BARRIERS TO PHYSICAL ACTIVITY IN VISIBLE MINORITIES

By

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A thesis proposal to my supervisory thesis committee

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ABSTRACT

There has been limited research on the role of visible minority status on health in Canada. In particular, the physical activity of visible minorities has not been extensively examined. Participation in physical activity is influenced by various biological, environmental, and social factors, and these factors act as either facilitators or barriers to physical activity participation. Previous research has shown that the main barriers to participation in physical activity identified by visible minorities have been the different ethnic and cultural norms and practices of participants. A cross-sectional, online survey was conducted to examine the barriers to physical activity in visible minorities living in St. John's, Newfoundland. Participants included 75 visible minorities who participated in the web-based survey; 52 participants had complete data. A stepwise forward regression model was tested with total physical activity participation as the outcome variable. Sociodemographic, sociocultural, self-efficacy, and health-related variables were not significantly related to total physical activity levels. Only two barrier items were found to be significant and positively and highly correlated to physical activity: *physical activity taking too much time away from taking care of family members* ($\beta = 0.42$, $t = 2.538$, $p = .017$) and *not being talented in physical activity* ($\beta = 0.339$, $t = 2.131$, $p = .042$). This model was a significant fit ($F_{(2,56)} = 5.870$, $p = .007$) and accounted for 24% of the variance. All other barrier items were found to have insignificant partial correlations and thus did not improve the model. Limitations of the study are discussed with emphasis recruitment of visible minorities and future research recommendations are provided.

Key words: barriers, visible minorities, physical activity participation

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CHAPTER 1: INTRODUCTION

The terms race and ethnicity are often misunderstood. In the literature, race is defined as a group of people who share certain physical characteristics, and ethnicity is defined as a group of people who retain customs, language, or social views (Ford & Kelly, 2005). A minority group in the literature is defined as a group of people who, because of their race or ethnicity, experience a wide range of discriminatory behaviour and are assigned to a low-status position in society (Amersfoort, 1978; Floyd, 1999). According to Statistics Canada, visible minorities are defined as "persons, other than Aboriginal peoples, who are non-Caucasian in race or non-white in color" (Statistics Canada, 2013, p.14). Immigrants are non-native born people and are defined as a vulnerable group of people who face numerous challenges, including cultural differences, family disintegration and loss, prejudice and discrimination, linguistic challenges, and limited social networks (Hsu et al., 2004; Hwang & Ting, 2008; Yu, 1997).

Ethnic and racial groups are a growing segment of the North American population. Canada boasts the highest proportion of foreign-born populations (Statistics Canada, 2013). Although the number of studies that examined the participation of ethnic and racial minorities in physical activity has increased in recent years (Berg et al., 2002; Ransdell & Wells, 1998), this body of knowledge remains limited (Allison, 2000; Floyd, 1999; Philipp, 2000; Taylor et al., 1998). Assessing physical activity is of importance in order to examine the relationships between inactivity and the development of diseases. Regular physical activity reduces the risk of premature death and disability from a variety of diseases and conditions, which include heart disease, diabetes, colon cancer,

osteoarthritis, and osteoporosis (Warburton., 2006). Despite the health benefits of physical activity, 70% of adults are sedentary or only irregularly active (CDC, 2001). Physical activity concerning visible minorities has not been extensively examined in Canada, yet it is essential for the development of appropriate public health initiatives. Visible minority immigrants are less likely to be physically active compared to nonimmigrants (Dogra et al., 2010). The majority of studies have explored the involvement of ethnic and racial minority groups in physical activity in relation to health disparities (Crespo et al., 2000; Crespo et al., 2001; Kandula & Lauderdale, 2005). A major process of eliminating health disparities is through increased levels of physical activity among visible minority populations (Lee, 2005).

Visible minorities, and those who are immigrants, are vulnerable to various types of health risks because they tend to earn less income, are more likely to be unemployed or underemployed, live in low-income situations, and are under tremendous stress by immigration itself (Meyer et al., 2003). Moreover, data from the 2011 National Household Survey indicate immigrants comprise more than one-fifth of the Canadian population (Statistics Canada, 2013). The immigrant population in Canada is diverse and growing, yet little is known about their physical activity behaviour and how it changes as they adapt to a Canadian lifestyle (Tremblay et al., 2006). Canada is well known for its friendly immigration and refugee policy and receives more than 240,000 immigrants yearly (Government of Canada, 2013). Black, South Asian, and East or Southeast Asian immigrants are less active than White immigrants, and the reverse relationship is observed among non-immigrants (Tremblay et al., 2006). Physical activity concerning immigrant status has not been extensively examined in Canada but is important for the

development of appropriate public health initiatives.

