	3 (30%)	7 (70%)	10
Professional	43 (35.8%)	77 (64.2%)	120
Service and Sales Workers	17 (37%)	29 (63%)	46
Total	81 (37.3%)	136 (62.7%)	217
Age Group			
18-29	17 (50%)	17 (50%)	34
30-44	42 (32.1%)	89 (68%)	131
45-59	20 (42.6%)	27 (57.5%)	47
60-69	2 (40%)	3 (60%)	5
Total	81 (37.3%)	136 (62.7%)	217

There was no association between age and PA levels after the Kruskal-Wallis test ($p = 0.767$) (see Table 4.3).

Table 4.3: Median Minutes of Total Physical Activity Per Day

Age Group (Years)	Female		Male		Total
	Median minutes	N	Median minutes	n	
18 – 29	29.29	21	85.71	13	34
30 – 44	60.00	83	51.43	48	131
45 – 59	49.64	31	45.00	16	47
60 – 69	37.14	1	36.43	4	5
Grand Total		**136.00**		**81.00**	**217**

Table 4.4 shows a weak Spearman's Rho test correlation between BMI and daily sitting time ($r_s = 0.192$).

Table 4.4: Median Minutes on Daily Sitting

Age Group (Years)	Female		Male		Total
	Median minutes	N	Median minutes	N	
18 – 29	540	7	480	7	14
30 – 44	520	15	540	11	26
45 – 59	420	7	480	11	18
60 – 69	540	1	450	4	5
Grand Total		**30**		**33**	**63**

Table 1

The chi-square test ($\chi^2 = 8.702$) showed a statistically significant relationship between being overweight or obese and PA levels (see Table 4.5).

Table 4.5: BMI and Physical Activity Level Cross Tabulation

			Inactive	Active	Total
BMI	Normal or Under	Count	18	57	75
		Expected Count	28.0	47.0	75.0
	Overweight or Obese	Count	63	79	142
		Expected Count	53.0	89.0	142.0
Total		Count	81	136	217
		Expected Count	81.0	136.0	217.0

Independent-Samples Mann-Whitney U Test showed a significant difference between gender and BMI (p=0.04) (see Table 4.6). Females reported a higher mean rank when compared to males.

Table 4.6: BMI and Gender

	Gender	N	Mean Rank	Sum of Ranks
BMI	Female	136	118.58	16127.50
	Male	81	92.91	7525.50
	Total	217		

There was no significant difference in terms of work, transport, and leisure-time PA across the different occupations (the Kruskal-Wallis test showed p = 0.359, 0.173 and 0.085, respectively) (see Table 4.7).

Table 4.7: Job Category and PA Levels

			Active	Inactive	Total
ISCO_Cat	Managers	Count	4	6	10
		% within Active/Inactive	7.7%	3.6%	4.6%
	Professional	Count	32	88	120
		% within Active/Inactive	61.5%	53.3%	55.3%
	Clerical Support Workers	Count	8	33	41
		% within Active/Inactive	15.4%	20.0%	18.9%
	Service and Sales Workers	Count	8	38	46
		% within Active/Inactive	15.4%	23.0%	21.2%
Total		Count	52	165	217
		% within Active/Inactive	100.0%	100.0%	100.0%

4.2.3 Summary of Results

The mean age for the subjects was 38.6 ± 9.1 years, and a majority of participants were within the 30-44 age group. The mean BMI was 28.2 ± 6.4 kg/m², and 65.4% of participants were either overweight or obese. Over 60 % of the participants were physically active. Males were more physically active than females. The average daily sitting time was 8.1 ± 2.2 hours. There was a weak correlation between BMI and sitting time. There was a significant difference gender and BMI with females reporting higher mean ranks when compared to males. There was no significant difference in PA levels with age and across the different occupations. The next section presents the qualitative findings of the study.

4.3 Qualitative Study Findings

This section presents the characteristics of the interview participants as well as the results of the interviews. The interviews were designed to answer the following research objectives:

1. To determine Grootfontein office-based workers' perceptions about PA.
2. To explore and describe the barriers and facilitators of Grootfontein office-based workers to PA.
3. To explore and describe the personal preferences of Grootfontein office-based workers for future interventions to promote PA participation.

4.3.1 Characteristics of Interview Participants

Semi-structured interviews were conducted with 26 participants who had previously completed the survey (see Figure 4.1). Both physically active (n = 15) and inactive (n = 11) participants were included to understand the barriers and facilitators of PA among office workers in Grootfontein, Namibia.

Data saturation was reached at interviews eleven and ten for physically active and inactive participants. However, the researcher recruited more participants in order to have a diverse sample. The average duration of interviews was 11 minutes (range 5–27 minutes). Interview participants worked in health, financial, education, retail, logistics, local government, information and communication technology, and public

safety and service sectors and had an age range of 29-52 years. The characteristics of the interview participants are summarised in Table 4.8.

Table 4.9 provides a comprehensive overview of the four themes and their sub-themes that were identified during the thematic analysis process and used in the final report guided by the research objectives.

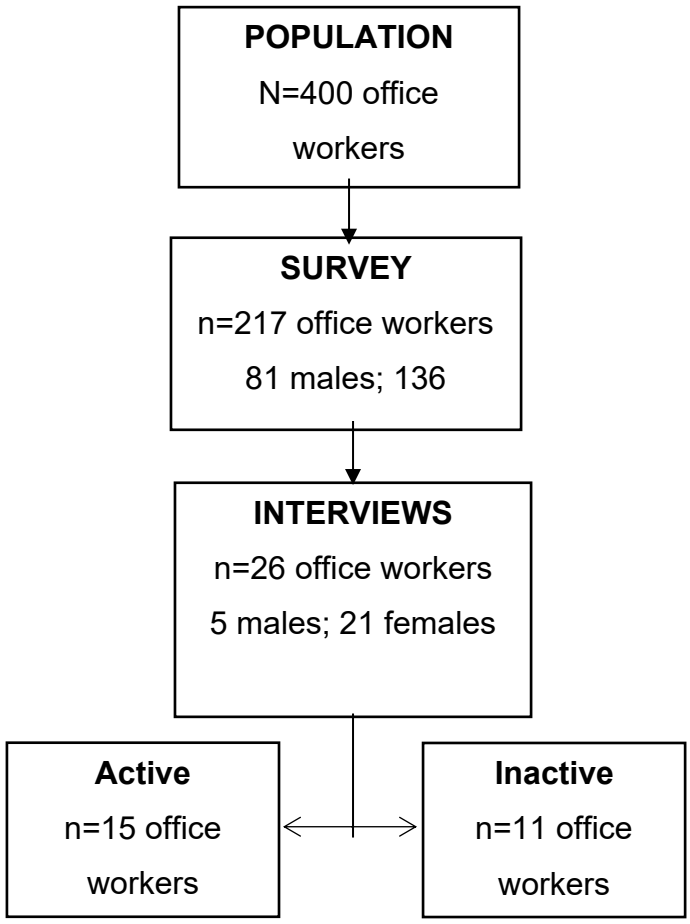

Figure 4.1: Recruitment Flow Chart

Table 4.8: Characteristics of Interview Participants

Participant	Age	Sex	Sector	Job Title	Experience	PA status	BMI
P1	49	F	Public (Labor)	Office admin	16	inactive	46.9
P2	48	F	Private (Roads)	Office admin	23	inactive	39.2
P3	32	F	Private (Medical)	Office admin	7	active	22.5
P4	29	F	Public (Correctional)	Office admin	11	active	31.2

Participant	Age	Sex	Sector	Job Title	Experience	PA status	BMI
P5	42	F	Public (Education)	Office admin	17	active	29.3
P6	37	F	Public (Police)	Office admin	14	active	29.4
P7	39	M	Private (Car dealership)	Sales Consultant	1	inactive	29.8
P8	34	F	Public (Correctional)	Office admin	12	active	26.5
P9	38	F	Private (Medical)	Office admin	14	active	30.1
P10	42	M	Private (Insurance)	Supervisor	20	active	30.9
P11	45	F	Public (Police)	Office admin	18	active	33.5
P12	32	F	Public (Correctional)	Office admin	8	inactive	27.4
P13	34	F	Private (Finance)	Customer service consultant	11	inactive	23.1
P14	31	F	Private (Retail)	Sales Consultant	3	inactive	23.9
P15	34	F	Public (Correctional)	Supervisor	4	inactive	30.6
P16	32	F	Private (Pension)	Biometrics Administrator	1	inactive	30
P17	32	F	Private (Retail)	Sales Consultant	7	inactive	29.2

