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**THE IMPACT OF PHYSICAL ACTIVITY ON MENTAL  
WELLBEING DUE TO MIGRATION FROM HOT TO  
COLD CLIMATE**

Master thesis

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This Master thesis has been compiled independently. All works by other authors used while compiling the thesis as well as principles and data from literary and other sources have been referred to.

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## INTRODUCTION

Mental wellbeing is a critical determinant of an individual's ability to function well (World Health Organization, 2022, p. xiv; Harris, 2018, p. 2). It is often accompanied by socio-economic consequences such as increased medical costs and incapacity to work (Liu et al., 2021, p. 2). Mental wellbeing not only refers to the general mental wellbeing of an individual but also includes life satisfaction, resilience, self-efficacy, self-esteem, connectedness, coping, self-control, spiritual mindedness, hope, sense of coherence, happiness, and life purpose (Orth et al., 2022, p. 4). These factors define a person's mental wellbeing. Since COVID-19, World Health Organization (2022, p. vi) recorded an increase in individuals suffering from mental health challenges such as depression and anxiety disorders.

Physical activity benefits physical (World Health Organization, 2020, p. 2) and mental health (Jacob et al., 2020, p. 2). Thivel et al. (2018, p. 2) define physical activity as any body movement caused by the contraction of skeletal muscles that results in energy use above the resting metabolic rate and is characterised by its modality, frequency, intensity, duration, and context of practice. Physical activity refers not only to physical exercise but all high-level physical activities that result in using energy above the regular resting metabolic rate (Thivel et al., 2018, p. 2). Anderson & Durstine (2019, p. 7) stated that preventing and managing diseases such as cardiovascular diseases, cancer, and diabetes is one of the advantages of physical activity. While the effects of physical activity on physical health have been widely studied, very few studies on its impact on mental health exist (Pears et al., 2022, p. 180). In the wake of the COVID-19 pandemic, social distancing rules have resulted in prolonged periods of inactivity and have awakened research into the effect of physical activity on mental health (Pears et al., 2022, p. 180). The World Health Organization (2022, p. xiv) recognised the effect physical inactivity from COVID-19 had on individuals. Ammar et al. (2021, p. 9) record increased sitting time due to COVID-19 social distancing rules. Banks & Xu (2020, pp. 685, 707) further

showed increased mental health problems due to the COVID-19 lockdown using indicators such as anxiety and stress. Furthermore, they stated that the pandemic had more effect on the population of youths and women. Jacob et al. (2020, p. 2) implied that physical activity could reduce the impact caused by the COVID-19 pandemic on mental wellbeing. McDowell et al. (2019, p. 545) proved that physical activity could prevent stress disorders and anxiety. Despite the many advantages of physical activity on mental health, World Health Organization (2021, p. 6) recorded a 5% decline in physical activity between 2001 and 2016.

Physical activity is affected by the extreme climate, and thus, it could result in less exercise, resulting in inactivity and a dull lifestyle. Furthermore, weather and climates are significant determinants of behavioural change, which could be about physical activity. (Obradovich & Fowler, 2017, p. 1). In addition, Climate change has been demonstrated to have varying effects on mental health. The phenomenology of climate change consequences varies greatly – some mental problems are prevalent, while others are unique to abnormal environmental situations. Furthermore, climate change affects certain population groups that are directly exposed and more vulnerable due to geographic factors and a lack of access to resources, information, and protection. (Cianconi et al., 2020, p. 1).

Recent statistics have shown a decline in physical activity (World Health Organization, 2021, p. 6). The World Health Organization (2022, p. xii) also recorded an increasing number of people suffering from mental health disorders since 2020. Based on the description above, Extreme climate change lowers the individual's physical activity level resulting in worse mental wellbeing. Reviewing existing literature, there is limited studies on the effect of physical activity on mental wellbeing especially for Africans.

This master's thesis goal is to evaluate the impact of physical activity on the mental wellbeing of Africans in Estonia and present recommendations to Africans living in Estonia on how to improve the mental wellbeing of people moving from hot to cold regions.

This study would address the following research question:

- How does physical activity affect mental wellbeing?

- What effect does migration from hot to cold climates have on the physical activity of migrants?
- How effective is physical activity for mental health promotion?

The research task will include the following steps:

- Reviewing existing literature on mental wellbeing, mental health, physical activity, migration, Africans, and other secondary data relevant to the study.
- Designing the research method and determining the relevant scale for measuring variables.
- Design the online questionnaire and collect data from Africans in Estonia.
- The analysis of data using descriptive statistics and statistical models.
- Discuss the findings and present the recommendations.

The study is limited to Africans in Estonia as this population represents immigrants from hot to cold climates and for which the data is easily accessible. Time and finances prevent the exploration of immigrants from hot to cold temperatures in other parts of the world. The study would benefit not only migrants in Estonia but people who intend to move from hot to cooler climates. The recommendations of the study and its findings would be publicly available to those that need them.

This thesis is in two chapters. The first chapter is being the literature review. This section reviews existing literature on mental wellbeing, physical activity and climate change. It also reviews literature on the theories relating to mental wellbeing and physical activity. The second chapter is the empirical part. This chapter explains the research methods and design used in the course of the study, the population of the study, the method of selecting the sample size and sample size determination method, the process and method of collecting data and the method of analysing this data, the results of the data analysed the discussion part and recommendations.

# 1. LITERATURE REVIEW

## 1.1. The Concept of Mental Wellbeing

The mental health of any individual is an essential part of general wellbeing (World Health Organization, 2022, p. xiv). The World Health Organization (2022, p. iv) describes it as a basic human right. Mental health and mental wellbeing have been used interchangeably in many pieces of research (Orth et al., 2022, p. 1). Mental health is a state of wellbeing characterized by coping with stressors, learning, working, and contributing to society (World Health Organization, 2022, p. 8). It is an all-encompassing term that measures the presence or absence of mental illness and the level of an individual's mental wellbeing (Bratman et al., 2019, p. 2; Lawrance et al., 2022, p. 445). Bratman et al. (2019, p. 2) describe mental health as the absence of mental illness and the presence of psychological wellbeing. Mental illness typically refers to disorders relating to cognition, behaviour and affect. They include anxiety, stress, substance abuse, depression disorders, schizophrenia, autism, and other illnesses affecting the mind. The interactions of social and environmental factors shape the mental health of every individual uniquely (Patel et al., 2018, p. 1553) interacting with genetic, neurodevelopmental, and psychological processes and affecting biological pathways in the brain (Lawrance et al., 2022, p. 447). These interactions also change throughout the individual's life and with changes within his environment (Lawrance et al., 2022, pp. 446–447). Mental disorders involve significant deviation in thinking, emotional regulation, behavior or psychology (Lawrance et al., 2022, p. 447).

Mental wellbeing considers the individual's psychological functioning and hedonic factors (Ng Fat et al., 2017, p. 1130). It involves the proper functioning of an individual as well as the overall feeling of being happy. Psychological functioning encompasses acceptance of self, personal growth, life purpose, mental health, mastery of self, autonomy, and positive social relationships (Wiklund et al., 2019, p. 582). The ability to

function well, cope in stressful environments, connect to society and feel happy indicates good mental health and wellbeing (World Health Organization, 2022, p. xiv; Orth et al., 2022, p. 1; Ng Fat et al., 2017, p. 1130). Mental wellbeing encompasses positive psychological and physical wellbeing, caring, and supportive relationships of the individual with people and groups, the ability to handle stressful events, the ability to control and regulate emotions and thoughts. It also takes into cognisance the individuals Mood with regards to their satisfaction with life, their belief in a better future and that goals would be met, the feeling of significance and purpose, satisfaction with their overall quality of life, the ability to cope and recover from stressful and adverse conditions, the ability to efficiently use the skill they possess and judgement to cope in given situations, confidence and self-worth. Understanding one's talent, the ability to manage everyday life challenges and stressors using the skills at their disposal, looking at life from a multidimensional perspective and celebrating wholeness through attention and awareness are also indicators of mental wellbeing. (Orth et al., 2022, pp. 5–7) Ayeb-Karlsson (2020, p. 2) describes wellbeing as being subjective and constantly changing, further stating that mental wellbeing affects a person's psychological and social functioning.

A global mental health challenge is a global crisis (GBD 2017 Disease and Injury Incidence and Prevalence Collaborators, 2018, p. 1789). All countries have mental health challenges in their health system. There are treatment gaps in the mental healthcare system, gaps in information research, governance, resource, and services (World Health organization, 2022, p. xv). The system needs more investment and development (Lawrance et al., 2022, p. 444). COVID-19 widened treatment gaps in the mental healthcare system even more, Mental health systems were strained, and it became difficult to access healthcare during that period (World Health Organization, 2022, p. xiv). Mental disorders are clinically diagnosed by establishing the presence of abnormal psychology and behavioral impairment. In many societies, it is difficult to access help for these symptoms; thus, mental health disorders and issues related to mental wellbeing go undiagnosed and untreated (Lawrance et al., 2022, p. 445). For communities with access to mental health treatments, the costs of these treatments make them inaccessible to lower and middle-class income earners. In addition to being costly mental conditions are often considered pervasive and unwelcoming (World Health Organization, 2022, p. xv). In many developing countries, there is often the non-availability of mental health

practitioners, and affordable treatment for mental health and wellbeing is often not accessible (World Health Organization, 2022, p. xv). Mental wellbeing, especially in underdeveloped countries, is not given a lot of priority (Buenaventura, 2020, p. 1129) as the symptoms of low mental wellbeing are not always obvious and people find it difficult to recognize symptoms of mental health challenges (Abi Doumit et al., 2019, p. 2), however, the presence of mental illness is often an indication of lower mental wellbeing (World Health Organization, 2022, p. 13). Mental wellbeing conditions often go unnoticed and untreated (World Health Organization, 2022, p. xv). In all countries, there are gaps in the quality of mental wellbeing services. This gap varies from country to country (World Health Organization, 2022, p. xv)

Investing in mental health advances public health, reduces suffering, enhances the quality of life of persons with mental health and wellbeing challenges, and improves their psychological functioning and life expectancy. Poor mental wellbeing can put social relationships on hold and reduce productivity, especially with employees and business owners. This reduces social and economic development, further strengthening poverty and increasing the gap between the haves and the have-nots. Low mental wellbeing implies little contribution to society and reduced productivity. (World Health Organization, 2022, p. xv) People with schizophrenia or other severe mental health conditions are at risk of low mental wellbeing. This population also has a high mortality rate (Thivel et al., 2022, p. 2).

Adverse and unfavorable circumstances could manifest anywhere in a person's life. Still, those that happen at sensitive periods, such as early childhood, could result in psychological conditions and affect functioning (World Health Organization, 2022, p. xiv). Mental wellbeing is affected by social, economic, environmental, political, behavioral, physiological and psychological factors (Ng Fat et al., 2017, p. 1130; Bratman et al., 2019, p. 2; Lawrance et al., 2022, p. 445).

The Socio-economic determinant of mental health includes adverse climate conditions, violence, lack of quality education, unsafe living environment, unfavourable work conditions and unstable source of income (Lawrance et al., 2022, p. 456; World Health Organization, 2022, p. xiv). Unstable government and political conditions are determinants of mental wellbeing, especially in underdeveloped nations (Barchielli et al.,

2022, p. 1). Barchielli et al. (2022, p. 4) investigated the impact of war on the psychological wellbeing of civilians directly caught up in war zones. The adverse effects of war are associated with mental health, fear, substance use, stress, loneliness, burnout, and other related conditions.

The psychological wellbeing of people living in war-torn countries is affected by anxiety, stress and substance abuse (Barchielli et al., 2022, p. 4). The COVID-19 pandemic created a global crisis for mental health. It served as an additional stressor affecting the psychological health of millions. Anxiety disorders and depressive symptoms increased by over 25% in the first year of the pandemic. At the same time, due to the global lockdown, mental health services were severely disrupted, widening the treatment gap for mental health conditions. (World Health Organization, 2022, p. xiv). Genetics can often play significant roles in the mental health and wellbeing of a person (World Health Organization, 2022, p. xiv, Bratman et al., 2019, p. 2) and mental health conditions can lower levels of wellbeing (World Health Organization, 2022, p. xiv), and some of these conditions can be hereditary (Bratman et al., 2019, p. 2). These factors, behavioural, psychological, physiological, environmental, socio-economic, and political factors, interact with each other to determine the level of a person's mental wellbeing (Lawrance et al., 2022, p. 447)

Low mental wellbeing presents as stress disorders, anxiety disorders, and depression symptoms and could impair individual psychological functioning (World Health Organization, 2022; Jacob et al., 2020, p. 2). Mental wellbeing can be experienced in varying degrees depending on the difficulty level, stress, social and economic situation, and health conditions (Lawrance et al., 2022, p. 444). Similarly, factors that strengthen resilience and increase the ability to cope with unfavorable conditions (protective factors) may occur throughout a person's life (World Health Organization, 2022, p. xiv). Protective factors include positive social relationships and interactions, quality education, a decent source of income, a safe living environment, emotional skills, access to employment opportunities and community integration (Rousseau & Frounfelker, 2019, p. 5).