1.1 Background of the Study

Promoting regular physical activity has become an important priority for public health interventions due to well-established physical and psychological health benefits associated with the behaviour (Sparling et al., 2000). Physical inactivity is largely responsible for the worldwide burden of chronic disease and healthcare costs (Ding et al., 2016). Physical activity is complex and multidimensional (Dishman et al., 1985). It is a successful component of health promotion and disease prevention for individuals and communities and is an integral component of the body's energy balance (Galson, 2009). Physical activity is recommended for the general and clinical population to improve psychological well-being. Regular physical activity is important for maintaining long-term physical, cognitive, and emotional health (Bethancourt et al., 2014). It has been shown to have numerous health benefits, including decreasing mortality, morbidity, and the risk of chronic diseases such as heart disease, type 2 diabetes, asthma, and cancer (Warburton, 2006). Additionally, physical activity reduces the risk of mental health illnesses such as depression (Booth et al., 2012) and leads to an overall improvement in mental health (Lichtman & Poser, 1983). It builds muscular and cardiovascular fitness (Shephard & Balady, 1999) and has a positive effect on sleep patterns and bone density (Galson, 2009). Physical activity also enhances quality of life by improving overall health and functional abilities (Wocken, 2013).

Physical activity and exercise are terms that describe different concepts. These terms are often confused with one another, and the terms are sometimes used

interchangeably. Physical activity in the literature has been defined as any bodily movement produced by skeletal muscles that result in energy expenditure (Caspersen et al., 1985). Exercise is a subset of physical activity that is planned, structured, repetitive, and has a final or an immediate objective (Caspersen et al.,1985). Research has shown that participation in physical activity declines from childhood to adulthood (Duncan et al., 2007). Despite the known health benefits, physical inactivity remains a significant public health issue. Therefore, it is important to understand the factors that motivate and facilitate people to be physically active (Etnier et al., 2017).

Physical activity is influenced by biological, environmental, or social factors and these factors may act as facilitators or barriers to physical activity participation (Sallis & Owen, 1999). There have been several comprehensive reviews of the correlates and predictors of physical activity and among these reviews thirteen were with personal factors (Trost et al., 2002; Eyler et al., 2002; Rhodes et al., 1999; Plonczynski, 2003; Kaewthummanukul & Brown, 2006; Rhodes & Smith, 2006) and nineteen of these reviews were with environmental factors (Trost et al., 2002; Eyler et al., 2002; Duncan et al.,2005; Humpel et al., 2002; Plonczynski, 2003; Cunningham & Michael, 2004; Owen et al., 2001; Tucker & Gilliland, 2007; Wendel-Vos et al., 2007). These factors have been categorized into seven groups: demographic, health-related, biological, cognitive and psychological, behavioural, social, program-related, and environmental (Allen & Morey, 2010). Correlates of physical activity are also generally divided into two categories: those considered modifiable, such as economic status, education, personal traits, social support, and environmental situation; and those considered non-modifiable, such as age, gender, and ethnicity. To understand the ways of promoting physical activity,

researchers also often study correlates of physical activity as two broad categories: environmental and individual (McArthur et al., 2014). Individual characteristics include sociodemographic/ sociocultural, physiological, and psychological factors (McNeill et al., 2006). Environmental factors include social environment as social support from spouse and family members has been linked to greater participation in physical activity, environment and policy factors as environmental and policy factors are more effective than individual behaviour and lifestyle modifications at reaching the target population, and physical-environmental factors as they play a role in health behaviours as the link between physical environmental factors and physical activity has received little empirical attention (Eyler, 2003).

Environmental factors, particularly the physical environment, play a key role in physical activity participation. Weather, lack of personal safety or neighborhood crime, and lack of transportation are environmental factors commonly viewed as barriers to physical activity (Allen & Morey, 2010). One predictor of physical activity is the distance individuals must travel to reach exercise facilities (Sallis et al., 1989). The environment plays a critical role in behaviour, as stated by the social cognitive theory that will be provided later in the thesis. Social environment is the most commonly studied correlates of physical activity (Eyler et al., 2002).