Participant	Age	Sex	Sector	Job Title	Experience	PA status	BMI
P18	52	F	Private (Law)	Secretary	8	inactive	53.8
P19	39	F	Private (Medical)	Office admin	5	inactive	47.5
P20	39	F	Private (Mobile)	Customer Service Agent	10	active	22.9
P21	42	F	Private (Mobile)	Supervisor	9	active	29.2
P22	32	M	Private (Finance)	Business Consultant	5	active	23.1
P23	33	F	Public (Works)	Office admin	9	active	18.7
P24	29	M	Private (Finance)	Bank teller	3	active	29.4
P25	32	M	Private (Insurance)	Sales Consultant	10	active	23.3
P26	33	F	Private (Medical)	Office admin	8	active	41.5

Table 4.9: Overview of Themes and Sub-themes

Themes	Definition of theme	Sub-themes	Codes
Knowledge and awareness of PA	Participants' understanding of PA and what it entails	Definition of PA	Body movement, exercise, walking, running…..
		Benefits of PA	Improved health, prevention of disease, improved fitness….
		Volume of PA	10-30 mins per day 2-4 times per week…

Themes	Definition of theme	Sub-themes	Codes
Barriers to PA	Factors that prevent or reduce participants' ability to be physically active	Lack of time	Nature of work, high workloads, family responsibilities…….
		Lack of support	Lack of facilities, negative environment, laziness, nothing…..
		Fear	Poor safety, fear of worsening chronic conditions,….
Facilitators to PA	Factors that promote or encourage participants to be physically active	Health	Improved stress and mental health, improved sleep, improved fitness, improved energy levels, self-care…….
		Presence of support	Training partner, training group, more affordable facilities
		Weight loss	Better body image, better looks
Interventions to promote PA participation	Participants proposed interventions to promote PA participation	Provision of more facilities	Workplace wellness & exercise programs, recreational parks & gyms, affordable facilities, more sport codes…
		Community involvement	Community training groups & tournaments, business people & other stakeholders…..
		Awareness and education	Community PA talks, family PA talks, advertising available activities…

4.3.2 Theme One: Knowledge and Awareness of PA

Figure 4.2 depicts the composition of the first theme on knowledge and awareness of PA. The theme was presented below using the respective sub-themes.

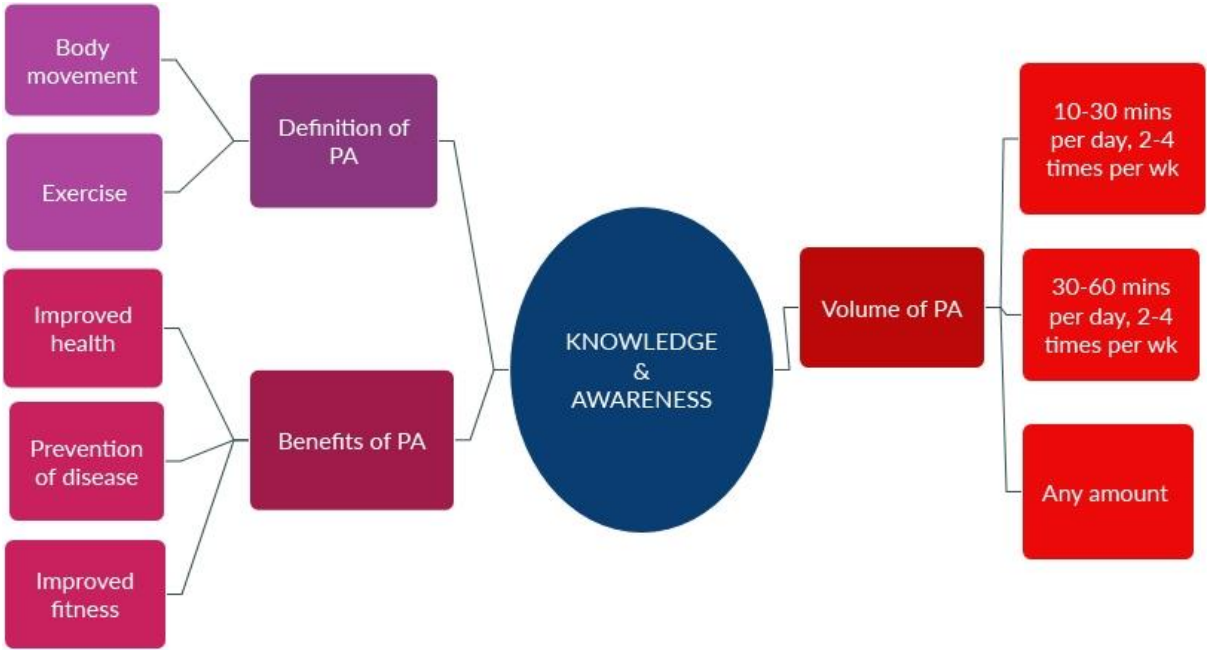

Figure 4.2: Theme One: Knowledge and Awareness of PA

4.3.2.1 Definition of PA

The participants had an excellent comprehension of what PA entails. Participants associated PA with body movement and exercise, giving examples like running, walking, sports, gym workouts, and house chores. There were no differences between physically active and inactive participants.

Box 1. Salient responses: Definition of PA

"It's something like body movement, like if I can give examples like walking, running, dancing or picking up something as long as you are moving your body" (P23).

"So basically, for me, it's like when you are actively doing something like running, gym sessions or sports, including let me say laundry, cleaning the house because I'll be moving up and down and so on" (P12).

"In my opinion, physical activity basically is being active, like running, lifting weights, basically making use of your muscles on a day-to-day basis more than you are usually sitting down" (P25).

4.3.2.2 Benefits of PA

Participants were aware of the various benefits of leading a physically active lifestyle. The commonly highlighted benefits were improved health, fitness, and prevention of disease. Both active and inactive participants were aware of the benefits of PA.

Box 2. Salient responses: Benefits of PA

"You will just be fit and healthier" (P17)

"Like, yeah, you will be healthy. You can also you can also avoid sickness" (P8)

"You live a healthier lifestyle like some of us who are hypertensive and suffer from chronic diseases. It helps us to keep fit" (P9).

4.3.2.3 Recommended Level of PA

While they were aware of the benefits associated with PA, they had varied opinions on the recommended PA levels to achieve these benefits. Some participants highlighted that 10-30 minutes per day for 2-4 times a week was enough to achieve some benefits. Some participants indicated that 30-60 minutes per day for 2-4 times per week was enough. The rest is associated with any form or amount of PA to be enough. There were no clear guidelines on the intensity, as most participants highlighted that you should at least sweat or feel exhausted after engaging in PA.

Box 3. Salient responses: Recommended level of PA

"For a day, I would say maybe 10-15 minutes, maybe 30 minutes. Something like, let's say, 15 minutes of jumping jacks or squats when you wake up in the morning or after work, 15 minutes of the same before a shower. 30 minutes every day is enough" (P16)

"4 days in a week, and you should sweat at least or get exhausted if not sweating" (P24)

"If you are unfit, start slow, like walking, and as you improve, then start jogging. I think even three to four times a week for me it will be fine and increase the days as you go" (P5)

"So I think if you can manage a little bit the activities, for instance walking every day. Perhaps let's say 1 km if you have time for that. I don't think there is a specific amount as long as you keep the activities going, it will contribute to your healthier level" (P26).

4.3.3 Theme Two: Barriers to Physical Activity

Figure 4.3 depicts the composition of the second theme on barriers to PA. The respective sub-themes are presented below.

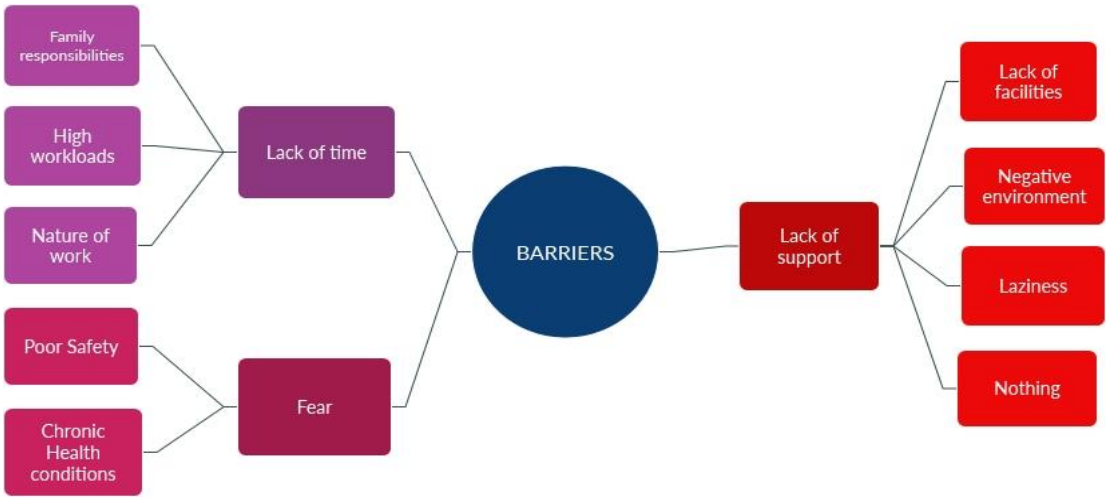

Figure 4.3: Theme Two: Barriers to PA

4.3.3.1 Lack of Time

The most commonly discussed barrier was lack of time due to family responsibilities and high workloads. Most participants felt that the nature of their work and high workloads made it difficult to break sitting time in the workplace. As a result of busy work schedules, they were too tired to engage in PA after working hours. Family responsibilities, which included taking care of kids, preparing meals, and assisting with schoolwork, also reduced PA opportunities after work.