The World Health Organization (2022, p. 153) enumerates ways to improve individuals' mental health and lists encouragement of physical activity as an effective way to maintain

good mental health and wellbeing. Reduced contact with the natural environment can often affect mental health, especially for individuals living in deprived environments, socially segregated by economic conditions and poverty (World Health Organization, 2022, p. xiv). Contact with nature has been shown to improve mental health and wellbeing; however, in many cases, mental wellbeing's socio-economic and environmental determinants may outweigh the effect of contact with nature (Bratman et al., 2019, p. 1). Many countries have established policies and plans to strengthen their mental health systems. Movements advocating for people with mental health and wellbeing problems have been amplified. There is an increase in research done in these areas. These research and development have provided essential information and aided development. (World Health Organization, 2022, p. xiii). The World Health Organization Member States adopted the Comprehensive mental health action plan 2013–2030, committing to meet global targets for improved mental health. These were focused on strengthening leadership and governance, community-based care, promotion and prevention, and information systems and research. But the World Health Organization's latest analysis of the countries' performance against the action plan shows that they have been very little progress. People continue to battle problems with mental wellbeing, and the mental health systems are still lacking and unable to meet people's needs. In the meantime, global threats to mental wellbeing are always present. Social and economic inequalities, conflicts, violence, and public health emergencies threaten the improvement of mental wellbeing. (World Health Organization, 2022, p. xiii)

Aside human movement, increased financial protection are important in closing the care gap and reducing inequities in mental health. To that end, it is essential to consider mental health in universal health coverage packages. So too, is integrating mental and physical health care, which improves accessibility, reduces fragmentation and duplication of resources, and better meets people's health needs. (World Health Organization, 2022, p. xv)

The ability to function well and feel happy is an indication of stable psychological health. Mental wellbeing problems can result from economic and financial distress, social segregation, political instability and in some cases mental illness. To battle the problem of low mental wellbeing entails understanding the individual and causes of the mental

health challenge being faced. The World Health Organization (2022, p. xiii) established its mental health action plans to combat issues relating to mental health, still its implementation has been slow. To efficiently battle problems facing psychological wellbeing, it is important to provide economic and financial protection as well as adequate mental health services, reducing the care gap in mental health.

## **1.2. Physical Activity and its Importance**

Physical activity significantly contributes to mental health (Jacob et al., 2020, p. 2). It is any body movement caused by the contraction of skeletal muscles that results in energy expenditure above the resting metabolic rate. It is characterised by its modality, frequency, intensity, duration, and context of practice. Physical activity refers not only to physical exercise but all high-level physical activities that use energy above the regular resting metabolic rate. This high-level activity includes regular physical activity carried out in the course of our everyday life, exercise, dance, and sports. (Thivel et al., 2018, p. 2) While dance, exercise and sports are subcategories of physical activity, they are not the only constituents of physical activity. Physical activity is characterised by any waking behaviour that results in energy expenditure above the normal resting metabolic rate (Thivel et al., 2018, p. 2). Thus, physical activity is not only demonstrated through experiences such as cultural or religious dance, children and professional sports, exercises, leisure walks, tree climbing, weightlifting and other laborious activities, both household chores and work activities. It also appears in cases of forced migration due to civil wars, protest marches against oppression, and political rallies. In all these forms, physical activity becomes a medium to express oneself, which is healthy for mental wellbeing. (Matias & Piggin, 2022, p. 187)

The World Health Organization (2021, p. 3) sets guidelines for the number of calories burned and the required time to carry out physical activity for an individual. They recommend that an individual spends at least 150 minutes of moderate physical activity per week. Only 42% of Estonians are physically active, reaching 150 minutes of moderate physical activity per week (Tikk, 2020, p. 8). At least 20% of individuals do not meet the recommended physical activity levels (World Health Organization, 2021, p. 6). There has been an alarming decline in the level of physical activity in the last two decades (Matias

& Piggin, 2022, p. 183). Due to the decline in physical activity rates and the global population failing to meet recommendations, health facilities have promoted physical activity even more vigorously. They are increased measurement and surveillance programs, increased promotion of physical activity's health and economic benefits. (Matias & Piggin, 2022, p. 183) Owing to advances in technology and innovation, jobs have become more sedentary in recent years rather than involving physical strain and exercise (Thivel et al., 2018., p. 2). Sedentary behaviours are any waking behaviours characterised by an energy expenditure above or equal to 1.5 metabolic equivalent while sitting, reclining, or lying. Sedentary jobs are characterised by less use of energy and reduced body movement. This may include screen time, time spent in front of a computer screen, time spent writing, and sitting. (Thivel et al., 2018., p. 2) Globally, there has been a decline in the levels of physical activity (World Health Organization, 2021, p. 6). 81 percent of adolescents were insufficiently active in 2016 (World Health Organization, 2021, p. 6). A person is physically active when he reaches the recommended level of physical activity for their age. Some people may have a sedentary lifestyle but still engage in activities that allow them to meet the recommended physical activity level for their age. Good examples are people with tertiary jobs. According to Thivel et al. (2018, p. 2), people can be sedentary and physically active. In their research, they consider physical inactivity and physical activity as opposites. Physical inactivity refers to not being able to meet the level of physical activity requirement according to the physical activity guidelines (Thivel et al., 2018, p. 2).

The increase in physical inactivity in the last century has become a significant risk factor for mortality (Thivel et al, 2018., p. 2). Various benefits of physical activity have been stated in the literature. Evidence suggests that physical activity reduces mortality rate and can combat cardiovascular diseases, cancer, mental health, weight-related diseases, and ailments relating to strengthening the bone and muscles (Thivel et al., 2018, p. 2). Physical activity could reduce global mortality by up to 5 million annually (World Health Organization, 2021, p. 3). Physically inactive people are at 30% risk of death compared to physically active people (World Health Organization, 2021, p. 3). Regular Physical activity can contribute to overall health growth and ageing, preventing many chronic illnesses. It is a preventive measure as well as treatment for certain health conditions. (Thivel et al., 2018, p. 2)

Physical activity helps in preventing and managing physical health as well as mental health (Anderson & Durstine, 2019, p. 7). Light intensity physical activity improves health related quality of life (Gall et al., 2019, p. 6). Higher ages are associated with lower levels of health-related quality of life and psychological wellbeing after use of physical activity regimen. Still, regular physical activity improves the mental health of individuals (Gall et al., 2019, p. 6). Some studies are particular to children and adolescents, showing the relationship physical activity has with cardiovascular health, bones, and weight control (Gall et al., 2019, p. 2). Gall et al. (2019, p. 2), also showed that multi-dimension physical activity had little effect on the health-related quality of life of school children. Ghrouz et al. (2018, p. 630) have shown improvement in sleep patterns and depressive and stress symptoms due to physical activity. Physical activity improves health-related quality of life. Promoting regular physical activity among children in disadvantaged settings is important to improving health-related quality of life. Policy makers should provide policies and encourage schools to improve the level of physical activity carried out in the school, including physical activity in their curriculum. (Gall et al., 2019, p. 8) Their policies and school environment should be physical activity friendly. Physical activity reduces stress, anxiety and depression and may influence the mental health of individuals during social distancing (Jacob et al., 2020, p. 2). Physical activity protects against depression irrespective of geography, age, and gender (Schuch et al., 2018, p. 631). Jacob et al. (2020, p. 4) show a significant negative relationship between high physical activity levels and mental health. In their study, respondents with low levels of physical activity faced issues relating to stress, anxiety, and depression. They further advise that this category should be targeted for mental health intervention schemes. While they find a significant negative association between physical activity and mental health, they say it is unclear whether low physical activities lead to mental health problems or whether mental health issues result in low physical activity. Mental health and wellbeing problems may occur in an individual at different stages of their life; however, physical activity could reduce or suppress symptoms relating to mental health disorders, increasing people's mental wellbeing (World Health Organization, 2022, p. xiv).

Various behavioural theories focus on human needs and how human behaviours change to meet these needs. These theories favour promoting activities that have positive effects on connectedness, status, self-esteem, competence, self-efficacy, sense of autonomy, and

self-protection (Matias & Piggin, 2022, p. 190). The theory of self-determination holds that for an individual to function optimally, the individual must meet three important needs. The need for autonomy, the need for competence and the need for relatedness which can also be termed connectedness (Ryan & Deci, 2017, p. 3). Autonomy allows the individual to experience the sense of willingness for his own actions and the consequences that follow. Competence involves experiencing the effect of ones' interaction with society while relatedness refers to connectedness, the feeling of connectedness with a significant other and social world it involves the feeling of being accepted (Ryan & Deci, 2017, p. 10). Being able to meet these needs allows for stable mental wellbeing (Vasconcellos et al., 2020, p. 1445). Social and physical activities can animate or constrain these needs (Matias & Piggin, 2022, p. 185). Physical activities such as dance, exercise, tree climbing and playing allow the individual express, explore and meet the need for connectedness, autonomy and competence (Matias & Piggin, 2022, p. 185). Matias and Piggin (2022, p. 185) explain the interrelationship between physical activity and the urge to feel to explore and to connect. They explain that physical activity is not just a contraction of muscles but a way to meet basic psychological needs of a person. Even pleasure, satisfaction and enjoyment can be born out of actions requiring the expense of a more than normal amount of energy. Several activities such as playing, exercising, dancing, drama have an innate ability to give the participant an enjoyable experience, however lack of exploration could limit the pleasure from these experiences. While physical activities burn calories and aids physical health and fitness, it also involves being able to sense and experience thing that give meaning to life. For each individual these things could be different however these urges could be manifested through human movement. These reasons are the manifestation of urges that make physical activity make sense for people's lives. (Matias & Piggin, 2022, p. 186) Reviewing the effect of arts on mental health, arts such as dance and drama allow for self-expression and benefit mental wellbeing, sense of control, social engagement and reduces mortality (Stickley et al., 2018, p. 367).

Physical activity can promote connectedness and spirituality (Matias & Piggin, 2022, p. 189). Dance in some cultures oft has deep spiritual and cultural connections. It is also connected to diverse religions (Matias & Piggin, 2022, p. 189). Spirituality is an indicator of good mental wellbeing. Gillam's (2018, p. 150) study purports that, participatory arts

positively affect mental health and wellbeing. Participatory arts activities are unregulated activities that involve active participation. They are often facilitated by artists who have little or no training in therapeutic or psychological activities. These activities can include visual arts, music, dance and drama (Stickley et al., 2018, p. 367). Dance and drama constitute high intensity and moderate intensity physical activity. Gillam (2018, p. 150) classifies dance and drama as participatory arts. It improves mood, social, physical and psychological wellbeing. It also improves resilience in young people, improves community participation thereby promoting connectedness and educates societal stigma. Resilience and connectedness are important determinants of a healthy mental state and measure mental wellbeing (Orth et al., 2022, p. 1). Participatory arts also enhance creativity and personal development (Gillam, 2018, p. 150) which improves low mental wellbeing. Activities such as dance is therapeutic and beneficial to people living with dementia. Creative arts benefits people living with mental health problems and suffering low mental wellbeing. They reduce symptoms of depression and anxiety and improves overall emotional wellbeing. (Gillam, 2018, p. 150). It is important that creative arts do not become only a vehicle for expression of self but also for increasing connectedness and promoting social inclusion (Gillam, 2018, p. 155).

Participatory arts involving older people benefits mental wellbeing, physical wellbeing, community participation and reduced societal stigma (Stickley et al., 2018, p. 367). Measuring connectedness, hope, identity, meaning of life and empowerment as determinants of mental health, Stickley et al. (2018, p. 367) found that participatory arts including those art involving human movement and use of energy above normal metabolic resting rate such as dance and drama, improves mental wellbeing. Participatory art enhances connectedness and hope (Stickley et al., 2018, p. 367). It is observed that physical activity may also help with self-expression and building confidence (Stickley et al., 2018, p. 368)

Matias and Piggan (2022, p. 199) puts forth the unifying physical activity theory. This theory explains the interrelationship between inherent human urges, interaction with the environment and expression of self through physical activity. According to their theory, the need to feel, explore, transform and connect are the major reasons people engage in physical activity. These physical activity urges also inform the activity's quality and

intensity (Matias & Piggan, 2022, p. 199). Meta-analysis of the mental wellbeing of people who engaged in dancing (a form of physical activity) indicated that this activity allowed for the expression of self and was a significant contributor to mental and psychological wellbeing (Laird et al., 2021, p. 1). Core psychological needs could grow from the desire to feel, explore, transform and connect. Being able to meet these needs with physical activity will also address other psychological need of the individual. (Matias & Piggan, 2022, p. 199) These, the urges expressed in movement can allow individuals understand themselves, others, and society, enabling purpose and discovery (Matias & Piggan, 2022, p. 188).

Dance allows individuals to cope with stress-related health conditions. Participants of conscious dance reported the longer the duration or greater the frequency of practice, the greater its effect on mental wellbeing (Laird et al., 2021, p. 2).