Physiological, psychological, and sociodemographic/sociocultural factors are the commonly studied individual factors to physical activity (Eyler, 2003). The physiological factors associated with exercise adherence include prior physical activity history and smoking (Allen & Morey, 2010). Research has shown that smokers have an increased risk of dropping out of physical activity programs and individuals with existing chronic

conditions are less likely to be physically active (Sallis & Owen, 1999). Perceived health is known to be positively associated with physical activity levels. People who perceive themselves to be healthy are more active than those who report poor health (Eyler, 2003).

The psychological factors associated with exercise adherence include a person's self-efficacy and having high self-efficacy is important for exercise adherence (Trost et al., 2002). Self-motivation is associated with physical activity levels (Bild et al., 1993). Enjoyment is another psychological factor correlated with physical activity because if individuals enjoy participating in physical activity, they are more likely to participate (Sallis, Hovell, & Hofstetter, 1989).

The prevalence of physical activity for adults varies by sociodemographic/sociocultural characteristics. Whether an individual is physically active depends on demographic characteristics such as gender, age, ethnic background, and socioeconomic characteristics such as education and income (Saffer et al., 2011). Research has shown that the least active people include women, older adults, people with lower socioeconomic status, individuals living on a low income, and visible minorities (Pate et al., 1995).

Studies have shown that a correlation exists between physical activity, sex status, and age; with males being more physically active than females and levels of physical activity decreasing with age (Vancampfort et al., 2011). Research has shown that compared to men, women have lower levels of occupation-related physical activity and greater household-related physical activity; furthermore, socioeconomic covariates have a much smaller effect on leisure time physical activity among women than men (Crespo et al., 2001; Marquez & McAuley, 2006). Education and income level are positively

associated with physical activity (Sallis & Owen, 1999). In general, evidence suggests that a positive association exists between income and self-reported physical activity (Humphreys & Ruseski, 2011).

When race/ethnicity is considered, visible minority populations have been reported in the literature to be less likely to perform physical activity and are more likely to be sedentary than the general population (Lee, 2005; Gothe & Kendall, 2016; Taylor et al., 1998). The reasons for the differences in inactivity among racial/ethnic minority groups remains unclear; however, cultural attitudes about healthy body weight may influence physical activity (Crespo et al., 2001; Ibrahim et al., 2013). Research on physical activity among visible minority groups is essential. The focus of literature reviews is on studies that have only looked at racial/ethnic minorities and does not include literature that compares across racial/ethnic groups, which does give insights into the racial/ethnic groups. There has been limited research conducted in this area in Canada and, in particular, very little research being conducted among male visible minorities.

A theory that connects the individual and the environmental factors is the social cognitive theory (Bandura, 1986). This theory has been used as a conceptual framework to emphasize the interactions among individuals, personal factors, and the social and physical environment (e.g., McNeill et al., 2006). Intra-personal, social, and physical environmental factors can affect barriers to physical activity (e.g., Reichert et al., 2007). Social cognitive theory emphasizes the need to identify the barriers and motivations of physical activity in order to change health behaviours (Bandura, 1986). The most common and easiest way to assess barriers of physical activity and physical activity behaviours.

1.2 Purpose Statement

Ethnic minorities, specifically Hispanic and African American adults, report being in poor or fair health more often than White, non-Hispanic populations (Corbin et al., 2003). When examining differences in health status by race or ethnicity, studies show that minorities suffer from chronic diseases (diabetes, hypertension) that are more commonly observed among people who are physically inactive (Crespo, 2000). Physically inactive lifestyles are highest among minority populations immigrants, lower socioeconomic groups, women, and the elderly (CDC, 2000; Crespo et al., 2000). Although sedentary lifestyles are becoming an epidemic and public health efforts must reach the masses, it is important that health promotion practitioners acknowledge and understand the gap that exists in physical activity between non-Hispanic White populations and ethnic minorities. Not only does this raise concern, it indicates a need for stronger interventions within many components of society. A major process of eliminating health disparities is through increased levels of physical activity among minority populations. Overall, research indicates a national decline in physical activity participation among all adults, ages 18 to 65 years. Based on nation-wide surveillance data, physical activity trends are also seen for race/ethnicity (Brownson et al., 2000; Taylor et al., 1998). More White, non-Hispanic adults (49.7%) are meeting the recommended guidelines for moderate physical activity than African Americans (39.2%), Hispanics (43.2%), and other ethnicities (48.0%) (CDC, 2000). Also, minority women are more likely to be sedentary and in fair or poor health (Corbin et al., 2003).