Box 4. Salient responses: Lack of time

"For instance, when you knock off, you are also a housewife. When you get home, cooking and homework are waiting for you. So the time you used to have for sports is no longer there… in the workplace, as I said, time is the biggest limit, you don't find the time" (P2)

"You are tired when you come from work. Then you feel like, no, I will do something tomorrow. Tomorrow will come, and something will come up again at home or at work. So, I think the biggest barrier is being tired and not having time. Tiredness as you are working the whole day and there is no one to motivate or encourage you to engage in physical activity" (P5).

"Let me say daily work schedules. Sometimes you knock off late" (P8).

"…so some of us work 7 to 5 jobs. So the time you come home, you have to quickly do something. Like, let's say, cook for the kids and so forth. Prepare for their next day of school, and at that time, you are done. Even if you wanted to, you couldn't take a jog. It's now a bit too dangerous in the location. So those are some of the things, like the crime rate and the time that you get home from work" (P14).

"Printing documents that all, other than that there is no time at work…." (P13)

4.3.3.2 Lack of Support

The absence of support from colleagues, family, and community members was cited as a barrier to PA participation. They highlighted that supportive friends or partners would highly influence their behaviours. The lack of facilities partly led to fewer individuals in the community taking part in PA, further discouraging participation. The community environment is seen to promote harmful behaviours like excessive alcohol consumption and the use of drugs. Those who decide to be physically active are often faced with judgement and negative comments from community members.

Box 5. Salient responses: Lack of support

"Friends and lifestyles in the community can influence your behaviour. I used to drink a lot and not take care of myself. So I would say drinking and drugs can prevent you from being physically active" (P22)

"I think also because there is no influence. Like people influencing you to do it with them. If I have to run alone, I won't enjoy it, but if there are people that I have to do it together with them, then also I think it will encourage me" (P3)

"So sometimes, if you say you want to run, others might perceive you as crazy. How people are judging you, the perception of other people seeing you doing a certain thing can prevent you from being active" (P11)

"People in the town are not much into sports. Let's say if maybe I want to take a walk, I'll be alone in the street. It's not encouraging me. If I meet someone, it will encourage me" (P23)

"In the community of Grootfontein, we don't have enough facilities. I've seen what other towns have come up with, like in Tsumeb. They have a community park where people can exercise without paying anything. So, I think facilities is one of the big barriers to people being physically active" (P25)

4.3.3.3 Fear

Participants cited fear as a major barrier. Participants had fear of injury or worsening their health conditions and fear of crime as barriers to participation. While they were motivated to be physically active, they were too scared of adverse health outcomes and getting mugged. Poor safety is evidenced by increased crime rate, reduced lighting in the community, and reduced PA participation, especially during the night.

Box 6. Salient responses: Fear

"Fear of being injured, lack of confidence, fear of my phone being grabbed discourages me from being physically active" (P23)

"I was a netball player. I have been playing until recently, but operations have come in. I think I had up to six operations. It's like you didn't; you didn't heal inside, in fact. The most recent one was last year. It's not like I'm really physically fit to start with that. I've tried some sit-ups on my own time while I'm at home, but it feels like it's getting swollen inside. It really demoralises me also" (P1)

"I fear injury when doing sports because one of our colleagues broke a whole bone, his leg. So you know I have a fear of injuring myself and then not recovering from that. So basically, even when I'm participating in sports, and I'm very, very cautious, I'll just play a little bit, and then I'll leave it" (P12)

4.3.4 Theme Three: Facilitators of Physical Activity Participation

Figure 4.4 depicts the composition of the third theme on facilitators to PA. The respective sub-themes are presented below.

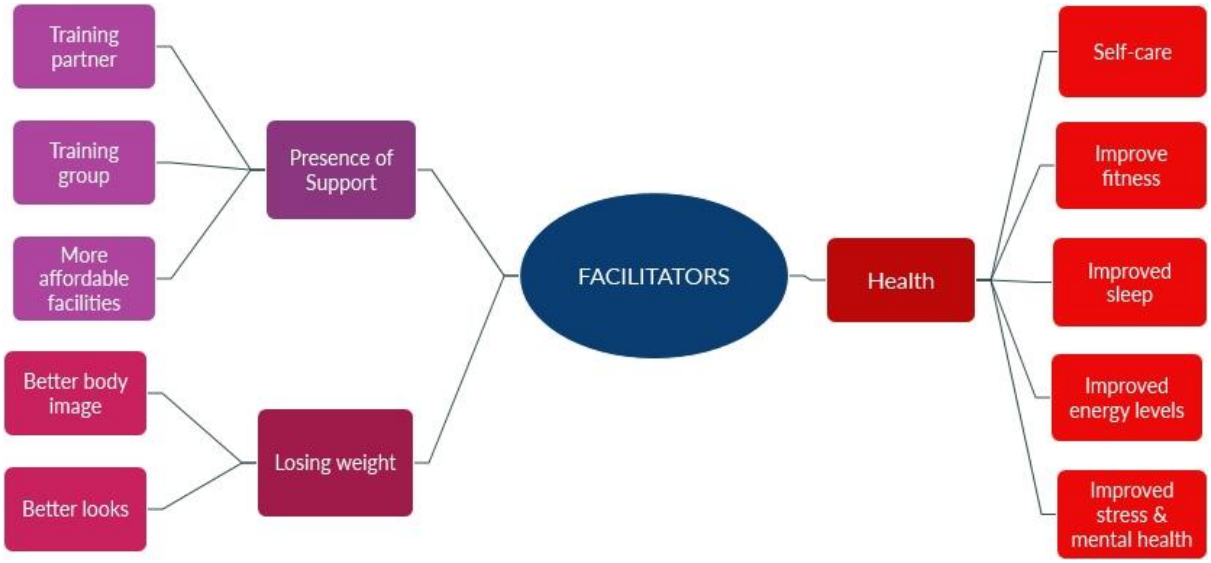

Figure 4.4: Theme Three: Facilitators to PA

4.3.4.1 Support

Participants highlighted that they would be motivated to engage in PA in the presence of support from family and community members. Support and accountability from a training partner/friend or group were also thought to influence more motivation, as training alone promoted laziness.

Box 7. Salient responses: Support

"Can you people please bless me with a partner like my person who is interested in exercising? Then we do it together. Having friends and a person you see every day will push you to engage in more physical activity" (P16)

"So motivation, I guess, someone pushing you and motivating you towards your goals. Some of the motivation comes from my parents and maybe my kids at the moment" (P21)

"Doing it in a group. If there is a group of specific people of the same age, do things together like sports (e.g. volleyball). Like saying people of this age, you can come together and come up with your own group" (P11)

4.3.4.2 Health and Self-care

Participants were motivated to be physically active to stay healthy, improve fitness, and for self-care reasons. Some participants acknowledged the importance of disease prevention and taking responsibility for their own welfare rather than engaging in PA after a diagnosis or a doctor's recommendation.

Box 8. Salient responses: Health and self-care

"They say prevention is better than cure, so I prefer. I don't need to wait for me to be like diagnosed with a certain disease, for me to exercise…" (P8)

"At this point, my mental health. It's a way of dealing with stress and depression. I think there's research I can't quite pinpoint what it is, but then when you are physically active, there are some chemicals that are released in your body that are equivalent to whatever medical prescription pills they give you. So yeah, I guess mental, body wise and health wise are my motivations" (P25)

"What motivates me? I think about my health because if I don't do it myself, no one will do it for me" (P2)

"Because I highly believe in your health is your wealth. Without being healthy, there is absolutely nothing that we can do. If I get sick, I won't be able to come to work. I won't be able to take care of my kids. I won't be able to do all those good things in life. So for me, in order for me to be able to achieve all those other things, I have to take care of my body. Yeah, I have to take care of my body, so just that encourages me and motivates me to be physically active" (P21)

4.3.4.3 Losing Weight

Losing weight and a better body image motivated participants to engage in PA. Most participants were not happy with their bodies, especially belly fat.