In another study, participants reported that physical activity significantly affects their symptoms of depression, stress and general mental wellbeing (Jacob et al., 2020, p. 1). The study used the Short Warwick-Edinburgh mental wellbeing scale to measure mental wellbeing. They showed moderate to high-intensity physical activity negatively correlated with mental wellbeing, stress, anxiety and depression. Pascoe et al. (2020, p. 4) also showed that physical activity affects depression, stress and mood states depending on the intensity of the physical activity. Vigorous (high-intensity) physical activity affected moods states. Key socio-demographic outcomes, sitting time and health outcomes explained a variation in depression score (Pears et al., 2020, p. 184). More involvement in physical activity and lower sitting time significantly lowers depression scores (Pears et al., 2020, p. 184). People with lower sitting time experience higher levels of mental wellbeing (Pears et al., 2020, p. 184). Physical activity allows the individual to meet his psychological needs (Matias & Piggan, 2022, p. 184). The interrelationship between these psychological needs and physical activities enhances the individual's quality of life. Pascoe et al. (2020, p. 1), have shown an interrelationship between physical activity, self-control, self-efficacy and subjective wellbeing. Briki (2018, p. 62) show the effect of physical activity on mental health and wellbeing. Physical activity improves thinking, learning, and judgement, reduces stress, anxiety, and depression, ensures health growth in young people and contributes to general mental wellbeing (World Health

Organization, 2021, p. 3). It contributes significantly to mental health promotion, helping to reduce symptoms of depression (Pascoe et al., 2020, p. 2). Physical activity allows people to be more conscious of their movement and act intentionally to meet their own goals, needs and demands (Matias & Piggin, 2022, p. 184). Being able to meet own goals contributes to healthy mental wellbeing (Orth et al., 2022, p. 5).

For health practitioners and other mental wellbeing professionals to help combat mental health and wellbeing issues, they have to understand the effect of creative arts. These arts allow self-expression and other forms of physical activities on mental health and wellbeing. They need to learn more about these activities, be involved in them and encourage others to do so. (Gillam, 2018, p. 155) Health practitioners can work with community and professional sports organizations to ensure health and safety policies to reduce health-related risks (Wald & Demorest, 2022, p. 388).

Studies have also shown that physical activity can treat some illnesses and have linked physical inactivity to adverse health outcomes (Thivel et al., 2018, p. 1). A range of factors can change an individual's physical activity level, like migration and climate change (Shor & Roelfs, 2019, p. 2; Wald & Demorest, 2022, p. 390). Tikk (2020, p. 2) recommended using physical activity on prescription to improve their patient's physical activity levels. Healthcare providers should advise patients to become more physically active and equally add physical activity to their treatment prescription (World Health Organization, 2021, p. 7). Although it has become a proven method for treating some ailments and is being used in several countries (Sweden and Finland), Estonia has yet to implement it in the healthcare system (Tikk, 2020, p. 2). Educational training and collaboration from health institutions and other relevant stakeholders are needed for successful implementation (Tikk, 2020, p. 2).

Bell et al. (2019, p.1) describes the relationship between mental wellbeing and physical activity as having no strong relationship. Their study used the Williams Edinburgh Mental Wellbeing scale (WEMWBS) to measure mental wellbeing of adolescents. They also combined the WEMWBS and the Strength and Difficulties Questionnaire (SDQ) to measure for mental wellbeing and mental health disorder. Their study found no relationship between mental wellbeing or mental health disorder and physical activities. They adjusting for age and gender in their experiment and still found no relationship

between physical activity and mental wellbeing. They describe physical activity as having the potential to reduce symptoms of depression and anxiety in adolescents. However, they did find a positive association between vigorous or high intensity physical activity and emotional problems. They also found that among their participants, the female respondents had poorer mental wellbeing than the males (Bell et al., 2019, p. 5). Female respondents also showed higher symptoms of mental disorder than the males. Prioreshi et al. (2020, p. 1), in their study which focused on women in Africa, south Africa precisely showed that women were able to meet the recommended physical activity levels of 150 minutes per week however they engaged in very limited leisure physical activity. Guthold et al. (2018, p. e1077) evaluated physical activity from 2001 to 2016 and showed African men to rank among people with the lowest levels of physical activity.

Globally, health strategies have been developed to reduce the effect of sedentary behaviours and physical inactivity and increase the levels of physical activity (Thivel et al., 2018., p. 1). The World Health Organization (2021, p. 7) lists the following as ways to reduce physical inactivity:

- Policies to increase the physical activity should promote walking, cycling and other non-motorised medium of transportation that are available and safe for all.
- Facilities for exercise and sports should be provided in schools and places of work to encourage physical activity during free time. People should be educated on physical activity and how it can improve their mental wellbeing.
- Schools for child development and post-primary schools should be equipped with quality physical activity education. These institutions should help children develop behavioural patterns that keep them active throughout their adult lives.
- Investing in new technologies, innovation, and research to develop cost-effective methods to increase physical activity.
- Ensuing regular surveillance and monitoring of physical activity and policy implementation. They should be community-based programs and facilities that promote physical activities for all ages and groups.
- Physical activity should be included in prescriptions where necessary to increase physical activity amongst patients.

Physical activity involves any human movement that allows the expenditure of energy above normal resting metabolic rate. It includes exercise, dance, drama, children's play and can sometimes result from the kind of employment done by the individual. The unifying theory of physical activity explains that it allows an individual meet certain basic psychological need needs like the need to feel explore and transform, improving mental wellbeing. Despite the many physical and mental health benefits of physical activity there is still declining levels of physical activity globally. Prescribing physical activity as a treatment method for people leaving with problems that can be treated with physical activity has been recommended. Encouraging physical activity in schools, leisure places and within the community would also help promote physical activity reducing mental health problems where necessary.

### **1.3. Migration from Hot to Cold Temperatures and Physical Activity**

Migration from country to country is often shaped by economic vulnerability, political, social and demographic factors. People may migrate to acquire knowledge and earn income for their families. (Jha et al., 2018, p. 124) Migration events change depending on the level of financial capital, gender, age, health as well as human capital (Cattaneo et al., 2019, p. 194). Migration supports the transfer of capital and intellectual resource, allowing undeveloped communities to move towards development and modernization. It allows the transfer of resources such as finance, knowledge, innovation to home communities. This improves the wellbeing and livelihood of home communities. (Jha et al., 2018, p. 124)

Although the disparity in income, low standards of living and poverty can be major reasons for migration, these are not the only reasons. Migration can also be an adaptive response to changing climate. (Jha et al., 2018, p. 122) Changes in climate can result in extreme weather events such as snow, rain and rising sea levels. These can also cause degradation of the environment. These changes can cause short- or long-term migration. In many cases migrants may have lost their source of lively hood in their home country if these occupations were climate sensitive. While in other cases, people migrate due to the inability to adapt to changing climate conditions. (Jha et al., 2018, p. 122) Adverse

climate change can reshape the comparative advantages of regions, making some places less productive and livable (Adger et al., 2020, p. 396). Some weather changes can become intolerable, restricting lifestyle of people in these regions (Adger et al., 2020, p. 396). Human migration can be a response to climatic stress and shocks (Cattaneo et al., 2019, p. 189). The type of climate events shapes the relationship between climate and migration. Climate change is associated with various risks including exposure and vulnerability of the population (Cattaneo et al., 2019, p. 193) and can affect the consistency of income over time and the labour returns (Cattaneo et al., 2019, p. 199).

Migration entails leaving one's home and adjusting to new surroundings (Hajro et al., 2019, p. 331), which is stressful and can reduce mental wellbeing (Rousseau & Frounfelker, 2019, p. 1) and, in some cases, result in mental health problems such as depression and anxiety disorder (Rousseau & Frounfelker, 2019, p. 1). Regular physical exercise has been shown in studies to help decrease the detrimental impacts of migration on mental health by offering a sense of control and self-efficacy (Briki, 2018, p. 62; World Health Organization, 2022, p. 152). Migration is associated with low levels of mental wellbeing in some sub-population and is generally agreed that migrants could experience stress-related disorders, particularly in cases of forced migration. The refugee population of migrants are even at a higher risk of experiencing stress, anxiety and depression disorders due to migration. The extent and severity of the mental wellbeing challenges faced by migrants are based on a combination of factors surrounding the migration process. Organising a migration journey could be stressful and demanding; requiring skill, agents, finances and to a large degree, good health. (Rousseau & Frounfelker, 2019, p. 2) Financial distress, cultural and language barriers, social support, and adverse climate change may affect psychological functioning and wellbeing (Rousseau & Frounfelker, 2019, p. 1). Climate change affects not only physical health but mental health and wellbeing. Literature suggests that immigrants may be healthier in their home country than in the host country with low mortality rates and stable mental wellbeing in their native-born country than non-immigrants (Shor & Roelfs, 2019, p. 2; Rousseau & Frounfelker, 2019, p. 2). Immigrants facing mental wellbeing challenges may find it difficult to access the appropriate care and services owing to social barriers, culture and language barriers (Rousseau & Frounfelker, 2019, p. 1). Physical activity is proven to combat stress and mental health and wellbeing challenges (Pascoe et al., 2020, p. 4; Gall

et al., 2019, p. 2). However, physical health challenges were one of the first health impacts of weather to be highlighted (Lawrance et al., 2022, p. 444).

Changes in the work environment, change of jobs to more sedentary job types, immigration and changing climates can affect the individual's schedule resulting in reduced levels of physical activity (Shor & Roelfs, 2019, p. 2; Wald & Demorest, 2022, p. 390; Obradovich & Fowler, 2017, p. 1). Physical activity should be promoted within diverse societies. Due to adverse and extreme weather conditions, some communities do not engage in high levels of physical activity (Obradovich & Fowler, 2017, p. 1). It has been shown to improve health and allow mental stability for individuals with problems relating to mental wellbeing.

Climate change affects the frequency, intensity, and duration of physical activity especially during extreme temperature events, severely affecting health. These temperature changes are dangerous to mental wellbeing and can frequently lead to illness. Research has shown that adverse temperatures increase health problems and mortality rates (Shor & Roelfs, 2019, p. 1; Wald & Demorest, 2022, p. 388). The effect hot temperature differs from that of cold temperatures, even though both extreme heat and extreme cold can cause health challenges. The increase in mortality following extreme cold climates is longer lasting. (Shor & Roelfs, 2019, p. 1)

Extreme climates can equally adversely affect children's health and their involvement in physical activity. Extreme temperatures, extreme cold or extreme heat has adverse effects on the physical activities of children and adults. (Morrison, 2022, p. 1) It affects leisure and professional physical activity (Wald & Demorest, 2022, p. 390). As weather patterns become more extreme, it becomes difficult for children to tolerate them (Morrison, 2022, p. 1); the same is true for adults. The intensity and quality of physical activity and even the motivation to be engaged in physical activity can be influenced by weather conditions (Wald & Demorest, 2022, p. 388).

Adverse and unfavourable weather conditions often affect people who engage in professional and recreational physical activities. Participation in sports is integral to life (Wald & Demorest, 2022, p. 388). They deter physical activity. People perform less physical activity when faced with extreme climates. These temperatures reduce or modify

physical activity behaviours, the time physical activities can occur, where they can occur, and the activity's intensity. For professional athletes, extreme climate affects the timing of their activity, the amount of time dedicated to practice, and their overall performance. Extreme temperature result in unfavourable changes to schedules, location of physical activity and its intensity. (Wald & Demorest, 2022, p. 390) For migrants who move from hotter climates to cooler ones, the extreme cold becomes a deterrent to exercises and other outdoor physical activities as their bodies adjust to new climates and temperatures. Moving from warmer to colder climates causes adjustments in physiological, psychophysical, behavioural, and social patterns, often unfavourable. (Shor & Roelfs, 2019, p. 2). Extreme climate even affects the schedules of major sporting events to ensure safety. In the many affected countries, sports practices and individual training sessions are moved to safer locations or are held when temperatures are safer. Sports professionals recommend modifications of events or individual workout duration, changes in practice or training sessions or modifications of workouts. These modifications include frequent breaks, pre-cooling, and hydration measures during workouts or events. The use of new technology like road surfacing and other playing surfaces that reduce the effect of extreme temperatures, the strategic location of playing areas and risk reduction strategies at the individual level are suggested. (Wald & Demorest, 2022, p. 388)

Global threats to mental health today include climate crises (World Health Organization, 2022, p. 10). Low mental wellbeing is related to reduced exercising and other physical activity which can be caused by extreme temperatures (Shor & Roelfs, 2019, p. 2). Some migrants moving from warmer climates to extreme cold temperatures reported that exercise and other physical activity were promoted more in their home country (Shor & Roelfs, 2019, p. 2). They participated in activities such as cycling and walking, whereas in cooler climates, they are often forced to drive because of the weather conditions. People who move from warmer to colder climates often change from more physically active jobs to sedentary ones in the host community (Shor & Roelfs, 2019, p. 2). This affects their level of physical activity (Obradovich & Fowler, 2017, p. 1). Furthermore, immigrants from colder climates that transfer to other cold countries are often well equipped for the weather conditions. In contrast, those from hot climates are often unprepared for the temperatures. The former is more likely to have acquired experience with winter sports such as skiing and ice skating and are also more likely to have the proper equipment,

while the latter does not. (Shor & Roelfs, 2019, p. 2) Alternatively, immigrants who grew up in warmer climates are likely less used to and educated about the dangers of cold winters and might thus underestimate them. They may not be ready for extreme cold weather and are less likely to have appropriate coats, boots, or thermal wear. Purchasing the proper winter gear can be particularly difficult when children are involved. Children can rapidly outgrow their clothing. Since migrants from developing countries tend to have more children, there is also likely to be a more significant financial burden. Immigrant parents, who often lack sufficient financial means, may therefore fail to provide children with appropriate gear, leading to both more significant health risks when children play outside and a potential lack of adequate physical activity. (Shor & Roelfs, 2019, p. 2)

Furthermore, immigrants from warmer climates often have darker skin, their body features, culture and clothing are often different from that of the host country's'. These make them stand out in crowds, and in many cases, they can suffer social discrimination, exclusion and have difficulty finding jobs, getting equal social and economic opportunities and difficulty assimilating. (Shor & Roelfs, 2019, p.2) Social isolation, distancing, and loneliness have significant implications for psychological symptoms including depression, anxiety, and reduction in their quality of life (Pears et al., 2021, p. 179). Extreme cold climates also make it difficult to go out and meet with friends especially since migrants from warmer climates are not used to the cold. This reduces their levels of social interaction (Shor & Roelfs, 2019, p. 2) causing isolation and distancing (Pears et al., 2021, p. 179).