Research in the area of physical activity among visible minorities is advancing; however, there is still a need to explore the correlates and barriers to physical activity among visible minority groups (residents/immigrants) in Canada, both male and female. The purpose of this study is to explore the individual (physiological and psychological) and environmental (social, policy, and physical) factors that affect physical activity in visible minority immigrants/non-immigrants who are either permanent/non-permanent residents of Canada in urban Newfoundland (NL), St. John's. There are currently ten main visible minority groups in St. John's namely South Asian, Chinese, Black, Filipino, Latin American, Arab, Southeast Asian, West Asian, Korean, and Japanese. The visible minority population of St. John's in 2016 was 8765 (Statistics Canada, 2016). The results of the study will be useful to health promotion in the City of St. John's due to its growing visible minority population, with 4,000 visible minorities making the population of the city. This may help inform culturally valid survey questionnaires to assess population physical activity behaviours in Canada.

CHAPTER 2: LITERATURE REVIEW

The following is a review of literature on physical activity participation among racial/ethnic visible minorities and correlates and factors to physical activity among this population. The review begins by providing a review of the individual and environmental correlates of physical activity among visible minorities and the theory that connects the individual and environmental factors. Next, I discuss the sociodemographic and cultural factors and the physiological and psychological correlates of physical activity. The review then highlights physical activity participation among visible minorities and the cultural attitudes surrounding these visible minorities. Lastly, the review ends with racial and ethnic barriers to physical activity and language as being a barrier to physical activity.

2.1 Individual and Environmental Correlates of Physical Activity among Visible Minorities

Barriers to physical activity represent attitudes and beliefs about physical activity (Eyler, 2003). To date, however, physical activity has been primarily associated with personal attributes and less with social and physical environment factors (i.e. Sallis & Owen, 1999). Therefore, it is important to identify and understand barriers to physical activity to plan effective interventions (Reichert et al., 2007). Visible minority populations have been reported in the literature to be less likely to perform physical activity and are more likely to be sedentary than the general population (Lee, 2005; Gothe & Kendall, 2016; Taylor et al., 1998). Based on these physical activity-level differences among racial/ethnic groups, it is essential to provide an overview of the literature that

pertains to the influences on and correlates of being physically active among the visible minority populations. The following overview provides readers with a sense of factors that may arise for minority populations trying to adhere to a physically active lifestyle. It is becoming clear from physical activity research that visible and non-visible minority populations have several environmental, social, political, environmental, and organizational factors influencing physical activity levels (Banks-Wallace, 2000; Brownson et al., 2000; Johnson et al., 1995; King et al., 2000). Correlates to physical activity can be classified as individual or environmental (McArthur et al., 2014). Determining the strength of the interactions between various correlates and physical activity is an integral first step to promoting a physically active lifestyle and improved health.

2.1.1 Individual correlates of physical activity

The most commonly reported individual correlates of physical activity in the literature are lack of time, lack of health concerns, inconvenience, lack of self-motivation, lack of self-management skills, low self-efficacy, and fear of being injured (Sallis et al., 1992; Sallis et al., 1990). The most commonly reported barrier in the literature, regardless of sub-group, has been lack of time which a likely a long standing and ongoing barrier (Sallis & Owen, 1999). Time is a very consistent barrier to physical activity and is strongly linked to cultural issues as well. Multiple research studies have shown that lack of time was the strongest barrier to physical activity perceived by African American female adults (Carter-Nolan et al, 1996; Gothe & Kendall, 2016; Jones & Nies, 1996; Nies et al., 1999; Sanderson et al., 2003) and for American-Indian men and women

(Fischer et al., 1999). Similarly, studies have shown that lack of time was reported as a common barrier among Hispanic female adults (Bautista et al., 2011; Heesch et al., 2000; Skowron et al., 2008) and additional resources included demonstrating the ongoing examination of lack of time.

Taking time out to focus on oneself, or temporarily removing oneself from the obligations of family and work to exercise, is often not acceptable in minority subgroups (Eyler et al., 1998). A common barrier reported in the literature is family responsibilities (Jones & Nies, 1996; Gothe & Kendall, 2016). Ceria-Ulep et al. (2011) which includes multiple competing role responsibilities in terms of family obligations, job constraints, and community responsibilities. Racial/ethnic minority women including Korean immigrant midlife women were more family-oriented compared to white women and did not participate in physical activity because of heavy family responsibilities. While Asian immigrant women did report spare time, they spent their time to complete household chores and childcare rather than participating in leisure time physical activity.