Box 9. Salient responses: Losing weight

"Probably just a flat tummy. There was a time I had a very flat tummy until the baby happened. So yeah, that's only. I think my body isn't that bad anyway. So, the only problem I have is my tummy. I should exercise that more" (P14)

"Obviously number one to lose weight" (P20)

"Having a nice shape. I don't want to be a lady with a big stomach. I just want to be in good shape. That's what will encourage me to work out" (P3)

4.3.5 Theme Four: Interventions to promote PA participation

Figure 4.5 depicts the composition of the fourth theme on interventions to promote PA. The respective sub-themes are explained below.

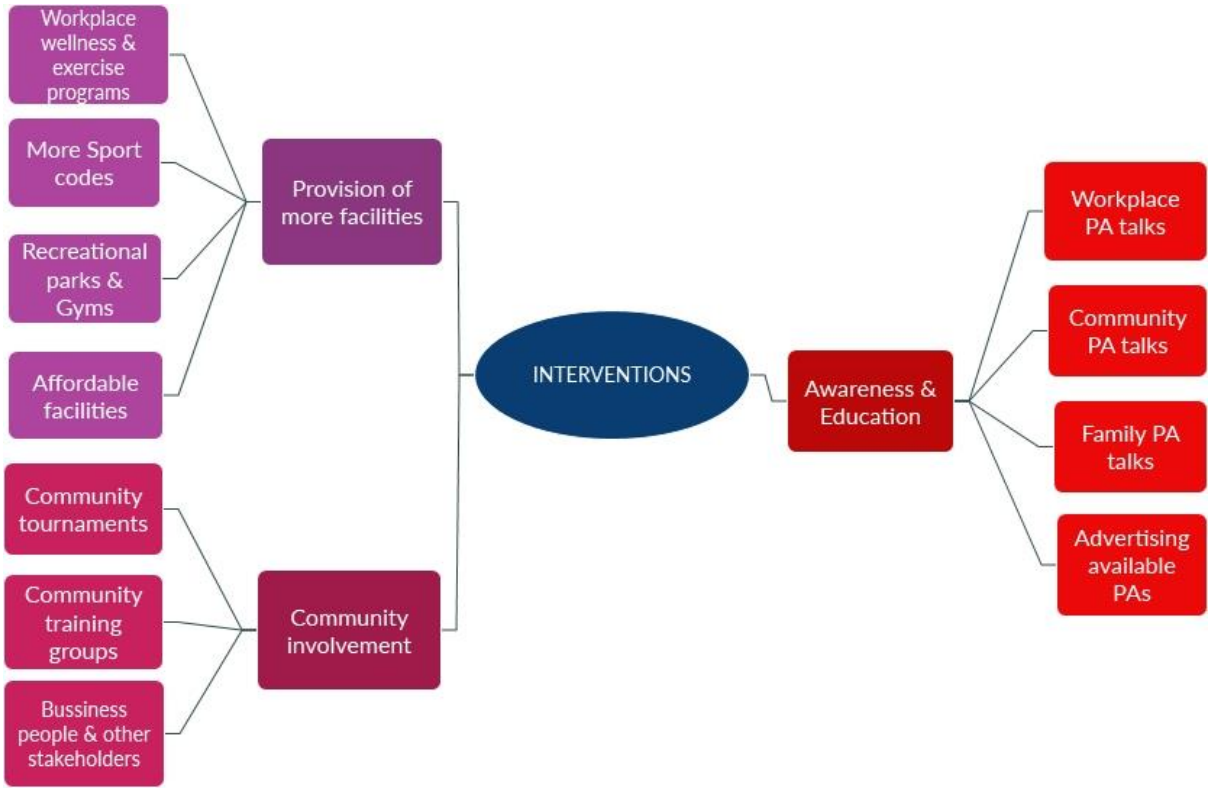

Figure 4.5: Theme Four: Interventions to Promote PA Participation

4.3.5.1 Provision of more facilities

Participants identified that the provision of more facilities like recreational parks, gyms, swimming pools, and more sporting activities would promote more

participation and address alcohol and substance abuse. They also recommended these facilities in high-density suburbs. Currently, there are no recreational parks, and available facilities are mostly in town and are quite expensive. Participants also recommended workplace wellness programs and exercise facilities.

Box 10. Salient responses: Provision of more facilities

"In the community of Grootfontein, we don't have enough facilities. I've seen what other towns have come up with, like in Tsumeb. They have a community park where people can actually exercise without paying anything" (P25)

"I think it's more of a thing of there should be more facilities…..I think I only know of two gyms….I have seen these gyms in the town area. In the location, we don't have such facilities. Maybe they should bring such facilities to the location" (P7)

"In the workplace, because most of the time we are here, they must give us wellness days, you know. Okay, sports days are there, we have sports days in our workplace. But on a daily or monthly basis, at least to have a wellness something. Then you don't have a choice; you have to take part. All of us will take part" (P2)

"At work, they can bring something that at a certain time you go there and stretch or do certain physical activities. A small gym at work, that will do" (P24)

"We need different types of sports, not just soccer. There is such a limit on the things that young people can do. So because there's such a limit of things that people that young people can do, people will always tend to do things that affect them negatively" (P21)

4.3.5.2 Awareness and Education

Awareness and education around the importance of PA were identified as potential interventions to promote PA participation. This included incorporating medical personnel to offer talks at the workplace, community and couples, and advertising the available facilities to increase awareness among community members.

Box 11. Salient responses: Awareness and education

"I think there should be more awareness campaigns about physical activity. Especially with regard to health issues. I feel like, for example doctors and

physical trainers can hold awareness campaigns for both young and old to emphasise the importance of physical activity" (P5)

"…some couples, one understands the benefits of exercising and one does not. We need conferences where we can teach the importance of exercising. You know you can be married to one person who tells you that you need to do wife duties, you need to do this and that, and you won't have time to exercise. That can limit you to do so. So, I think it's important for people to have meetings and understand the importance of so that tomorrow nobody can prevent anyone from exercising. And we also have some old people who don't understand the importance of exercising…" (P8)

"It's all about socialising and advertising and to check who is interested in what and introduce those activities" (P15)

"…people can get together, and then a person like yourself who is more educated in this physical activity thing can go there, and you can say, OK, ladies who are having this type of problem. You can do this type of exercise. Men who are having this type of problem. You can do this type of exercise…So if you educate me, then I come home, and then I educate my sister, who does not go anywhere…" (P12)

4.3.5.3 Community Involvement

Participants highlighted the importance of coming together as a community and taking responsibility for discussing ideas on how to promote PA. Business people and other key stakeholders were encouraged to set up facilities and sports events for more participation. Community-based training groups were also thought to be a key intervention amid socioeconomic challenges.

Box 12. Salient responses: Community involvement

"We already know that our government already has a lot on their plate, so I guess interventions should come from community members instead of just waiting for the government to do everything. Not long ago, I saw a community member who started a boxing club with 8-10 year olds. I was quite astonished to see someone start something like that. Community members need to come up with these initiatives. We can talk to some stakeholders, but everything must come from the community" (P25)

"If we do it as a group. Like at work every Wednesday is a sports day. So if the community can come up with physical activity ideas we can use freely" (P23)

"Like in my community, I think if we could as women now if we could come up with a group of women that we set out this time on Saturday…Then we go work out Saturday…we do it again on Wednesday" (P3)

"In the community, they must introduce more tournaments and events among companies" (P20)

4.3.6 Summary of Findings

This section outlined the barriers and facilitators of PA among office workers in Grootfontein, Namibia. It also highlighted the proposed interventions to promote more participation. Below is a summary of the qualitative findings. The next chapter discusses the results and findings of the study.