Adapting to climate change involves reducing the extent of exposure and vulnerability. It also involves adequate preparation and building resilience in an event of extreme climate events. The effects of adverse climate should be taken into consideration during national planning and by international corporations (Adger et al., 2020, p. 398). As a result of escalating climate change, institutions and policies should be established and developed to combat the problem of adverse climate effects. These could reduce the costs associated with the unfavorable effects of adverse climates on health and the economy. Countries and governments can help to reduce the effects associated with adverse climatic conditions, provide infrastructure and services that would aid adaptation process. (Adger et al., 2020, p. 396) These policies can even facilitate adaptation to extreme cold allowing

people to carry out their regular everyday activities (Adger et al., 2020, p. 396). Climate related risks cannot be completely eliminated (Schwerdtle et al., 2018, p. 2). Advances in heating, ventilation and air conditioning technologies have contributed significantly to adaptation to frigid conditions, improving the indoor thermal environment (Luo et al., 2018, p. 262).

Physical activity and adverse climates are factors affecting mental health. Climate crises have a detrimental effect on health. (Lawrance et al., 2022, pp. 443–444) Temperatures are important to mental health, and so is changing temperature due to immigration, especially in cases of extreme temperatures. Moving from warmer to cooler climates is associated with a negative effect on health and mental wellbeing. (Shor & Roelf, 2019, p. 2) Child physical activity can be affected by climate change. This affects the type of activity the child carries out. This can also be true for adults (Morrison, 2022, p. 22) Physical activity in hot temperatures could result in heat-related illnesses compared to cooler temperatures as their body temperatures rise from their physical activity (Morrison, 2022, p. 6). Extreme cold can become a deterrent to leisure and professional physical activity (Shor & Roelf, 2019, p. 2). People find it difficult to go out in frigid climates. Immigrants who move to countries with similar temperatures have significant health advantages. However, this is not true for immigrants who move from warmer to colder climates. (Shor & Roelf, 2019, p. 8) The migrant population often suffers a significant degree of mental health challenges. Health professionals seeking to assist individuals need to consider the language barrier of these immigrants and, in many cases, may need to work with interpreters as well as be sensitive to the difference in culture and background in the process of their diagnoses and delivery of their services.

In addition, screening migrants and providing intervention services for mental wellbeing-related issues, professionals need to be sensitive to individuals' background, families and their resettlement trends (Rousseau & Frounfelker, 2019, p. 1). There exists an interrelationship between climate change, migration, mental wellbeing and physical activities. Climate change, particularly in extreme temperatures like the move from warmer climates to colder ones, negatively affects physical activity (Morrison, 2022, p. 6); this could result in prolonged mental wellbeing challenges. Migration is a risk factor for adverse mental health conditions, and the same is true for adverse climate change.

## **2. STUDY OF PHYSICAL ACTIVITY AND MENTAL WELLBEING OF AFRICANS IN ESTONIA**

### **2.1. Research Design**

The study adopts quantitative methods. Quantitative research methods involve using deductive reasoning to answer the research questions in a study. The data under this kind of research method is often quantitative in nature. (Atmowardoyo, 2018, p. 197) Quantitative methods are used to analyse data in the study. This method allows the researcher to explain quantitative data (Atmowardoyo, 2018, p. 197). The study is quantitative in nature and specifically adopts the correlational research design. Research design involves using guidelines and procedures that are evidence based to form a framework for carrying out a research study (Majid, 2018, p. 1). The type of research design chosen is often dependent on the type of study embarked upon, the research questions, objectives of the study, the study population, and the sampling type. The integration of all these components determines the study design. (Majid, 2018, p. 1). Correlational research design is used to measure relationship between two or more variable, to investigate the extent of the relationship that exist between these variables (Seeram, 2019, p. 176). To understand the nature of the relationship between migration from hot to cold climates, physical activity, and mental wellbeing the study deems it fit to adopt the correlational research design.

The study population of interests are Africans living in Estonia. The population of the study is the entirety of the target group the research intends to study (Majid, 2018, p. 3). In some cases, it is not feasible to use the entire population (Majid, 2018, p. 3) hence the use of sample sizes. The sample type is purposive sampling. A purposive sample has its characteristics defined for the purpose of the study (Andrade, 2021, p. 87). This sampling type is important especially in cases where the outcomes are affected by socio-cultural factors (Andrade, 2021, p. 86). The study uses purposive sampling as it allows the

researcher to choose the sample based on its relevance to the study (Andrade, 2021, p. 86). The purposive sampling size allows the researcher choose Africans in Estonia. The researcher chooses this group because of ease of collecting data as the researcher is an African immigrant in Estonia and can relate with issues facing mental wellbeing and physical activity. They also represent the group of immigrants moving from hot to cold regions in Estonia (Statistics Estonia, 2022). According to Statistics Estonia (2022), in 2021 there was 227 people who immigrated in Estonia from Africa (see Table 1). Legal entry into Estonia and temporary stay in Estonia is regulated by Aliens Act (2010, § 43). A temporary residence permit is issued with the period of validity of up to five years (Aliens Act, 2010, § 119). From 2017–2021 the net migration was 932 persons.

**Table 1.** Immigration, emigration and net migration of Africans in Estonia in 2017–2021

	Immigration	Emigration	Net migration
2017	109	6	103
2018	225	16	209
2019	321	41	280
2020	171	45	126
2021	277	63	214
Total			932

Source: Statistics Estonia, 2022

Sample size is calculated on the net migration using Taro Yamane sample size formulae (Uakarn et al., 2021, p. 78) which results in a sample size of 280 respondents. Find calculations below:

$$n = N / (1 + N(e)^2)$$

where  $n$  – the sample size,

$N$  – the population under study,

$e$  – the error term of 0.05.

$$n = 932 / (1 + 932(0.05)^2)$$

$$n = 279.87$$

Although 280 was the sample size responses collected was 504 responses of these 273 where fully filled without missing variable, thus 273 responses where used. The data type is primary data, and the instrumentation for data collection is questionnaire.

Questionnaire is one major method of collecting primary data. It can be used to collect data from a wide range of individuals in a standardized way. This allows the data to be consistent and understandable, allowing for analysis and interpretation. (Roopa & Rani, 2012, p. 273). They allow the privacy of the respondents to be maintained while other findings are still useful. The questionnaire contains closed-ended and open-ended questions. The respondents are African living in Estonia, a representative sample of migrants from hot to cold climates in Estonia. Questionnaires are distributed online using the Lime Survey platform. The links was shared on African groups on social media relate to Estonia: Facebook, Instagram, the Facebook group for the association of African students in Estonia and other social media African group pages. The questionnaire was opened on the 27th of March 2023 until 7<sup>th</sup> of April. The questionnaire (see Appendix 1) scale used was be adopted from Ng Fat et al. (2017. p. 1144) and Ghrouz et al. (2018). The Warwick–Edinburgh Mental Wellbeing Scale (WEMWBS) measures mental wellbeing (Ng Fat et al., 2017. p. 1144). These scales were chosen because they provide a holistic view of mental wellbeing. The International Physical Activity Questionnaire (IPAQ) measures physical activity (Ghrouz et al., 2018). This scale was used as it took into consideration most of the physical activities engaged in Estonia.

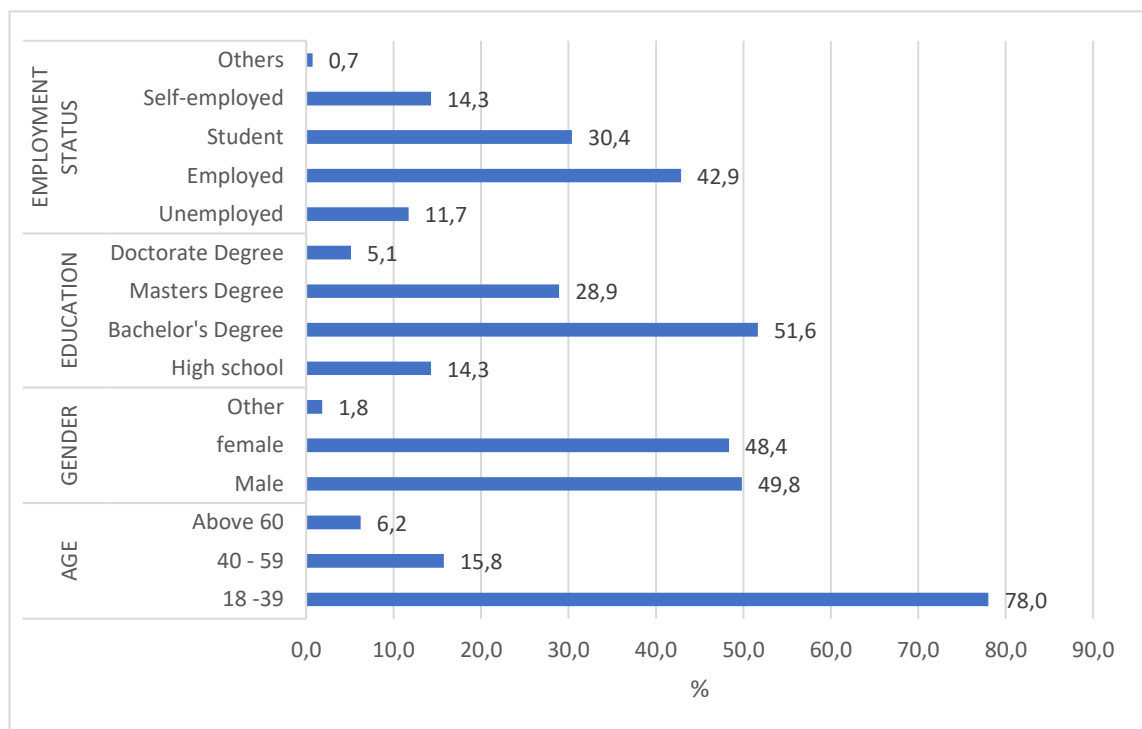
In the analysis of data SPSS version 25 was used to calculate correlations and frequencies. The charts where however extracted on excel 2016. Descriptive statistics and correlations significant at a *p*-value less than or equal to 0.05 was used to analyse all closed ended questions; content analysis was used to analyse all open-ended questions.

## **2.2. Results**

### **2.2.1. Statistical analysis**

This section shows the results of the responses collected from respondents. This section shows frequency tables of the demographic data, the descriptive statistics of question relating to mental wellbeing, physical activity and migration from hot to cold climates. Data for Africans living in Estonia was collected and sorted for only respondents who migrated from the hot regions of Africa to Estonia. 273 responses was used.

The Figure 1 present information on the demographic data of all respondents in the study. The figure contains demographics of the number of respondents gender, age, employment status and level of education. Three categories were outlined in the gender column. Majority of the respondents were males, 49.8%. Females were 48.4% and those that did not identify as male or female who chose the option ‘other’ were 1.8% of the population. The difference between the male and female respondents was really small. The results showed almost equal percentage of both males and females.