A qualitative study with a sample of minority women, including Filipino, Chinese, American Indian, African American, and Hispanic participants, found that personal barriers (lack of time, health concerns, and lack of motivation) were the most common reasons for not exercising (Eyler et al., 1998). Fatigue or lack of energy was also found to constrain active pursuits among Latino, African-American and American-Indian men and women in studies by Fischer et al. (1999) and Harnack et al. (1999), and among women of various racial groups in a study by King et al. (2000). Moreover, lack of motivation was shown to be negatively associated with physical activity among male and female ethnic minority members in studies by Carter-Nolan et al. (1996), Fischer et al. (1999),

Eyler et al. (1998), and Sternfeld et al. (1999). Physical health limitations are another barrier reported by African American adults (Gothe & Kendall, 2016; Jones & Nies, 1996). Banks-Wallace (2000) found that African American women were influenced to participate in physical activity by personal and family histories of heart disease and other risk factors.

2.1.2 Environmental correlates and the physical environment

The environment plays a significant role in physical activity participation, as stated by Bandura's social cognitive theory that emphasized the importance of the environment and the social interaction of a person playing a key role in physical activity participation (Eyler, 2003). Environmental correlates to physical activity include social characteristics, policy factors, and physical environmental factors. Physical environmental correlates to physical activity is the main environmental factor of interest in the present study. Environmental barriers to physical activity include living in unsafe neighborhoods, the accessibility of recreation facilities, walking paths, and cycling trails. Factors such as traffic, availability of public transportation, crime, and pollution may also have an effect. Research has shown that one of the barriers to physical activity in African American women was the presence of animals, such as dogs walking on the street (Gothe & Kendall, 2016). Other environmental barriers include the social environment, such as support from family and friends, and community support (Sallis et al., 1990; Evenson et al., 2002; Martínez-Gómez et al., 2009; Ramirez et al., 2007).

Over the last decade, an increasing number of studies have provided evidence that outdoor recreation among immigrants in the U.S. is constrained by inadequate access to

quality natural environments (García, 2013). Research suggests that low-income, densely-populated central-city communities, where many visible minorities and immigrants reside, lack well-maintained parks, playgrounds, and recreation facilities (García, 2013; Stodolska et al., 2011). A qualitative study with a sample of minority women, including Filipino, Chinese, American Indian, African American, and Hispanic participants, found that the most commonly reported environmental barriers were safety, availability, and cost of recreation programs.

Perceived safety is a commonly reported barrier among visible minorities. In a study by Heesch et al. (2000), African Americans perceived lacking safe places to exercise or walk as a barrier. Pham et al. (2007) also reported that their research participants cited safety issues and the lack of space and organized sports programs as major barriers to physical activity and exercise. Taylor et al. (1998) reported that multiple contextual factors circumscribing immigrants' daily life influenced their physical activity experience: weather conditions and safety concerns, a lack of familiarity with their new city, the location of facilities, and a lack of organized sports and leisure activities for immigrants. Some common reported environmental barriers in African American female adults were weather (Gothe & Kendall, 2016; Henderson & Ainsworth, 2000; Nies et al., 1999; Wilcox et al., 2002), poor neighbourhood conditions (Andersen et al., 2015; Gothe & Kendall, 2016), crime (Gothe & Kendall, 2016), access to facilities (Andersen et al., 2015; Gothe & Kendall, 2016 & Jones & Nies, 1996), lack of knowledge (Andersen et al., 2015), and the presence of animals (Gothe & Kendall, 2016). Similarly, in Latinas, the commonly reported environmental barriers was weather (Bautista et al., 2011; Skowron et al., 2008), poor neighborhood conditions (Lopez et al., 2008), access to facilities (Lopez

et al., 2008; Skowron et al., 2008), and crime (Lopez et al., 2008; Skowron et al., 2008; Voorhees & Young, 2003).