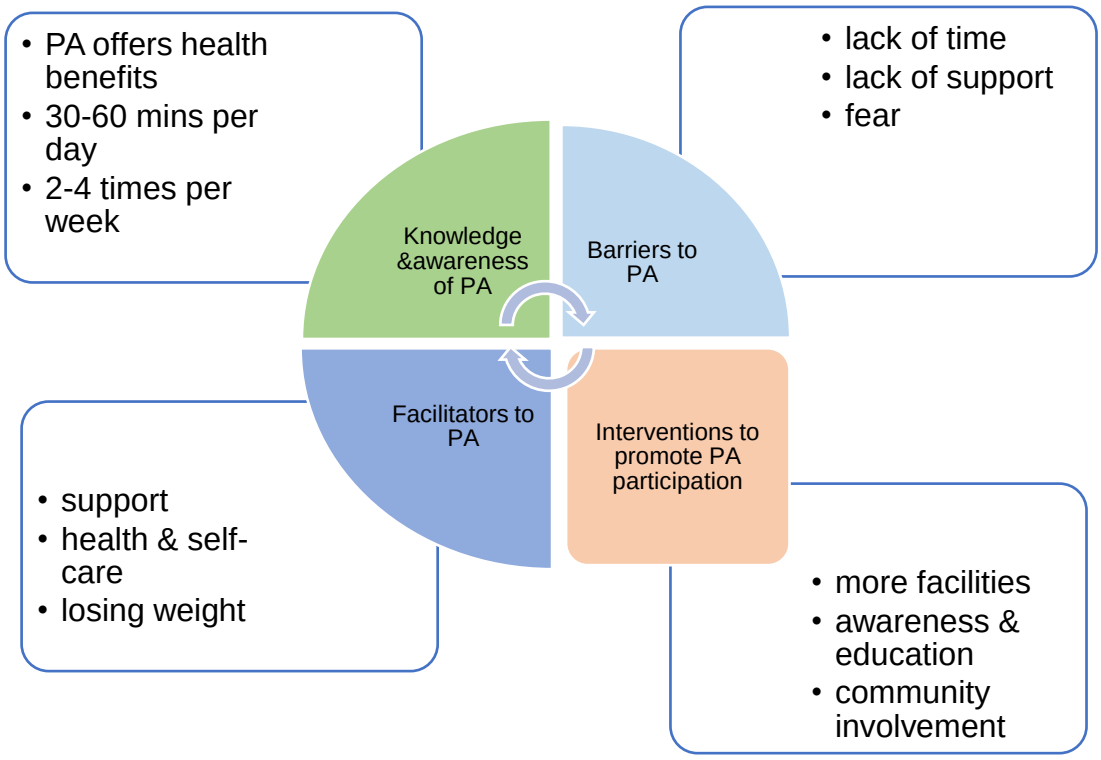

Figure 4.6: Summary of Interview Findings

CHAPTER 5 DISCUSSION

5.1 Introduction

This chapter discusses and analyses this research's main results and findings in relation to existing literature. This was followed by recommendations targeting office-based workers to increase PA participation as well as the strengths and limitations of this research.

5.2 Overview

This mixed-methods study aimed to assess PA levels, barriers, and facilitators among office-based workers in Grootfontein, Namibia. The study found that 62.7% of the participants were physically active, but 65% were either overweight or obese. Barriers to PA were time, support, fear, and safety, while facilitators were health reasons, weight loss, and support. The study also explored office workers' preferred PA interventions, suggesting more facilities, community involvement, awareness, and education. This is the first study assessing PA among Namibian office workers, and the findings could guide future initiatives to increase PA participation.

5.3 Physical Activity Levels, Barriers and Facilitators of Office Workers

Office workers in the current study were predominantly in their third and fourth decade of life, and a majority of them had over five years of working experience. The majority (65%) of the participants were either overweight or obese, and the sample had more female participants, which is comparable to previous studies on office workers (Hene et al., 2021; Torres et al., 2021; Gradidge et al., 2022). The majority of the office workers held professional roles, and there was equal representation of clerical support and service and sales workers.

A majority (62.7%) of office workers were physically active, in contrast to previous studies which reported high levels of physical inactivity among office workers in financial, education, and public service sectors (Kolbe-Alexander, Conradie & Lambert, 2013; Addo et al., 2015; Almuzaini & Jradi, 2019; Hene et al., 2021;

Nketiah et al., 2022). PA is higher in low to middle-income countries when compared to high-income countries and is primarily influenced by work and transport domains (Althoff et al., 2017; Guthold et al., 2018; Hallal et al., 2023). The majority of participants in our study were within the 30-44 age range, which is known to be fairly active (Althoff et al., 2017; Hallal et al., 2023). Similar to previous studies, office workers claimed that lack of time and support were barriers to PA participation (Paguntalan & Gregoski, 2016; Ojo et al., 2019; Gradidge et al., 2021; Landais et al., 2022; Dabkowski et al., 2023). Despite the several barriers to PA being discussed, participants recognised the various benefits of PA, as reported in other studies (Paguntalan & Gregoski, 2016; Landais et al., 2022). According to the Health Belief Model, positive perceptions of PA have been associated with greater participation and can explain the high PA levels in the current study (Norman & Conner, 2016; Getachew et al., 2023). While this finding may imply that individuals are embracing active lifestyles, caution should be applied when interpreting self-reported PA data as it is prone to recall and social desirability bias (Cleland et al., 2014).

Previous studies have reported a high prevalence of overweightness and obesity (55-67%) among office workers, which are linked to low levels of PA (Dhurata, Gent & Robert, 2013; Kolbe-Alexander, Conradie & Lambert, 2013; Addo et al., 2015; Almuzaini & Jradi, 2019; Hene et al., 2021). Interestingly, the majority of office workers in the current study met the recommended levels of PA, but 65% of them were either overweight or obese. Evidence suggests that high sitting time is associated with obesity and other NCD risk factors independent of PA levels, and it is known to eliminate the benefits of meeting the recommended levels of PA (Biswas et al., 2015; Ekelund et al., 2016; Warburton & Bredin, 2017; Posadzki et al., 2020; Torres et al., 2021). Participants highlighted the desire to lose weight and achieve health benefits as facilitators to engaging in PA. However, an average daily sitting time of 8 hours was reported, which is comparable to previous studies with high sitting times (Heinonen et al., 2013; Clemes, Oêconnell & Edwardson, 2014; Smith et al., 2015). Continuous sitting after a single bout of PA has fewer benefits on body composition when compared to breaking sitting time with fewer amounts of PA (Rodriguez-Hernandez & Wadsworth, 2019). Successful interventions to alter body composition comprise an individualised PA program, a dietary plan, and reduced

sedentary behaviour (Cox, 2017). Evidence suggests that PA alone, even around the WHO guidelines, might not be universally enough for significant long-term weight loss (Cox, 2017). High sitting time, especially with TV viewing, has been associated with unhealthy eating habits and is quite prevalent among office workers (Heinonen et al., 2013; Clemes, Oêconnell & Edwardson, 2014; Ekelund et al., 2016; Hene et al., 2021). These findings emphasise the importance of awareness and education around PA dosage, breaking sedentary behaviour and diet when promoting PA.

Similar to previous studies, work roles and high workloads limited workplace PA opportunities (Paguntalan & Gregoski, 2016; Ojo et al., 2019; Gradidge et al., 2021; Landais et al., 2022; Dabkowski et al., 2023). Previous studies suggested walking as an inexpensive intervention to break sitting time (Gradidge & Golele, 2018; Hallam, Bilsborough & de Courten, 2018; Rodriguez-Hernandez & Wadsworth, 2019). Walking, coupled with the use of activity trackers and computer notifications, was effective in breaking sitting time and provided an accountability platform (Gremaud et al., 2018; Hallam, Bilsborough & de Courten, 2018; Islam et al., 2023). The use of sit-to-stand desks provided mixed results, with studies reporting poor long-term adherence and a high cost of securing them (Parry et al., 2013; Straker et al., 2013; Nelson-Wong et al., 2022). The current study suggests scheduling workplace group activities and wellness programs (and supported by previous studies) to increase participation through peer support and improve social connections (Lock et al., 2021; Dabkowski et al., 2023). Individual's willingness and mental discipline remain key to the success of workplace initiatives (Hallam, Bilsborough & de Courten, 2018; Lock et al., 2021; Dabkowski et al., 2023).