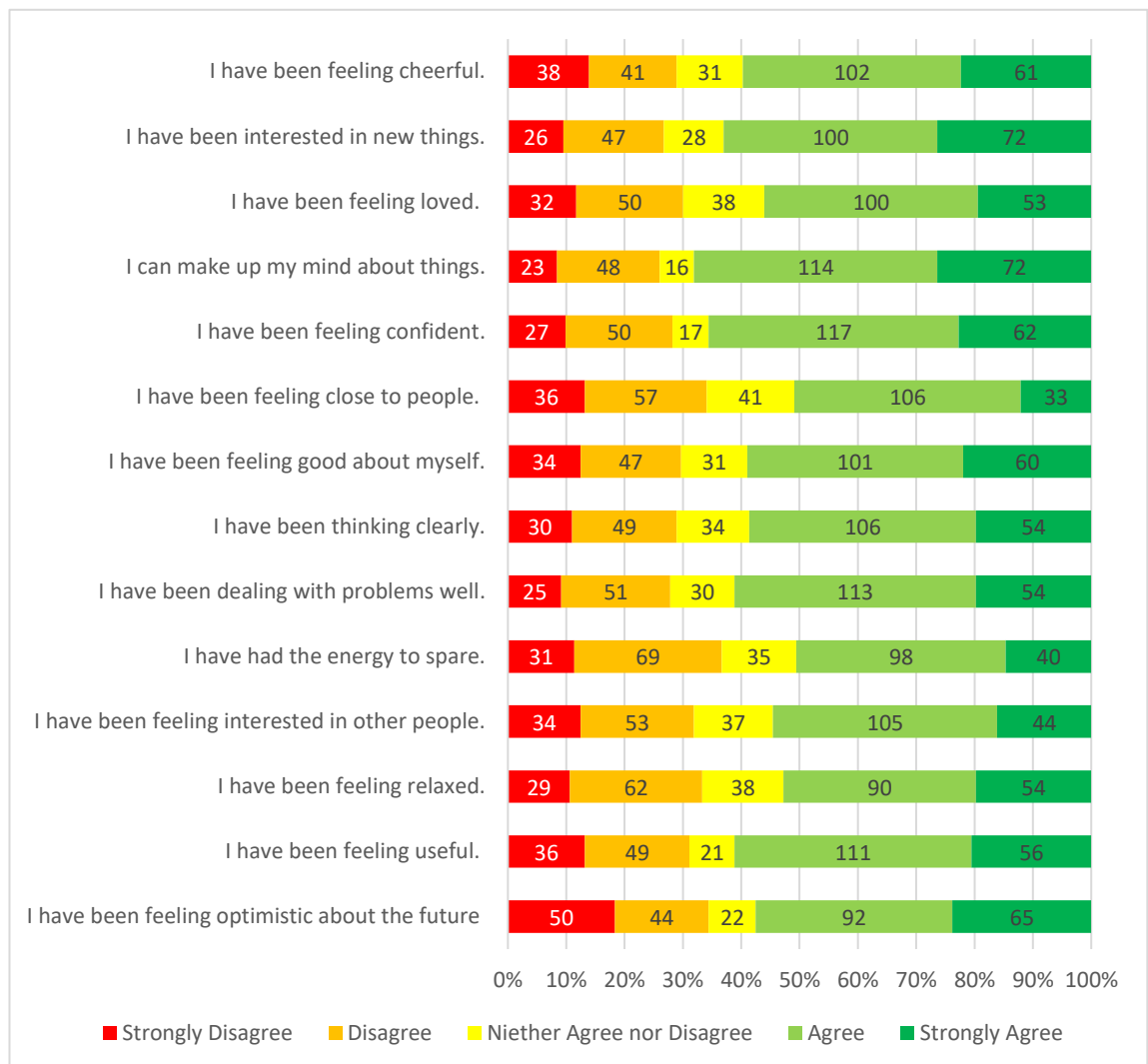


**Figure 1.** Demographic data of respondents, N = 273

The ages of the respondents ranged from 18 to respondents above 60. 6.2% of respondents where above 60, 15.8% of respondents ranged between 40 and 59, while 78% of respondents fell within the age range of 18 and 39. Therefore, majority of the respondents were young people. 51.6% of the respondents possess a bachelor’s degree, 28.6% had a master’s degree, 14.3% had high school certificates and 5.1% had Doctorate degrees. The implication is that the sample respondents could understand the information given to them on the questionnaire. 42.9% of respondents stated that they were employed, 3.4% of participants where students, 11.7% where unemployed, 14.3% of respondents where self-employed and 0.7% identified as ‘other’ not fitting into any of the categories. From the

figure above, the respondents were gainfully engaged, which would affect the state of their mental wellbeing, the respondents understood what the questionnaire evaluated as they all had some level of education, majority of the respondents were young people ranging between 18 and 39. All respondents who filled the questionnaire are currently living in Estonia.

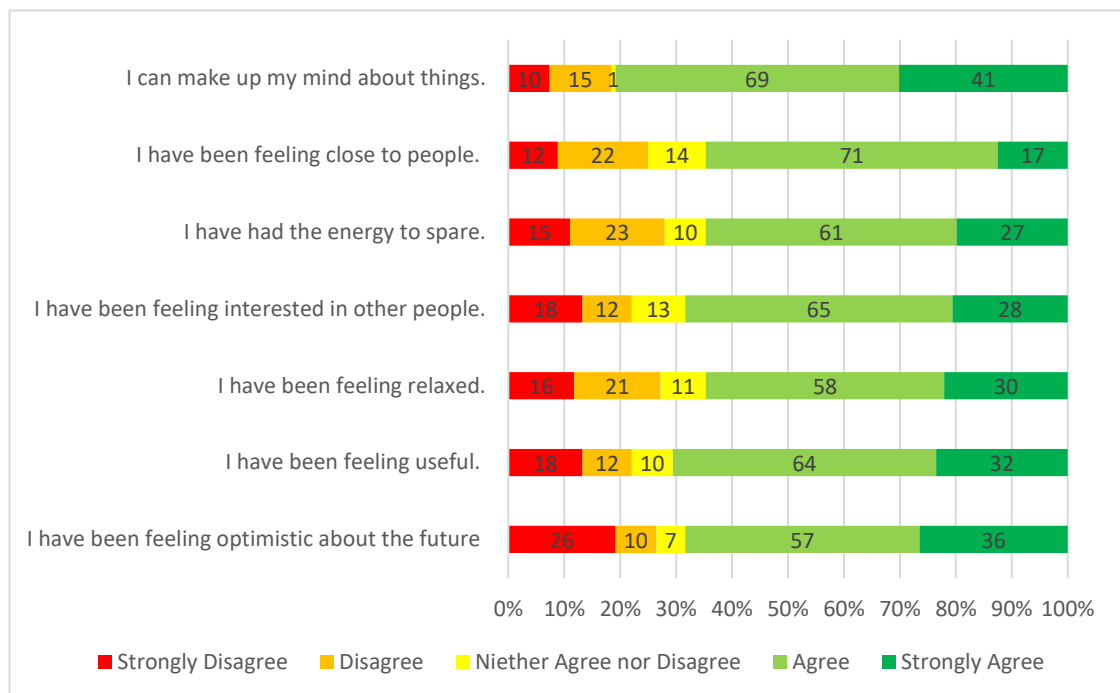
The Figure 2 shows the responses of all participants in the survey ranging from strongly disagree, disagree, neither agree nor disagree, agree to strongly agree. The figure shows the response for each category for all questions measuring mental wellbeing since moving to Estonia. 14 questions were used to measure mental wellbeing of the respondents. Bar charts were used as the pictorial representation of the information.



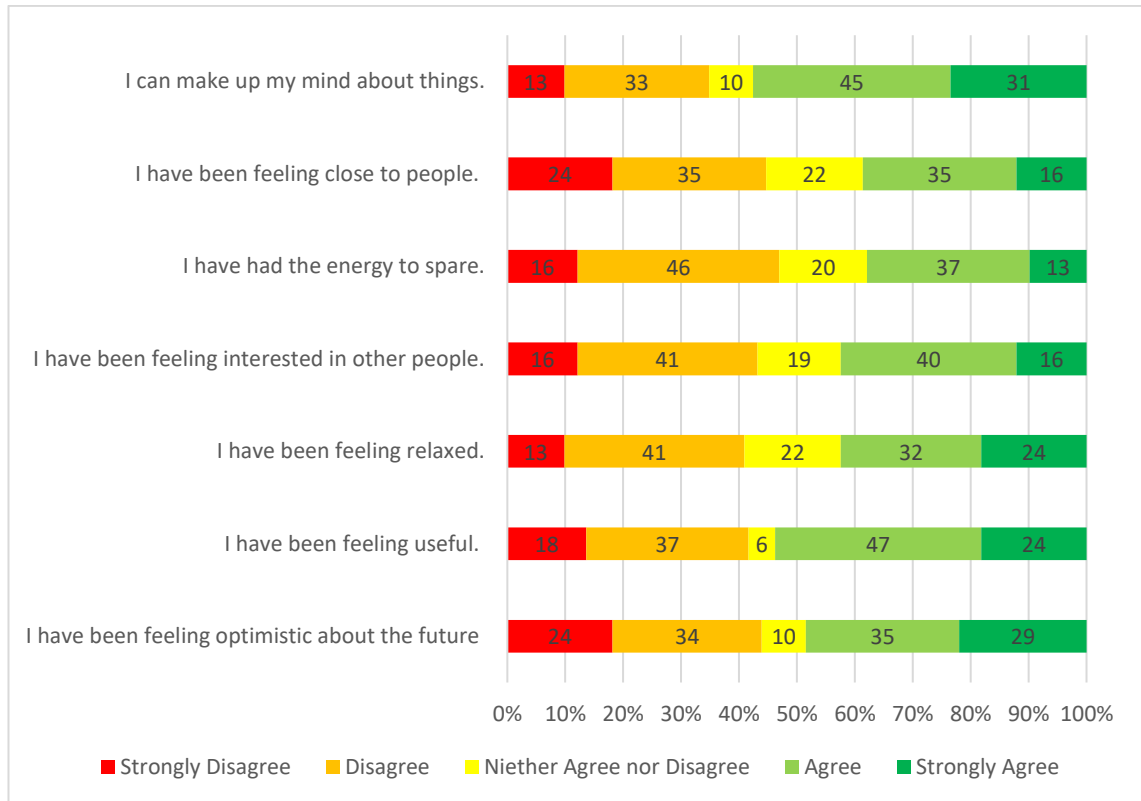
**Figure 2.** Respondents' mental wellbeing since moving to Estonia, N = 273

Respondents were mainly positive, agree or strongly agree. The most positive statement was “I can make up my mind about things” making 68.1% responses in the affirmative. 179 respondents replied positively to having confidence and 172 respondents attest to their interest in new things.

As demonstrated in Figure 3 and 4, the males have greater frequencies of those answering in the affirmative. 34.8% of female respondents had negative replies whereas for the males, only 18.9% of respondents had negative replies. While many of the respondents considered themselves decisive people, the male respondents were more decisive than the female respondents. 7.6% of respondents were neutral. This percentage was really small. “Have been feeling confident” and “I have been interested in new things” were statements with higher percentages following respondents’ ability to be decisive. Their confidence and interest in new things are an attestation to their healthy mental health and wellbeing.



**Figure 3.** Respondents’ mental wellbeing for males since moving to Estonia, N = 136



**Figure 4.** Respondents’ mental wellbeing for females since moving to Estonia, N = 132

Respondents agreed to having energy to spare. This question also has the highest number of respondents that disagree to the assertion. 36.6% of the respondents answer this question negatively while 35 of the respondents were indecisive with regards to this question. This was applicable to the general group for both male and female respondents. Looking at the frequency for male and female respondents. This question also carried the highest frequency for disagree the measurement of mental wellbeing being 28% and 47% respectively under. This was not the case for just male respondents but even female respondents recorded high number of respondents that had little energy to spare. The male respondents had lower percentages disagreeing than the female respondents.

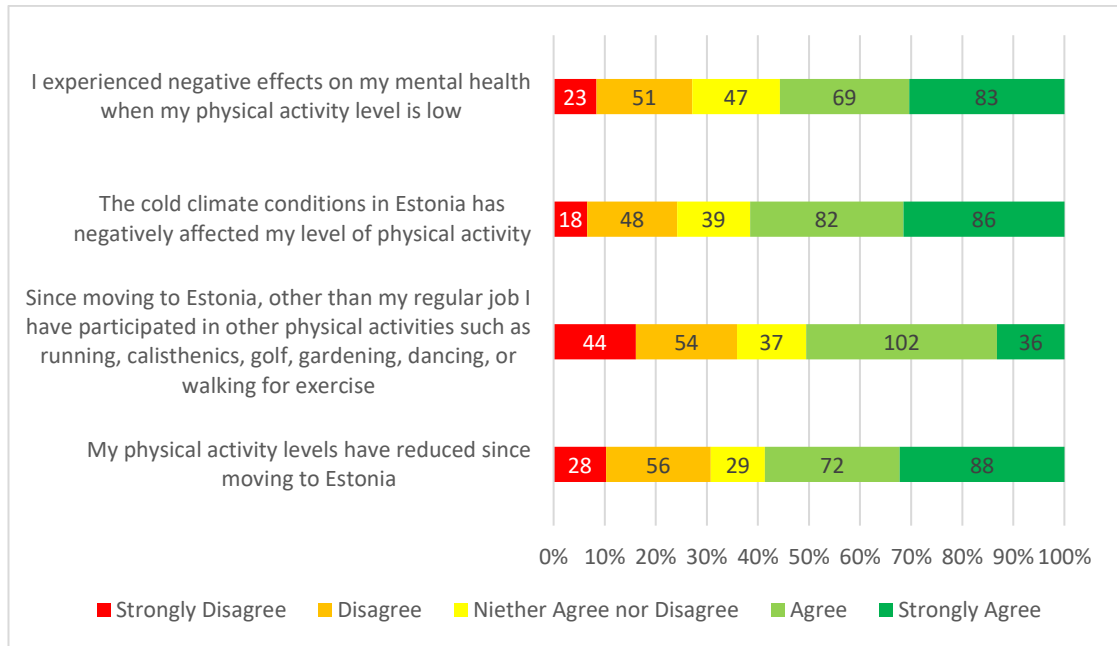
Overall, the mental health of Africans in Estonia is in good state although it could be better. They are optimistic about the future, they feel useful, are interested in new things, are decisive and confident. These characteristics had the highest number of positive responses. A significant percentage being 36.7% of the respondents did not seem to have energy to spare and were focused on their personal lives, the data also showed that a significant number of the respondents were not feeling close to other people.