Environmental and policy strategies are aimed at changing the physical and sociopolitical environments. These approaches may be more effective than individual behaviour and lifestyle modification strategies at reaching the target population (Schmid et al., 1995). When reporting attitudes toward policy measures to support physical activity, the lack of access to places to exercise has been reported as a barrier (Andersen et al., 2015; Gothe & Kendall, 2016; Jones & Neis, 1996). Policies that build or improve access to existing facilities may influence physical activity at the community level. When physical environments are conducive to exercise (e.g., walking and biking paths, safe streets), they are likely to have a stronger impact on the physical activity of their residents (Sherwood & Jeffery, 2000). Such constraints were identified by Henderson and Ainsworth (2000) as affecting walking among African-American and American-Indian women.

2.2 Social Cognitive Theory

A theory that connects the individual and the environmental factors is the social cognitive theory (Bandura, 1986). This theory has been used as a conceptual framework to emphasize the interactions among individuals, personal factors, and the social and physical environment (e.g., McNeill et al., 2006). Intra-personal, social, and physical environmental factors can affect barriers to physical activity (e.g., Reichert et al., 2007). Social cognitive theory emphasizes the need to identify the barriers and motivations of physical activity in order to change health behaviours (Bandura, 1986). The most

common and easiest way to assess barriers of physical activity and physical activity behaviours in large populations is through the administration of self-reported and interview-based questionnaires. These questionnaires are economical for large groups. However, despite the development of these standardized scales used to access correlates of physical activity, it is important to understand that standardized scales can lack cultural validity among ethnic/racial minority groups (Sallis et al., 1990). For example, many of the barriers measured on standardized scales were developed based on research from Western Caucasians and, therefore, may not assess the most salient barriers to physical activity among visible minorities.

The most commonly studied correlates of physical activity are generally divided into two categories: those considered modifiable, such as economic status, education, personal traits, social support, or environmental situation; and those considered non-modifiable, such as age, gender, and ethnicity (see Table 1). Modifiable (e.g., physical environmental) correlates provide mechanisms via which behaviour change might be achieved, and non-modifiable (e.g., demographics) correlates indicate which groups are most at risk and so most in need of intervention. Important modifiable correlates for physical activity include self-efficacy, the perceived benefits of physical activity, enjoyment, and social support (Sallis & Owen, 1999). The physical environment and policies, also modifiable, seem to play an important role in physical activity. Identifying and overcoming these barriers is, therefore, important to help facilitate individuals' regular physical activity (Withall et al., 2011).

Table 1: Examples of Individual and Environmental Modifiable and Non-Modifiable Correlates

Individual		**Environmental**	
Modifiable	**Unmodifiable**	**Modifiable**	**Unmodifiable**
Time, self-efficacy, enjoyment, social support, body-mass index, weight status, physical fitness, lack of self-management, fear of being injured	Gender, age, ethnicity, socioeconomic status	Physical environment, policies	Weather, accessibility of recreation facilities, living in unsafe neighborhoods

2.2.1 Sociodemographic and cultural factors

The sociodemographic correlates of physical activity studied in the literature include gender, age, ethnicity, and socioeconomic status. Age and gender are the main correlates of physical activity studied in reviews by Sallis et al. (2000) and Biddle et al. (2005). Physical activity declines with age as evident in the literature (e.g., Biddle et al., 2005). Ethnicity/race is addressed in reviews by Sallis et al. (2000), Biddle et al. (2005), and Gustafson and Rhodes (2006). These reviews suggest that 'white Caucasians' are more likely to be active than other ethnic groups. In fact, socioeconomic status is thought to account for most of the activity differences between minority and white populations (Anderson et al., 2004).

The sociodemographic characteristics that might influence Korean immigrant women's physical activity experience include age, marital status, high education, high income, length of stay, and English proficiency (Im et al., 2015). Low-income, lower education levels, and lack of access to cars are common constraints to immigrants' visitation of natural environments outside of the city. Similar constraints were reported by Lovelock et al. (2011) in their study of outdoor recreation among immigrants to New

Zealand. In the context of the U.S., Winter et al. (2004) found that Asian immigrants with higher incomes and education engaged in more outdoor recreation than Asian immigrants of lower SES. Socio-economic constraints, including lack of time, increased work responsibilities, lack of access to cars, inability to afford gas, and residence in poor inner-city neighborhoods have also been mentioned by Stodolska et al. (2011) as reasons for U.S. Latino immigrants' inability to visit more distant natural environments. Similarly, Hispanic respondents in Shores et al. (2007) study reported higher levels of transportation, economic and knowledge-related constraints to outdoor recreation compared to non-Hispanic Whites.