Office workers in the current study reported high leisure-time PA levels, a move thought to compensate for the low work-based PA. However, similar to previous studies, they encountered a lack of facilities, expensive facilities, safety concerns, and poor social support when engaging in leisure-time PA (Paguntalan & Gregoski, 2016; Gradidge et al., 2021; Isiagi et al., 2021; Mejia-Arbelaez et al., 2021; Landais et al., 2022). Lack of built environments, socioeconomic inequalities, and high crime rates in low to middle-income countries are thought to reduce PA participation (Sallis et al., 2012; Malambo et al., 2017; Chivunze et al., 2021; Isiagi et al., 2021; Mejia-

Arbelaez et al., 2021). Similar to previous studies, participants felt that available facilities favoured participation in males, young adults, and high-income residents, while gender roles inhibited participation among females (Paguntalan & Gregoski, 2016; Malambo et al., 2017; Gradidge et al., 2021; Isiagi et al., 2021; Mejia-Arbelaez et al., 2021; Landais et al., 2022). This probably explains the higher BMI values among female participants when compared to males in the current study. Participants suggested having affordable facilities even in low-income neighbourhoods, better lighting and police visibility to address age, gender, and safety barriers. Previous studies have reported success in addressing these barriers through inexpensive interventions like the Parkrun, Ciclova, and Cicloruta programs, which increased participation (Torres et al., 2013; Chivunze et al., 2021; Mejia-Arbelaez et al., 2021). The various group activities increased participants' sense of safety and promoted family and community engagement across all age groups, thereby providing support and accountability for better adherence to these PA programs (Torres et al., 2013; Chivunze et al., 2021; Mejia-Arbelaez et al., 2021). This highlights the potential of community-driven interventions, as suggested in the current study, to promote participation while waiting for a built environment from relevant stakeholders. Interestingly, the provision of built environments does not always guarantee increased participation (Bartels et al., 2023).

5.4 Recommendations

5.4.1 Recommendations for Practice

Institutions should be encouraged to provide work-based PA facilities and education to promote more PA participation. This could be in the form of group exercises, activity trackers, PA incentives, talks, wellness days, and competitions or sports events. These initiatives have been suggested to encourage participation through improved accountability, interest, and creation of time from busy work schedules (Gremaud et al., 2018; Hallam, Bilsborough & de Courten, 2018; Lock et al., 2021; Dabkowski et al., 2023; Islam et al., 2023).

Various stakeholders should come together and provide a variety of affordable PA facilities in the community. Available facilities are expensive and favour more male

participation. Participants also highlighted the need to have these facilities in high-density suburbs. Grootfontein was compared to nearby towns with more PA facilities and recreational parks, which are thought to improve safety and address alcohol and substance abuse, especially among the youth.

Community members should take responsibility for creating PA opportunities and initiatives. Inexpensive interventions like group exercises, walking programs, and sporting events have been suggested to encourage PA participation. This provides platforms for peer support and improved safety sense, which encourages better PA adherence (Torres et al., 2013; Chivunze et al., 2021; Mejia-Arbelaez et al., 2021).

5.4.2 Recommendations for Education

Education around PA dosage guidelines has been suggested to improve the participant's ability to attain the various health benefits of PA (Cox, 2017). Participants understood the various benefits of PA but were not aware of the required dosage to achieve these benefits. These guidelines are also key in weight loss, injury prevention, and the prevention of worsening health conditions (Paguntalan & Gregoski, 2016; Cox, 2017). Physical activity education was also suggested within family settings for better participation through associated social connections and accountability (Torres et al., 2013; Chivunze et al., 2021; Mejia-Arbelaez et al., 2021). High obesity and overweightness can also be addressed through education about other modifiable risk factors like diet, smoking, and poor sleep during wellness days for a more comprehensive approach to a healthier lifestyle.

5.4.3 Recommendations for Research

More research is needed around the topic of PA and associated NCD risk factors.

5.4.4 Recommendations for Policy

The Government should implement policies within their framework to increase PA levels and combat the growing burden of NCDs. Institutions should be included in the implementation of policies in order to address physical inactivity among office-based employees.

5.5 Strength of the Research

Findings from this research expanded the existing knowledge in the following areas: office workers' PA level, perceptions of PA, and barriers and facilitators they face in terms of their preferred interventions. This research is unique as it analysed the PA levels of office workers in Grootfontein, including their perceptions, barriers, and facilitators to PA. It provides suggestions around PA interventions to promote PA participation. It is crucial to examine the barriers and facilitators encountered by office workers before developing and executing PA interventions. The results from this study suggest that the provision of more facilities, support and community involvement would be beneficial in encouraging PA among office workers. Additionally, these findings could be applied to different office settings or occupations as they included office workers from various sectors.

5.6 Limitations and Future Research Opportunities

Firstly, the use of questionnaires is prone to recall bias, which can lead to either under or over-reporting of PA. Future studies should look at incorporating objective measures to improve accuracy. However, self-reported data has been generally acceptable due to low cost and feasibility when working with study samples.

The study's cross-sectional nature makes it difficult to establish the causal relationships between the different variables in this study. Cohort and intervention study designs are recommended for future research.

CHAPTER 6 CONCLUSION

6.1 Summary of Main Results and Findings

Technological advancements have led to the adoption of sedentary lifestyles, contributing to an increase in physical inactivity (Althoff et al., 2017; Guthold et al., 2018). Physical inactivity increases the risk of disease, mortality, and healthcare costs (Lee et al., 2012; Katzmarzyk, 2023). In Namibia, NCDs are the second leading cause of mortality (MOHSS, 2017; Namibia Statistics Agency, 2023). Office workers remain at great risk, and previous studies have reported high physical inactivity levels in this population (Clemes, Oêconnell & Edwardson, 2014; Msopa & Mwanakasale, 2018; Hene et al., 2021; Nketiah et al., 2022). PA is effective in addressing the impact of physical inactivity even with levels below the recommended guidelines literature (Cooney et al., 2014; Park, Han & Kang, 2014; Ekelund et al., 2016; Warburton & Bredin, 2017; Chastin et al., 2019; Posadzki et al., 2020). Several interventions have been investigated for their efficacy in addressing physical inactivity (Torres et al., 2013; Smith et al., 2015; Gradidge & Golele, 2018; Hallam, Bilsborough & de Courten, 2018; Chivunze et al., 2021; Mejia-Arbelaez et al., 2021; Dabkowski et al., 2023). However, there is limited knowledge of the perceptions of office workers, making it difficult to suggest interventions that would be effective in addressing physical inactivity in this population.

The first objective of this study was to describe the PA levels of office workers in Grootfontein, Namibia, using the GPAQ. Two hundred and seventeen participants were recruited in the survey, and 62.7% of them were physically active, while 65% were either overweight or obese. The majority of participants were female and within the 30-44 year age range. The average daily sitting time was 8 hours. The second objective was to determine office-based workers' perceived barriers and facilitators of PA using semi-structured interviews. The main barriers were lack of time, support, and safety, while the facilitators were health benefits, presence of support, and weight loss. Lastly, participants recommended the provision of more facilities, awareness and education, and community involvement to promote more PA participation.

6.2 Study Conclusion

In conclusion, the study found that the majority of participants were physically active and either overweight or obese. Females reported higher BMI values when compared to males. This highlights the need for a multi-factorial approach, in addition to PA, to address obesity. The participants had excellent comprehension of PA and its associated benefits but had a high average daily sitting time. Several interventions that are known to address the barriers highlighted in the study have been discussed.

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LIST OF APPENDICES

APPENDIX A: THE GLOBAL PHYSICAL ACTIVITY QUESTIONNAIRE

Section A: Demographic Details

Name: _____ ***Job Title:*** _____

Experience: _____ ***yrs Sex:*** _____ ***Age:*** _____***yrs Height:*** _____***m Weight:*** _____***kg***

BMI: _____***kg/m2 Email address:***_____

Cell no:_____

Physical Activity

Next, I am going to ask you about the time you spend doing different types of physical activity in a typical week. Please answer these questions even if you do not consider yourself to be a physically active person .

Think first about the time you spend doing work . Think of work as the things that you have to do such as paid or unpaid work, study/training, household chores, harvesting food/crops, fishing or hunting for food, seeking employment . *[Insert other examples if needed].* In answering the following questions, ' vigorous-intensity activities' are activities that require hard physical effort and cause large increases in breathing or heart rate, 'moderate-intensity activities' are activities that require moderate physical effort and cause small increases in breathing or heart rate .