Figure 3 and 4 above show the results of respondents' mental health when frequencies are calculated according to the respondents' gender. The pictorial representations above indicate that the male respondents seem to have more mental stability with higher levels of mental wellbeing. The female respondents record higher numbers of respondents disagreeing to their ability to make up their minds about things, feeling close to other people, having energy to spare, feeling interested in other people, feeling relaxed, feeling useful and feeling optimistic about the future.

Female respondents answered negatively when asked if they had been feeling close to other people. 44.6% of the female respondents disagreed to this assertion while 37.5% of the males agreed when asked same question. The male respondents however had 65% of male responded responding in the affirmative to their feeling close to other people. Female respondents also responded negatively when asked whether they had energy to spare. 47% of the female respondents responded negatively while 50 female respondents had positive replies. Male respondent however had higher number of affirmative answers to this question.

Generally, the male respondents seemed to be in better mental state than the female participants. Large differences exist between male responses to being able to make up their minds about things, feeling close to other people, having energy to spare, feeling interested in other people, feeling relaxed, feeling useful and feeling optimistic about the future, with response moving in the positive direction whereas for the female respondents, more negative replies are seen as shown on figure 4.

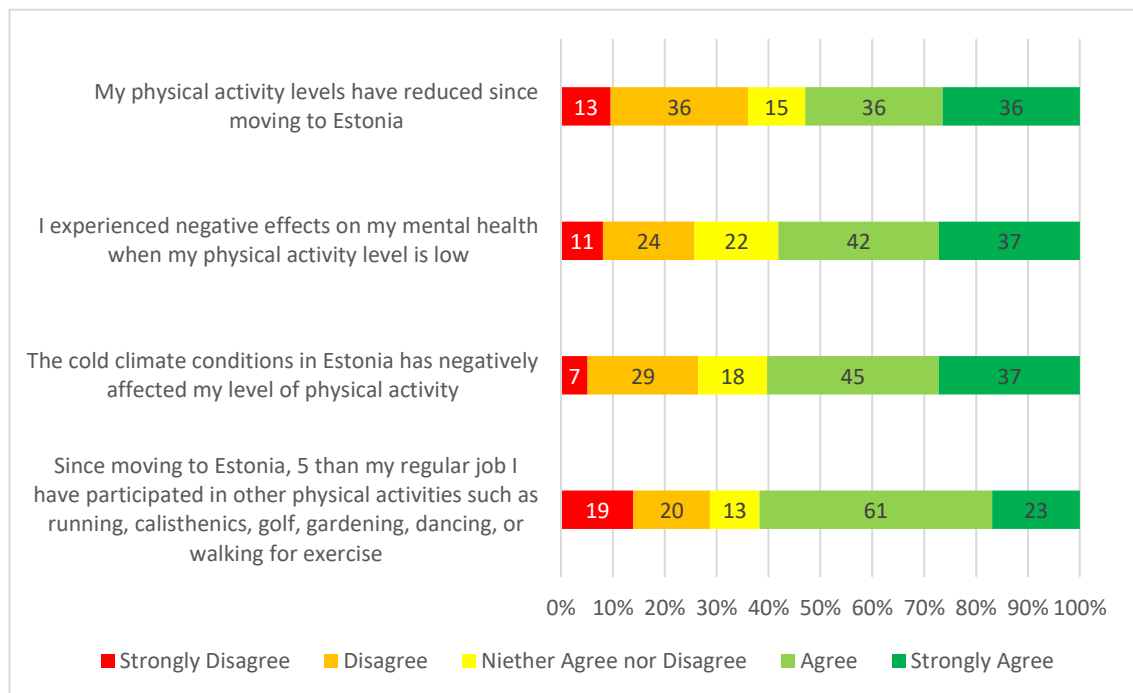
The Figure 5 represents the change in activity of Africans in Estonia with the change in climate conditions. The responses of respondents indicate that the cold climates are negatively affecting their physical activity in Estonia as opposed to the physical activity in their home country. The Figure 5 detailed the responses of respondents for each statement. Figure 5 showed that the physical activity of participants had been heavily affected by the change in climate conditions. A large number of respondents reported low physical activity level with changes in the climate conditions. The cold affected their activity level however respondents did engage in some physical activity aside their regular jobs.



**Figure 5.** Respondents' Physical Activity since moving to Estonia, N = 273

Respondents feel negative effects on their mental health when their physical activity level is low, 55.6% of respondents agreed or strongly agreed with that their mental wellbeing declines with reduced levels of physical activity. 74 respondents did not agree to this assertion. 47 respondents could not decide how physical activity affected their mental health. The highest number of indecisive responses was found when this question was asked. No difference was seen in the responses between the males and the females. Both groups seem to have similar responses to the question. The question with the highest number of positive responses. Respondents had the highest number of positive responses when asked if the cold weather affected their level of physical activity. 168 respondents agreed to this assertion while 66 responses replied negatively to this assertion. Furthermore, to substantiate the claim that the cold weather affects their physical activity levels, many respondents, responded positively when asked if their physical activity levels had reduced since moving to Estonia. 160 respondents agreed to this assertion. Coming from a country with relatively warm climates, the cold affected the respondent's ability to carry out physical activities as many of these activities would require having to leave their homes and because the climate differs from that of their home country the effects for Africans in Estonia is extreme.

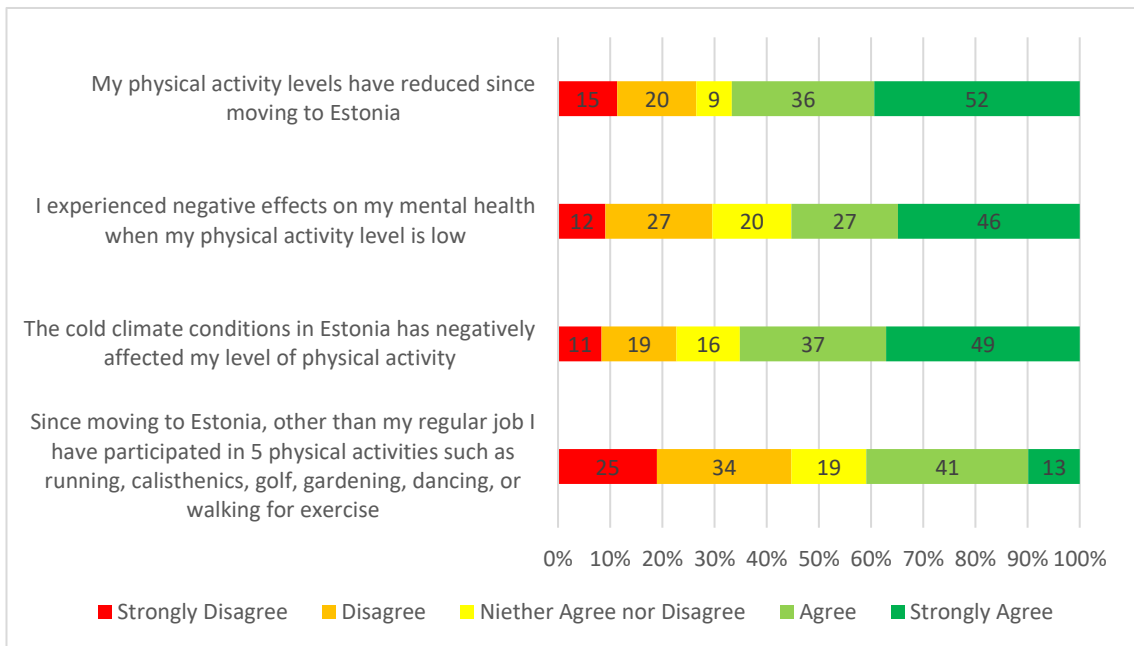
Following Figure 6, male respondents were less affected by the cold climates than the female respondents as 60% of the males agree to being affected by the climates while 65% of females agree to this assertion. The males also had a larger number of respondents being 62% of respondents agreeing to involving in other physical activities other than their day jobs. This question also had the highest number of positive replies for the males. The males had involved themselves more in other physical activities aside their day jobs since moving to Estonia. Following this question is the affirmative reply of respondents to the negative effects of the cold climates on the physical activity of respondents. Even though overall the males agreed that the cold weather affected their physical activity levels they equally had high percentage of respondents (28%) disagreeing to this question in comparison to other questions in this set of questions. Apparently, they could adapt better to the cold climates that the females hence their participation in other physical activities aside their day jobs.



**Figure 6.** Respondents' Physical Activity since moving to Estonia for Males, N = 136

Figure 7 shows the responses of female respondents the questions in the graph. The female respondents did not engage in other physical activities aside their regular jobs. 44.6% of respondents disagreed to this assertion while 41% of respondents agreed to this. Even though the respondents did not involve themselves in other activities aside their day

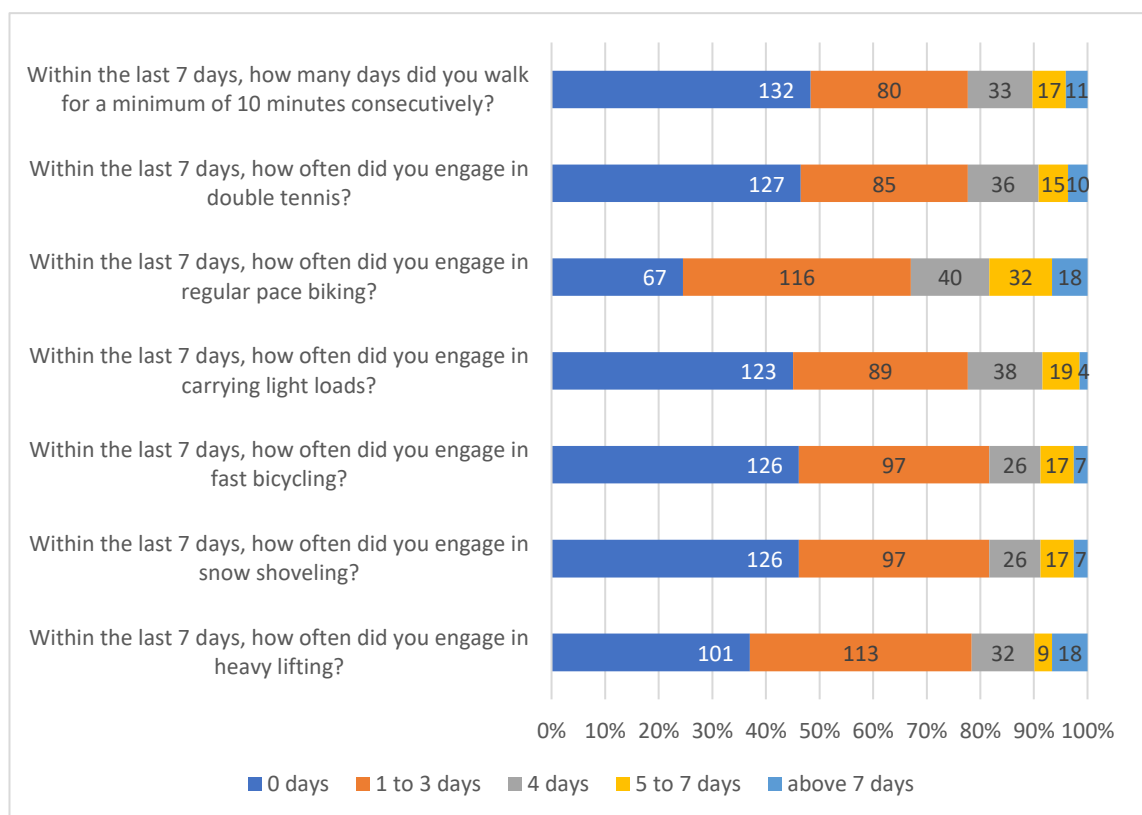
jobs, the difference in the number of respondents was relatively small. The most positive replies was when respondents were asked if their physical activity had reduced since moving to Estonia. Above 75% of respondents agreed to this assertion. Overall, the males are more physically active and adapted better to the cold climates than the female participants.