2.2.2 Physiological and psychological correlates of physical activity

The physiological correlates associated with physical activity include body mass index (BMI) or weight status, and physical fitness (Biddle et al., 2005; Sallis et al., 2000). The physiological factors associated with exercise adherence include prior physical activity history and smoking (Allen & Morey, 2010). These variables are studied as potential moderators of behaviour. Specific physiological factors to physical activity are not specifically studied as the assumption is it is the same as non-visible minorities. For a complete review of the correlates, see the review paper by Bauman et al. (2012). The most commonly reported psychological factor associated with physical activity is self-efficacy and social support (Eyler, 2003). Self-efficacy is defined as the confidence of being able to successfully perform a particular activity or behaviour (Bandura, 1986). It has been reported in the literature that individuals with greater self-efficacy are more likely to participate in physical activity (Sternfeld et al., 1999).

The other psychological correlate and outcome most commonly reported across ethnic/racial groups is social support (Marquez et al., 2004). Social support is one of the most commonly studied correlates of physical activity (McNeill et al., 2006). Sources of support have been linked to greater participation in physical activity include support from a spouse, family members, friends, program staff, coworkers, and other program participants (Sallis & Owen, 1999). Social influence would consist of the opinion of family, friends, colleagues, and health professionals but also the general opinion of society (Im et al., 2011). The influence of family and friends was repeatedly reported to have a positive influence on physical activity behaviour in healthy people. In a study by Sternfeld et al. (2000) the physical activity patterns of a randomly selected sample of women were examined. Women who had high levels of social support were more likely to participate in sports and/or exercise.

Research has shown that Korean American women lacked social support resources; their extended families, close relatives, and friends were in their country of origin. Because of the lack of social support, Korean women could hardly find anyone who could support their participation in regular exercise. Research has shown that interpersonal factors (i.e., social support, social norms) also appear to play a role in whether African American women report being physically active (Anderson et al, 2015; Banks-Wallace, 2000; Gothe & Kendall, 2016; Jones & Nies, 1996; Wilcox et al., 2002) and similarly, in Latina women (Voorhees & Young, 2003). Research has shown that African American women would not participate in physical activity because of fear of unattended animals (Gothe & Kendall, 2016).

2.3 Physical Activity Participation among Visible Minorities

Over the last two decades, relatively few studies have been conducted on physical activity participation among visible minority groups in Canada. These studies have generally concluded that ethnic background influences a variety of phenomena related to sport, leisure, and physical activity participation (Coakley, 2001; Henderson & Ainsworth, 2001; Hutchison, 1987; Juniu, 2000). Physical activity participation is lower among ethnocultural minorities as compared to the majority population (Tirone & Shaw, 1997).

The most widely studied ethnic minority populations in the literature have been Hispanics/Latinos, Mexicans, Asians, and African Americans, particularly in the United States (Pekmezi & Jennings, 2009). In Canada, research on race, ethnicity, and culture began much later than in the US., with Hall and Rhyne's (1989) study of 17 ethnic groups in Ontario being the earliest studies. In Canada, the federal government uses the phrase visible minority group to describe people who are non-White and who are not Aboriginal (i.e., Indian, Metis, or Inuit; Statistics Canada, 2013). In Canada, ethnic minority groups and immigrants are less likely to participate in conventional forms of exercise such as aerobics, weight training, and home-based exercise compared to Whites and non-immigrants and are less likely to engage in endurance exercise, sports, and recreational activities (Dogra et al., 2010). Although there is limited data in this area of research, it is clear that exercise adherence interventions for racial and minority groups must be tailored to meet specific cultural concerns, perspectives, and values (Pasick, et al., 1996).

2.3.1 Cultural attitudes on physical activity participation

The reason for the difference in inactivity among racial/ethnic minority groups remains unclear; however, it is important to understand that cultural attitudes, values, and meanings of physical activity differ among ethnic/racial minority groups. Much of the existing research suggests that people from different cultures display unique landscape preferences and environmental attitudes and values which, in turn, shape their physical activity preferences, motivations, attachments, meanings, and participation patterns (Buijs et al., 2009; Jay & Schraml, 2009; Johnson et al., 2004; Kloek et al., 2013). The majority of studies have provided evidence that minorities often participate in recreational activities in ethnically segregated groups, usually due to the expectation of discrimination or people's cultural preferences (Stodolska & Jackson, 1998).