Questions		Response	Code
Section B: Activity at work			
1	Does your work involve vigorous-intensity activity that causes large increases in breathing or heart rate like *[carrying or lifting heavy loads, digging or construction work*] for at least 10 minutes continuously? *[INSERT EXAMPLES] (USE SHOWCARD)*	Yes 1 No 2 If No, go to P 4	P1
2	In a typical week, how many days do you do vigorous-intensity activities as part of your work?	Number of days ⌊⌋	P2

3	How much time do you spend doing vigorous-intensity activities at work on a typical day?	Hours: minutes ⌊_⌋⌊_⌋ : ⌊_⌋⌊_⌋ hrs mins	P3 (a-b)
4	Does your work involve moderate-intensity activity that causes small increases in breathing or heart rate, such as brisk walking *[or carrying light loads*] for at least 10 minutes continuously? *[INSERT EXAMPLES] (USE SHOWCARD)*	Yes 1 No 2 If No, go to P 7	P4
5	In a typical week, how many days do you do moderate-intensity activities as part of your work?	Number of days ⌊_⌋	P5
6	How much time do you spend doing moderate-intensity activities at work on a typical day?	Hours: minutes ⌊_⌋⌊_⌋ : ⌊_⌋⌊_⌋ hrs mins	P6 (a-b)
Section C: Travel to and from places			
The next questions exclude the physical activities at work that you have already mentioned . Now, I would like to ask you about the usual way you travel to and from places . For example, to work, for shopping, to market, to place of worship . [insert other examples if needed]			
7	Do you walk or use a bicycle (*pedal cycle*) continuously for at least 10 minutes to get to and from places?	Yes 1 No 2 If No, go to P 10	P7
8	In a typical week, on how many days do you walk or bicycle for at least 10 minutes continuously to get to and from places?	Number of days ⌊_⌋	P8
Questions		**Response**	**Code**
9	How much time do you spend walking or bicycling for travel on a typical day?	Hours**:** minutes ⌊_⌋⌊_⌋ **:** ⌊_⌋⌊_⌋ hrs mins	P9 (a-b)
Section D: Recreational Activities			
The next questions exclude the work and transport activities that you have already mentioned. Now I would like to ask you about sports, fitness and recreational activities (leisure), [insert relevant terms].			
10	Do you do any vigorous-intensity sports, fitness or recreational (*leisure*) activities that cause large increases in breathing or heart rate like [*running or football]* for at least 10 minutes continuously? *[INSERT EXAMPLES] (USE SHOWCARD)*	Yes 1 No 2 If No, go to P 13.	P10

11	In a typical week, on how many days do you do vigorous-intensity sports, fitness or recreational (*leisure*) activities?	Number of days ⌊__⌋	P11
12	How much time do you spend doing vigorous-intensity sports, fitness or recreational activities on a typical day?	Hours**:** minutes ⌊__⌋⌊__⌋ **:** ⌊__⌋⌊__⌋ hrs mins	P12 (a-b)
13	Do you do any moderate-intensity sports, fitness or recreational *(leisure*) activities that cause a small increase in breathing or heart rate, such as brisk walking (*cycling, swimming, volleyball*)for at least 10 minutes continuously? *[INSERT EXAMPLES] (USE SHOWCARD)*	Yes 1 No 2 If No, go to P16	P13
14	In a typical week, on how many days do you do moderate-intensity sports, fitness or recreational (*leisure*) activities?	Number of days ⌊__⌋	P14
15	How much time do you spend doing moderate-intensity sports, fitness or recreational (*leisure*) activities on a typical day?	Hours**:** minutes ⌊__⌋⌊__⌋ **:** ⌊__⌋⌊__⌋ hrs mins	P15 (a-b)
Section E: Sedentary behaviour			
The following question is about sitting or reclining at work, at home, getting to and from places, or with friends, including time spent [sitting at a desk, sitting with friends, travelling in a car, bus, train, reading, playing cards or watching television], but do not include time spent sleeping. *[INSERT EXAMPLES] (USE SHOWCARD)*			
16	How much time do you usually spend sitting or reclining on a typical day?	Hours: minutes ⌊__⌋⌊__⌋ **:** ⌊__⌋⌊__⌋ hrs mins	P16 (a-b)

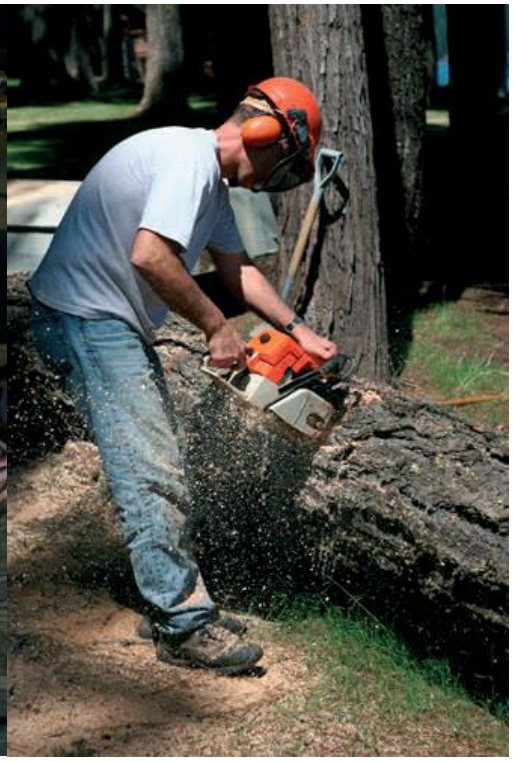
APPENDIX B: SHOW CARD EXAMPLES

Vigorous Physical Activity at Work

Examples of vigorous activities at WORK.

VIGOROUS Intensity Activities

Make you breathe <u>much</u> harder than normal



Other examples of VIGOROUS activities at WORK.	Forestry (cutting, chopping, carrying wood) Sawing hardwood Ploughing Cutting crops (sugar cane) Gardening (digging) Grinding (with pestle) Labouring (shovelling sand) Loading furniture (stoves, fridge) Instructing spinning (fitness) Instructing sports aerobics Sorting postal parcels (fast pace) Cycle rickshaw driving.

Moderate Physical Activity at Work

Examples of MODERATE activities at work.

MODERATE Intensity Activities

Make you breathe somewhat harder than normal.




Other examples of MODERATE activities at WORK.

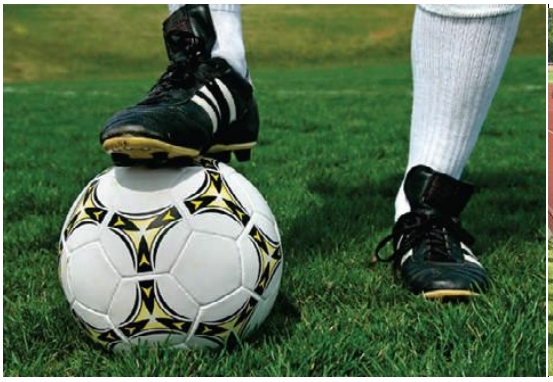
Cleaning (vacuuming, mopping, polishing, scrubbing, sweeping, ironing)
Washing (beating and brushing carpets, wringing clothes (by hand)
Gardening
Milking cows (by hand)
Planting and harvesting crops
Digging dry soil (with spade)
Weaving
Woodwork (chiselling, sawing softwood)
Mixing cement (with shovel)
Labouring (pushing loaded wheelbarrow, operating jackhammer)
Walking with a load on the head
Drawing water
Tending animals

Vigorous Physical Activity during Leisure Time

Examples of VIGOROUS activities during LEISURE TIME.

VIGOROUS Intensity Activities

Make you breathe <u>much</u> harder than normal.



Other examples of VIGOROUS activities during LEISURE TIME:

Soccer
Rugby
Tennis
High-impact aerobics
Aqua aerobics
Ballet dancing
Fast swimming

Moderate Physical Activity during Leisure Time

Examples of MODERATE activities during LEISURE TIME.

MODERATE Intensity Activities

Make you breathe <u>somewhat</u> harder than normal.




Cycling

Jogging

Dancing

Horse-riding

Tai chi

Yoga

Pilates

Low-impact aerobics

Cricket

Other examples of MODERATE activities at WORK.

APPENDIX C: SAMPLE INTERVIEW GUIDE

<table>
<tr><th colspan="2">Introduction</th></tr>
<tr><td colspan="2">Good afternoon, and welcome to our session. Thank you for taking the time to be on this interview on physical activity. My name is Blessing Nyazika, and I'm an MSc student at UCT. I'll be leading this interview as we talk about the barriers and motivators of PA. The interview is going to be recorded so that we do not miss any of your contributions. Data collected during this session will remain confidential and will be used for the purpose of this study only. Participation is voluntary, and you can withdraw at any stage of the study. All your contributions are important and will not be judged, as there is no right or wrong answer. Kindly switch off your cell phones or put them on silent. If you need to respond to a call, please do so as quietly as possible and rejoin as quickly as you can.</td></tr>
<tr><th colspan="2">Warm-up questions</th></tr>
<tr><td colspan="2">1. What is physical activity?
2. Which physical activities do you enjoy doing?</td></tr>
<tr><th colspan="2">Main questions</th></tr>
<tr><th>Main question</th><th>Prompt</th></tr>
<tr><td>1. What are the benefits of engaging in physical activity or leading a physically active lifestyle?</td><td></td></tr>
<tr><td>2. What would motivate or encourage you to be more physically active?</td><td>• Can you identify any other elements that could help boost and maintain your interest and motivation?
• Can you identify any ways you could reduce the amount of time you spend sitting on an average day?
• If you were going to consciously try to be more physically active and reduce the amount of time you</td></tr>
</table>

	spend sitting or being sedentary, what kind of physical activity goals would you choose to include? • What are some of the factors that motivated you to be physically active when you were younger, and how have these factors changed over the years?
3. What are some of the barriers you have encountered that prevent you from being more physically active or as active as you would like to be?	• That is, what is stopping you now or what has stopped you in the past? • Can you think of some instances where you decided you wanted to become more physically active? What have you done or are you trying to do? • What activities are of interest to you that may promote participation in physical activity?
4. What strategies or interventions do you think should be introduced to promote more participation in PA?	
Cool down	
We have covered all the areas I had scheduled for this interview. Is there anything you would like to add?	
Closing remarks	
Thank you so much for taking the time to take part in this interview. I'll provide you with a summary of this interview so that you can check for accuracy of the information.	