**Figure 7.** Respondents' Physical Activity since moving to Estonia for Females, N = 132

Figure 8 show the respondents physical activity levels per week. The section addresses seven statements, listing various types of physical activity and the number of times respondent engaged in this activity in the past seven days. As illustrated in Figure 8, African residing in Estonia have very low physical activity levels. They barely engaged in any physical activity. The activity most engaged I was regular pace bicycling. 75.4% respondents engaged in regular bike pacing at least once a week with a maximum of everyday in the week. Even though 206 respondents engaged in regular bike pacing the majority of the respondents only go bike pacing one to three days in the week. 116 respondents go regular bike pacing one to three days in the week while 90 respondents spend at least 4 days in the week on this activity. Despite the large number of respondents that participate in this event only 90 of them carry out this activity for up to an average or 4 days in the week. The rest of the respondents fall below average or do not involve themselves in this activity at all. The physical activity with the most frequency following

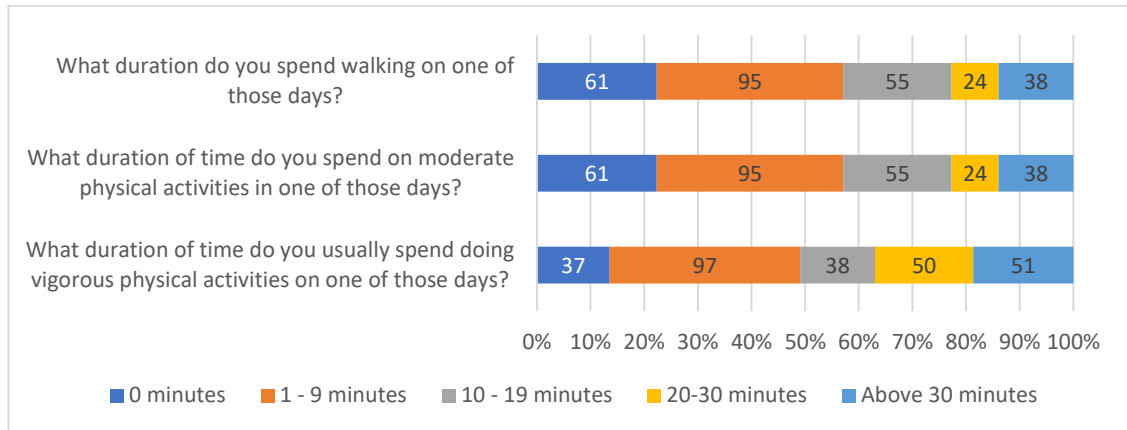
regular pace biking is lifting heavy weights. 172 respondents involve themselves in carrying heavy weights. More male engaged in this exercise than female respondents. 92 of 16 male respondents involved themselves in this activity, 75 female respondents involved themselves in this activity. Despite the large involvement in this activity, only 59 respondents were involved in this activity for an average of 4 days and above within the week. Going snow shovelling and fast bicycling had the lowest number of respondents who engaged in the activity for an average of 4 days and above. In both cases, only 60 respondents were involved in this activity above an average of 4 days, however participant living in flats may not need to be involved in snow shovelling this accounts for the limited number of participants involved in snow shovelling. Snow shovelling had more male participants involved in this activity than female participant, still the numbers for those that did not involve themselves in snow shovelling at all was high for both the males and the females. A total of 126 respondents did not involve themselves in snow shovelling. Double tennis is a common sport among Africans in Estonia, still more than 40% of respondents did not engage in this sport within the last 7 days.



**Figure 8.** Respondents' Physical Activity Duration per Week, N = 273

Generally, the physical activity involvement of respondents was very low and below the world health organizations recommended levels of 150 minutes per week. Respondents were barely involved in any physical activity and for those which they were involved in they barely spent an average of 4 days a week on the activities. The number of days used in carrying out physical activity for Africans in Estonia was very small and generally below average for all activities listed in the questions both for male and female respondents. Still respondents maintained mental wellbeing above average.

Figure 9 show the frequency of the time respondents spend on physical activity per day. This section has three questions within it. The bar chart below (Figure 9) depicts that respondents spend little time on physical activity when they decide to engage in it. Only few individuals have high physical activity levels. The question with the most positive response was “what duration of time do you usually spend doing vigorous physical activities on one of those days?”. 51% of respondents engaged in vigorous physical activity above 10 minutes in a day. however, the time spent on physical activity become almost insignificant when compared to the number of days in the week respondents spend on this activity as the majority of respondents spend one to three days in the week on any physical activity which is below average. Respondents engaged in vigorous and high intensity physical activity however, that did not spend sufficient time or number of days on this activity. Figure 8 also shows a high number of respondents being 63.9% of respondents involving in Heavy lifting at least one to three days in the week, an activity that can be categorised as high intensity or vigorous physical activity. For instance, respondents who spend 10 minutes on vigorous physical activity for three days in the week would have accomplished a total of 30 minutes of vigorous physical activity every week which would still fall below average. Thus, taking into consideration the number of days per week respondents spend on physical activity, it is the amount of time spent on physical activity becomes almost insignificant when the number of days spent doing this physical activity becomes added to the equation. Respondents did not spend up to 10 minutes walking consecutively every day. neither did they spend sufficient time on moderate physical activities. When asked what duration of time respondents spend walking every day, 156 respondents responded to less than 10 minutes per day. a high number of respondents had equally agreed to walking less than 10 minutes in a day consecutively.



**Figure 9.** Respondents' Physical Activity Duration per day, N = 273

The data also shows that the weather adversely affects their physical activity levels. With the extreme climate conditions respondents feel less motivated to engage in physical activity especially those involving outdoor activities.

Pearson Correlation between mental wellbeing and current physical activity was very weak (0.099,  $p = 0.044$ ). Therefore, low physical activity after migration from hot to cold regions does not affect mental wellbeing. Current physical activity and changes in physical activity due migration form hot to cold climates are positively correlated, but this correlation also very weak (0.152,  $p = 0.012$ ). Mental wellbeing and changes in physical activity due to migration are negatively correlated, and again this correlation is very weak (-0.192,  $p = 0.001$ ).

### 2.2.2. Content Analysis of Open-ended Questions

This section analysis the open-ended questions in the questionnaire. Respondents were asked five open ended questions. Replies of the respondents were analysed using content analysis. Words that describe mood, state of mental wellness was analysed for the number of times used by different respondents, description of respondents' state of mind, effect of the changing weather on their daily activities, their mental wellness and the levels of physical activities was analysed. Context was also taken into consideration by the researcher. Context in the use of words. The content analysis allowed for respondents to express themselves and tell, their stories and factors affecting them.

Respondents when asked to list the changes to their mental health with reduced levels of physical activity “none” appear 50 times in text, other respondents implying that there were no changes to their mental health replied with “no changes” which appeared 7 times in this section, 2 respondents replied with “N/A” meaning ‘not applicable’, one respondent indicated that they had paid no mind to his mental health while exercising. Respondents also reported negative effects of reduced levels of mental health with reduced physical activity, they reported the presence of mental stress from 11 respondents, mental sluggishness from 14 respondents, overthinking from one respondent, depression from 10 respondents, difficulty sleeping from 3 respondents, reduced energy levels from 7 respondents anxiety from 5 respondents, 9 respondents reported sadness, 15 respondents reported being agitated with reduced levels of physical activity. 8 respondents reported being disconnected from their environment, 3 reported frustration, 12 respondents indicated that they were uninterested in explaining. Two respondents reported that they were fine and reduced levels of physical activity did not affect their mental health. In general, 78% of the respondents reported no changes to their mental health when their physical activity levels were low. Although they were still respondents who said they had paid no attention to this and could not tell. Other respondents responded with negative effects such as depression, anxiety, disconnection from environment, frustration, sadness, the feeling of being agitated, difficulty sleeping among other factors.

Respondents also reported changes to their physical activity habits with changes in the weather. With migration from the hot regions of Africa to cold regions, participants reported changes such as inability to go out, due to the cold, the cold weather limited their movement, 10 respondents used sentences like reduced work hours, less physical activity, 4 reported that the cold weather made them feel lazy to engage in any physical activity. For 5 respondents the cold did not allow for long distances walks or running, 127 respondents reported that the weather made it difficult to walk to the gym, or engage on outdoor physical activities, some respondents that the extreme weather made it difficult to carry out any type of exercise at all both indoor and outdoor. they used phrases like ‘reduces movement’ ‘can’t go outdoors’, ‘no outdoor activity’ among others to describe their inability to go out to the gym, run or walk during extreme weather events. Four respondents reported being sick during the cold, 2 reported sluggishness, 33 respondents

reported that the cold didn't affect their physical activities. Of the 33, three of the respondents had pointed out that this was because even without the whether they engage in very little physical activities and their jobs were sedentary. 4 respondents had reported that they could not tell how the cold affected their physical activity.

When respondents were asked what limits their participation in physical activity, 111 respondents replied that the weather limited their participation in physical activities using phrases like cold weather, inability to walk in the snow and cold climate, 6 respondents report fatigue as a barrier, 2 report language barriers making it difficult to communicate, 10 reported difficulty accessing sporting facilities, of that 10 respondents, five of them said their inability to access the facility was because of the cold weather, 16 respondents reported that they lacked motivation to engage in sporting exercises, 50 respondents said they faced no obstacles. the major obstacle faced was the weather, it did not allow respondents to engage in outdoor activities, and makes having to access facilities difficult for respondents. 16 respondents also reported lack of time to engage in physical activities as a major obstacle to their engaging in physical activities.

In this section respondents were required to list the changes they had noticed to their mental health before migration. 4 respondents reported anxiety disorders, 2 respondents reported being extroverted and jovial before moving to Estonia, 2 respondents reported being more attentive, 2 respondents reported being more physically active, 14 respondents reported feeling connected to people and felt home 4 reported being optimistic, 2 reported being happy. two respondents also reported stable mental health, one reported being more confident prior migrating to Estonia, 77 respondents reported that they were no changes to their mental wellbeing prior migration using words like none, no changes, nothing. 3 respondents were unwilling to talk about it. Respondents also reported negative effects on their mental state prior migrating to Estonia. 4 respondents reported that their mental health was in bad states prior migration, 4 reported insecurities, 5 reported over thinking, respondents also listed sadness as one of the ways they felt before migration. One respondent had particularly stated that his mental health had improved after leaving his home country.

After being asked what changes respondents noticed to their mental health prior migration, respondents were asked the changes they noticed post migration. Words such

as 'lonely', 'isolated', 'alone', where used by respondents to describe the kind of changes noticed. This appeared 19 times in this section, respondents also reported being less communicative and quiet. 10 respondents reported that their depression levels had increased, 11 reported feeling disconnected from society and 4 respondents reported feeling anxiety. Respondents also reported positive effect post migration. They felt better about their achievements, less panic attack, they felt more confident than in the past. Many respondents reported the general feeling of being happy. Some respondent reported that they were unwilling to answer while others reported noticing no changes. Respondents also reported not taking note of these changes, hence their inability to compare prior and post migration.

### **2.3. Discussion and Recommendations**

This section discusses the findings of the study and compare the results with the findings from the literature.

Pearsons' Correlation was used to determine how physical activity affects mental wellbeing. The correlations for physical activity and mental wellness were very weak. Invariably, there is no association between physical activity and mental wellbeing. Following the descriptive data, Africans in Estonia are mentally stable. Their responses showed good mental health and stable mental wellbeing even though it could be better. They also showed very low levels of physical activity. They barely engaged in any type of physical activity and the results of the descriptive statistics measuring the days and time they spent on physical activities showed that respondents carried on sedentary lifestyles. Although the physical activity levels of Africans living in Estonia were relatively low, respondents still had stable mental wellbeing. The implication is that their good mental state was not a result of their physical activity levels.

This is similar to Bell et al (2019, p. 1) findings on physical activity, mental wellbeing and mental disorder in adolescents. The study found no relationship between mental wellbeing or mental disorder and physical activity. They however did find connections between high intensity physical activity and emotional problems. They also posit that physical activity has the potential to positively affect mental wellbeing in adolescence. Their studies are similar to our findings. Using correlation, the association between

mental wellbeing and physical activities very weak. Like in Bell et al. (2019, p.1) study, the researcher also finds the male respondents to have better mental wellbeing than the female respondents. The results from Bell et al. (2019, p.5), showed that female respondents had poorer mental wellbeing and were most likely to be affected by mental disorders. Female respondents showed lower levels of mental wellbeing even though their level of mental wellbeing was a little above average. The male respondents were in better mental states. There was very limited studies on the mental wellbeing of African women in their home country.

In the content analysis many of the respondents stated that they had notice no changes to their mental health with reduced levels of physical activity. Many respondents had also stated that their mental wellbeing had shown no changes pre and post migration. Respondents where already enjoying good mental wellbeing before migrating and even with the reduced levels of physical activities respondents till seem to be enjoying stable mental wellbeing. Even though many respondents listed changes like depression, loneliness anxiety disorders as changes to their mental health post migration, overall, respondents seem to be in good mental state post migration. For some respondents, their mental health seemed to have improved, gained their confidence, felt pride in their achievements and the general feeling of being happy. Some respondents showed a decline in mental health, others showed little improvement but many respondents claim to not have noticed changes to their mental wellbeing post migration. Even though respondents that post migration their physical activity levels had reduced even more as they had answered in the affirmative to involve themselves in very little extracurricular physical activity that did not involve their day job since moving to Estonia, respondents maintained good mental wellbeing. the correlations imply that decline in mental health post migration wasn't caused by reduced levels of physical activities.

To determine the effect that migration from hot to cold climates have on the physical activity of migrants, respondents were asked if their physical activities had reduced since moving to Estonia and 58.6% of respondents agree to the assertion that their physical activity levels had reduced since moving to Estonia. This however could be due to different reasons thus respondents where further asked whether the cold climate conditions negatively affected their physical activity levels and 61.5% of respondents

replied in the affirmative. The cold weather in Estonia affects the physical activity of respondent as a result the physical activity levels of Africans in Estonia has reduced since migration. When asked what kind of changes participants had experienced because of the cold climates, many of them complained of the inability to go out because of the cold, 127 respondents complained of being unable to engage in outdoor physical exercise, being unable to take walks outside due to the cold and the snow. They also complained of being unable to get to the gym to exercise because of their inability to go out in the cold. Shor & Roelf, (2019, p. 2) explained in their study that extreme frigid climates can deterrence to leisure and professional physical activity, reducing people's motivation to be involved in physical activities. People find it difficult to go out in cold climates. They further explain that people who move to countries with similar temperatures have significant adaptation advantages in terms of dealing with the climate. However, this is not true for immigrants who move from warmer to colder climates. (Shor & Roelf, 2019, p. 2) The migration of respondents from hot to cold climates adversely affects their physical activity levels negatively forcing them to live a more sedentary life than they would have had they not been affected by the weather. Some complained that the cold reduced work hours further reducing the number of hours that could have been used carrying out work related physical activities. The weather also made participants feel lazy and reluctant to go out and engage in physical activities.