APPENDIX D: INFORMED CONSENT

University of Cape Town

Faculty of Health Sciences

Department of Health and Rehabilitation Sciences

F45 Old Main Building Groote Schuur Hospital

Observatory, Cape Town, W Cape 7925

+27 (0)21 406 6401

http://www.dhrs.uct.ac.za

Dear Participant

I'm a master's student at the University of Cape Town studying Exercise and Sports Physiotherapy. I will be conducting a study on physical activity levels, barriers, and facilitators among office-based employees in Grootfontein. This study has been ethically approved by the Human Research Ethics Committee at the University of Cape Town.

What is the study about?

There is an increased level of physical inactivity globally, which is also affecting office-based employees. The purpose of this study is to establish the levels of physical activity as well as perceived barriers and facilitators to physical activity among office-based employees in Grootfontein. The study will be done in two phases at different times. The first phase involves the completion of a questionnaire, and the second phase involves taking part in an interview.

Who will be able to take part?

All office-based employees, male or female, on fixed-term contracts, are eligible to take part in this study. Participation is voluntary, and you have the right to opt out at any stage of the study.

What will happen if I decide to take part in this study?

After providing informed consent, you will be asked to complete a questionnaire measuring body mass index, work, transport, and leisure-related physical activity levels. The researcher will guide you in completing the questionnaire. You might be selected by the researcher to further take part in an interview on a date and venue that will be communicated to you via email or telephone. The interview will last approximately 30-45 minutes, and it will be recorded.

Who will see the information collected during the study?

Only the researcher and the two supervisors will have access to the collected information to aid with the data analysis. The information will be stored in a password-protected computer to aid with privacy and confidentiality. Interviews will be recorded and transcribed. However, participant details will be de-identified by the researcher during the transcription process.

What are the risks of taking part in this study?

There are no risks to your health and safety when taking part in this study.

What are the benefits of taking part in this study?

There is no direct personal benefit to taking part in this study. The results of this study will be shared with you via your preferred means of communication. Results from this study will help different institutions create interventions related to physical activity.

Who do I contact if I have questions about the study?

If you have any questions about the study, kindly contact the individuals below:

Researcher: Blessing Nyazika (+264 81 885 4846; bnyazika4@gmail.com)

Supervisors of this study:

Prof. Soraya Maart (soraya.maart@uct.ac.za)

Prof. Philippe Gradidge (Philippe.Gradidge@wits.ac.za)

The UCT Faculty of Health Sciences Human Research Ethics Committee can be contacted if you have any ethical concerns or questions about your rights and welfare as a participant in this study.

Contact: +27 21 406 6338
Email: hrecenquiries@uct.ac.za

Consent Statement

I hereby confirm that I have read and understood the informed consent form and the purpose of the study. I understand the risks and benefits of participating in this study, and I can leave this study at any stage. I understand that the information collected will be kept confidential, and I can contact the researcher and supervisors at any time during this study.

Participant Name and Surname: _____
Date: _____ Signature: _____

Researcher Name and Surname: _____
Date: _____ Signature: _____

Supervisor Name and Surname: _____
Date: _____ Signature: _____

Supervisor Name and Surname: _____
Date: _____ Signature: _____

APPENDIX E: EMAIL TO MANAGERS

University of Cape Town

Faculty of Health Sciences

Department of Health and Rehabilitation Sciences

F45 Old Main Building Groote Schuur Hospital

Observatory, Cape Town, W Cape 7925

+27 (0)21 406 6401

http://www.dhrs.uct.ac.za

Dear Sir/Madam

I hope I find you well. I'm a master's student at the University of Cape Town and am currently doing a study on physical activity levels, perceived barriers, and facilitators among office-based employees in Grootfontein. I'm writing to ask for permission and invite you to take part in this study. Kindly advise on the best way I can contact your colleagues to inform them about the study.

The study will involve the completion of questionnaires and taking part in an interview. I have attached the informed consent form with more details about the study. I would greatly appreciate your participation in this study. Kindly forward the information about this study to your colleagues. Participant recruitment will be estimated to be completed by June/July 2023. Please feel free to contact me or my supervisors for any enquiries.

Regards,

Blessing Nyazika (Researcher) +264 81 885 4846; bnyazika4@gmail.com

Prof. Soraya Maart (Supervisor) soraya.maart@uct.ac.za

Prof. Philippe Gradidge (Supervisor) Philippe.Gradidge@wits.ac.za

APPENDIX F: EMAIL/LETTER TO PARTICIPANTS

University of Cape Town

Faculty of Health Sciences

Department of Health and Rehabilitation Sciences

F45 Old Main Building Groote Schuur Hospital

Observatory, Cape Town, W Cape 7925

+27 (0)21 406 6401

http://www.dhrs.uct.ac.za

Dear (Participant Name)

I hope I find you well. My name is Blessing Nyazika, and I'm currently conducting a study on physical activity levels, perceived barriers, and facilitators among office-based employees. I have spoken to your manager, who has recommended I contact you via email.

If you are interested in taking part in the study, kindly check if you meet the inclusion criteria. The study will involve the completion of informed consent before completing questionnaires and taking part in an interview. I have attached the informed consent form with full details of the study.

Please feel free to contact me or my supervisors if you have any questions about the study.

Regards,

Blessing Nyazika (Researcher) +264 81 885 4846; bnyazika4@gmail.com

Prof. Soraya Maart (Supervisor) soraya.maart@uct.ac.za

Prof. Philippe Gradidge (Supervisor) Philippe.Gradidge@wits.ac.za

APPENDIX G: HREC APPROVAL

UNIVERSITY OF CAPE TOWN
Faculty of Health Sciences
Human Research Ethics Committee

Room 45 E-52-E-Floor- Old Main Building
Groote Schuur Hospital
Observatory 7925
Telephone [021] 406 6492
Email: hrec-submissions@uct.ac.za
Website: www.health.uct.ac.za/home/human-research-ethics

24 February 2023

HREC REF: 089/2023

Prof S Maart
Division of Physiotherapy
Health & Rehab Sciences-F-45 OMB
Email: Soraya.maart@uct.ac.za
Student:NYZBLE001@myuct.ac.za

Dear Prof Maart

PROJECT TITLE: PHYSICAL ACTIVITY LEVELS, PERCEIVED BARRIERS, AND FACILITATORS AMONG BANK EMPLOYEES IN GROOTFONTEIN, NAMIBIA-
(MASTER'S DEGREE-MR BLESSING NYAZIKA)

Thank you for submitting your study to the Faculty of Health Sciences Human Research Ethics Committee (HREC) for review.

It is a pleasure to inform you that the HREC has **formally approved** the above-mentioned study, subject to local Namibia REC approval.

Approval is granted for one year until the 28 February 2024.

Please submit a progress form, using the standardised Annual Report Form (FHS016) if the study continues beyond the approval period. Please submit a Standard Closure form if the study is completed within the approval period.
(Forms can be found on our website: www.health.uct.ac.za/fhs/research/humanethics/forms)

The HREC acknowledge that the student: Mr Blessing Nyazika will also be involved in this study.

Please quote the HREC REF 089/2023 in all your correspondence.

Please note that the ongoing ethical conduct of the study remains the responsibility of the principal investigator.

Please note that for all studies approved by the HREC, the principal investigator **must** obtain appropriate institutional approval, where necessary, before the research may occur.

Yours sincerely

PROFESSOR M BLOCKMAN
CHAIRPERSON, FACULTY OF HEALTH SCIENCES HUMAN RESEARCH ETHICS COMMITTEE

HREC/ref 089.2023