According to Matias & Piggin (2022, p. 183), there has been an alarming decline in the level of physical activity in the last two decades. This study equally showed low physical activity levels. Respondents had very low levels of physical activity. The females even lower than the males. Morrison (2022, p. 1) posit that extreme climate can adversely affect health and involvement in physical activities for children and adults. She further explains that as climate conditions become more extreme it becomes difficult for people to tolerate them and reducing the intensity of quality and volume of physical activity. Wald & Demorest (2022, p. 390) explain that extreme climate affects leisure and professional sports reducing the motivation to engage in physical activity. Their findings are similar to this study. Respondents replied in the affirmative when asked whether the weather affected their physical activity levels and to further substantiate this claim, they agreed to having reduced levels of physical activities since moving from their home country (hot temperature) to Estonia (cold temperature). The effect the cold weather has on Africans

physical activity habits reflected in their general level of physical activities. Participants reported extremely low levels of physical activity. Prioreshi et al. (2020, p. 1), showed that African women were able to meet the recommended physical activity levels of 150 minutes per week. However, they engaged in very limited leisure physical activity. Guthold et al. (2018, p. e1077) showed African men to rank among people with the lowest levels of physical activity. The low levels of physical activity of Africans in Estonia could be as a result of their physical activity habits from their home country. Since they were less involved in leisure physical activity in their home country, they became less likely have high physical activity levels in a country where their normal daily activity did not involve high levels of physical activity.

To determine the effective is physical activity for mental health promotion respondents were asked subjective questions on kind the changes in their mental wellbeing that they experience with reduced levels of physical activity. Majority of the respondents had listed 'none' when asked to state they changes they experienced with reduced levels of physical activities. Other respondents that listed that they experienced changes, listed changes such as sluggish thinking, anxiety, disconnection from their environment, sadness. However, for respondents that responded to sadness may have been already sad and physical activity had helped improved their mood. Some reported the feeling of being frustrated, reduced energy levels and difficulty sleeping. To some degree it can be stated that physical activity can help promote mental health on a small scale by improving their moods, for people feeling sadness, anxiety and frustrated, can help with depression and anxiety in some cases as respondents had reported physical activity helping them out with their depression levels, it would also promote connection to people and the environment. According to the World Health Organization (2021, p. 3) Physical activity improves thinking, learning, and judgement, reduces stress, anxiety, and depression, ensures health growth in young people and contributes to general mental wellbeing . Pascoe et al. (2020, p. 2) equally stated that contributes significantly to mental health promotion, and reduces symptoms of depression. This is similar to the results of our content analysis. Some respondents affirm that physical activity helped them improve their moods and reduced stress and anxiety.

A major factor that contributed to the low levels of physical activity for Africans in Estonia was the weather, even though some respondents complained of proximity to the gym and lack of time to carry out other activities aside their regular day jobs. The study recommends:

- The number of days and the amount of time spent on physical activities per day should be increased. This can be done by including physical activity in the daily schedule of Africans. Judging from the data, physical activities have been categorised as activities to be engaged in when their energy to spare. Africans need to discard this kind of thinking and include physical activities in their daily schedule.
- Africans living in Estonia should focus more on indoor exercises. This would help improve the number of hours they spend on physical activities daily.
- To engage in outdoor physical activities, Africans should prepare the right clothing, this would reduce the cold allowing them to participate in activities mostly performed outdoors. For people who prefer to exercise at the gym, having the right clothing for the weather would allow them make the trip to the gym.

One major limitation of the study is that it did not take into consideration the culture, way of life and other factors that affects the participants physical activity in their home country. The study also grouped all participants under Africa without taking into consideration that if participants are from different countries in Africa, their physical activity habits are going to differ according to culture, type of work carried out in their home country and even their way of life. This would determine the physical activity habits of the customer before migration which affects their physical activity levels post migration.

## CONCLUSION

Literature relating to mental wellbeing, physical activity and migration from hot regions to cold regions were reviewed. Some studies showed that physical activity had the potential to affect mental health and mental wellbeing. Some showed no relationship between mental wellbeing and physical activity. The study also reviewed existing literature on the effect of the cold on physical activity and its importance, taking into consideration people living in cold regions and extreme climates. Many studies showed that extreme climates affect physical activity levels of individuals. This research is one of the first to take into consideration the migration from hot to cold climates in evaluating the impact of physical activity on mental wellbeing for Africans living in Estonia. The study also took into consideration people moving from physically active lifestyles to more sedentary ones. Primary data was used, sample size was calculated using Taro Yamane's sample size formula to ensure adequacy of the sample size. The data was collected from Africans living in Estonia. Data was collected from 273 respondents. The data collected contained both closed and open-ended questions. Results were analysed using descriptive statistics, correlation and content analysis. The results showed that they existed very small relationship between mental wellbeing and physical activity. It also showed that Africans in Estonia have sedentary lifestyles and barely engage in any type of physical activity owing to the change in weather. Female Africans in Estonia have more difficulty adjusting to the climate change than males. Despite the low levels of physical activity, they still maintained stable mental wellbeing. Where they had complaints most of it was due to loneliness and the feeling of being home sick, some of them experienced depression and were disconnected from society. However overall, they maintained stable mental health. The snow and weather is a major limiting factor to their involvement in physical activities. The study showed that physical activities had no effect on mental wellbeing, it also showed that the climate negatively affected the physical activity levels of respondents. Physical activity does promote mental wellbeing on a small scale even though most of the respondents said they were no changes to their mental health with

changes in physical activity levels there were still respondents that had listed changes like improved moods, help with sadness, depression and anxiety.

The following topics are suggested for further studies:

1. An explorative study on the factors affecting mental wellbeing of Africans in Estonia
2. The impact of physical activity on mental wellbeing in Estonia.

Since mental wellbeing shows no association to physical activity for Africans migrating from hot to cold regions, it is important that an explorative study on factors affecting mental wellbeing be conducted. Studies that should also be inclusive of all categories of people living in Estonia, not just Africans. This would allow us understand if physical activity has no relationship to mental wellbeing or if this result was so because of the sample group of Africans.

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## **Appendix 1. Draft Questionnaire**

### **THE IMPACT OF PHYSICAL ACTIVITY ON MENTAL WELLBEING DUE TO MIGRATION FROM HOT TO COLD CLIMATE**

I am a student of the University of Tartu from the department of Tourism studies, curriculum - wellness and spa services designs and management. This year survey is to collect data for my master's thesis. The thesis seeks to understand the effect of extreme cold climates on physical activity and how this affects mental wellbeing with focus on population groups moving from hot to cold regions. This survey is to be filled by Africans currently living in Estonia. It will take 10–15 minutes. Kindly fill the questionnaire.

#### **Section 1. Demographics**

1. Select your age range
  - 18–39
  - 40–59
  - Above 60
2. Select your gender
  - Male
  - Female
  - Others
3. Select your employment status
  - Employed
  - Unemployed
  - Student
  - Self employed
  - Others
4. Choose your level of education
  - High school
  - Bachelor's degree
  - Master's degree
  - Doctoral degree

**Appendix 1 continued**

5. What region of Africa do you come from?

- Hot regions
- Cold regions

6. Are you currently living in Estonia?

- Yes                       No

**Section 2. Mental wellbeing and physical activity**

7. Please evaluate your mental wellbeing since moving to Estonia

<b>MENTAL WELLBEING</b>		<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neither agree nor disagree</b>	<b>Agree</b>	<b>Strongly Agree</b>
7.1	I have been feeling optimistic about the future.					
7.2	I have been feeling useful.					
7.3	I have been feeling relaxed.					
7.4	I have been feeling interested in other people.					
7.5	I have had the energy to spare.					
7.6	I have been dealing with problems well.					
7.7	I have been thinking clearly.					
7.8	I have been feeling good about myself.					
7.9	I have been feeling close to other people.					
7.10	I have been feeling confident.					
7.11	I can make up my mind about things.					
7.12	I have been feeling loved.					
7.13	I have been interested in new things.					
7.14	I have been feeling cheerful.					

**Appendix 1 continued**

8. Please evaluate your physical activity

<b>PHYSICAL ACTIVITY</b>		<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neither agree nor disagree</b>	<b>Agree</b>	<b>Strongly Agree</b>
8.1	My physical activity levels have reduced since moving to Estonia					
8.2	Since moving to Estonia, other than my regular job I have participated in other physical activities such as running, calisthenics, golf, gardening, dancing, or walking for exercise					
8.3	The cold climate conditions in Estonia have negatively affected my level of physical activity					
8.4	I experienced negative effects on my mental health when my physical activity level is low					

9. Please evaluate your physical activity in the last 7 days

		<b>0 days</b>	<b>1–3 days</b>	<b>4 days</b>	<b>5–7 days</b>	<b>above 7 days</b>
9.1	Within the last 7 days, how often did you engage in heavy lifting?					
9.2	Within the last 7 days, how often did you engage in snow shoveling?					
9.3	Within the last 7 days, how often did you engage in fast bicycling?					
9.4	Within the last 7 days, how often did you engage in carrying light loads?					
9.5	Within the last 7 days, how often did you engage in regular pace biking?					
9.6	Within the last 7 days, how often did you engage in double tennis?					
9.7	Within the last 7 days, how many days did you walk for a minimum of 10 minutes consecutively?					

**Appendix 1 continued**

10. Please evaluate duration of different activities

		0 minutes	1–9 minutes	10–19 minutes	20–29 minutes	Above 30 minutes
10.1	How often do you usually spend doing vigorous physical activities on one of those days?					
10.2	How often do you spend on moderate physical activities in one of those days?					
10.3	What duration do you spend walking on one of those days?					

11. Please evaluate your physical activity before and after moving to Estonia

		Very active	Inactive	Neither active nor inactive	Active	Very active
11.1	Before moving to Estonia how physically active where you?					
11.2	How physically active are you after moving to Estonia?					

12. List the changes to mental health you have experienced with reduced levels of physical activity.

13. List the changes the cold climate has on your physical activity habits.

14. What are the obstacles you face that limit your participation in physical activity?

15. What are the changes you have noticed to your mental health before migration to Estonia?

16. What are the changes you have noticed to your mental health after migration to Estonia?

Thank you for your response.

## RESÜMEE

### FÜÜSILISE AKTIIVSUSE MÕJU VAIMSELE HEAOLULE, MIS ON TINGITUD RÄNDE TÕTTU KUUMAST KLIIMAST KÜLMALE

Ogheneoruese Christabel Otor

Uuring käsitles füüsilise aktiivsuse mõju vaimsele heaolule, mis on tingitud migreerumisest kuumadest piirkondadest külmadesse. Sihtrühmaks olid praegu Eestis elavad aafriklased. Erinevad uuringud näitavad, et äärmuslikud kliimamuutused langetavad inimese füüsilise aktiivsuse taset, mille tulemuseks on vaimse heaolu halvenemine. Magistritöö eesmärk oli hinnata füüsilise aktiivsuse mõju Eestis elavate aafriklaste vaimsele heaolule ning anda neile soovitusi, kuidas parandada kuumadest piirkondadest külmadesse rännanud inimeste vaimset heaolu. Uuring on oluline, kuna on tehtud vähe uuringuid vaimse heaolu sõltuvusest füüsilisest aktiivsusest, eriti aafriklaste puhul. Uuring käsitles küsimust, kuidas füüsiline aktiivsus mõjutab vaimset heaolu, millist mõju avaldab ränne kuumalt kliimalt külmale migrantide kehalisele aktiivsusele ja füüsilise tegevuse tõhususele vaimse tervise edendamisel. Vaadeldi vaimset heaolu, füüsilist aktiivsust ja kliima muutuse mõju füüsilisele tegevusele. Uuringus vaadeldi ka füüsilise aktiivsuse mõju vaimsele heaolule. Vaimse heaolu mõõtmiseks kasutati uuringus Warwick-Edinburghi vaimse heaolu skaalat (WEMWBS) ja füüsilise aktiivsuse mõõtmiseks kasutati rahvusvahelise füüsilise aktiivsuse küsimustiku (IPAQ) lühiversiooni. Valim koguti 273 hetkel Eestis elavalt aafriklasest vastajalt. Neid andmeid analüüsiti kirjeldava statistika ja korrelatsiooni kaudu. Avatud küsimuste analüüsimiseks kasutati sisuanalüüsi. Tulemused näitasid, et üldiselt Eestis elavate aafriklaste stabiilne vaimne heaolu säilis, kuid meeste vaimse heaolu tase oli kõrgem kui naistel. Nii meeste kui ka naiste füüsilise aktiivsuse tase oli väga madal. Uuring näitas ka, et külm kliima mõjutas nende füüsilist aktiivsust negatiivselt. Aafrika naistel oli pärast migreerumist raskem kliimamuutustega kohaneda kui meestel. Uuring soovitab Eesti piirkonnas

elavatel aafriklastel füüsilise aktiivsuse taset tõsta, aafriklastel tuleks suurendada füüsilisele aktiivsusele päevade arvu ning keskenduda ka treeningutele sisetingimustes, et oma kehalise aktiivsuse taset tõsta.

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