There is evidence in the literature that minority groups experience a variety of adaptation challenges that entail acculturative stress, such as language barriers, a lack of cultural understanding, racial discrimination, and limited social network. For example, even though environmental factors may influence the ability of either gender to perform physical activity, females are affected by sociocultural factors because of their gender roles (Abbasi, 2014). In some cultural settings, physical activity performed by females is considered culturally inappropriate. Cultural attitudes about healthy body weight may also influence participation in physical activity (Crespo et al., 2001). Cultural variables and language barriers are related to both the adoption and maintenance of physical activity (Lim et al. 2007). Ethnic minority groups also experience discrimination and exclusion in activities that happen in their communities (Kadango, 2015).

The patriarchal cultural tradition emphasizing women's roles as mothers rarely allows many ethnic visible minorities to leave their children to participate in their own physical activity needs. For example, Korean immigrant women in the United States reported that physical activity is primarily influenced by cultural and immigration contexts, as well as daily life (Eun-Ok & Nyoung, 2001). Korean immigrant women's attitudes toward physical activity were also found to influence their physical activity experience. Three themes reflecting the women's attitudes toward physical activity were reported: physical activity is different from exercise, full of physical activity but lack of exercise, and no physical activity during menstruation. The women perceived that physical activity was a broad term that included breathing, eating, and every human activity. Exercise was regarded as a type of physical activity with an intentional purpose. They described their daily lives as full of physical activities such as cooking, cleaning, and laundry, childrearing activities, educating Korean language and customs, and their work outside the home. However, the women thought their work occupied all their time and left them no time for exercise. Their new work experience outside the home made them overburdened and did not allow any time for exercise. Korean American midlife women did not move their bodies as much as usual during their menstrual period because they were usually very tired, sleepy, and emotionally fragile during the period.

2.3.2 Racial and ethnic barriers to physical activity

Racial and ethnic barriers have been the focus of a small but coherent body of research that has considered the dynamics of ethnic differences and identities, nation, and relations in and through sport and physical activity. There is extensive evidence that the

experiences of black and minority ethnic people in sport are mediated by racism (Hylton, 2010). There is evidence in the literature to support that barriers to participation in physical activity affect specific socio-economic and sociocultural groups; specifically, barriers to physical activity can be more salient among women, older adults, and minority groups (i.e. Bethancourt et al., 2014; Koshoedo et al., 2015). In general, the barriers and incentives to exercise vary between and within subgroups of any population, including minority groups. Minorities are overrepresented in the lower socioeconomic groups (SES) and leisure physical activity levels are positively related to SES (Kriska & Rexroad, 1998). Although sedentary lifestyles are becoming an epidemic and public health efforts must reach the masses, it is crucial for health promotion practitioners to acknowledge and understand the gap that exists in physical activity between non-Hispanic White populations and ethnic minorities.

2.3.3 Language as a barrier to physical activity

Language barriers can greatly impact leisure participation. For example, language barriers result in Asian immigrants feeling isolated from their community. Older Asian immigrants may experience constraints—such as language barriers, lack of social support, and overreliance on family—that inhibit their ability to participate in leisure activities (Koh & Bell, 1987; Mio et al., 2008; Sohng et al., 2002). Many older Asian immigrants struggle to communicate with others because they are not proficient English speakers and, subsequently, experience barriers to communication and social interactions (Koh & Bell, 1987). According to Sohng et al. (2002), many older Asian immigrants live in households in which some family members cannot speak English. These individuals have numerous

challenges associated with their interpersonal communications that result in a sense of isolation. In a similar study of older Chinese and Korean immigrants, Mio et al. (2008) discovered that many older Asian immigrants reported that they depend on their children to communicate with others. Without help from their children, they encounter numerous problems resulting from communication barriers.

CHAPTER 3: METHODOLOGY

The purpose of this chapter is to provide a methodological overview of procedures of this study. A structured cross-sectional survey design was used in this exploratory study. The rationale for this approach is its descriptive nature and potential for generalizability and the ability to target a larger sample size. The following research question was addressed in this study: What are the factors associated with physical activity, and primary barriers that affect physical activity in visible immigrants/non-immigrants who are either permanent and non-permanent residents in St. John's, NL and its surrounding areas? This chapter describes the sample, research design and recruitment, variables and measures, the procedures, and description of data analysis. The proposal of this research was reviewed and approved by Memorial University's Interdisciplinary Committee on Ethics in Human Research (ICEHR) (See Appendix B).

3. 1 Sample

A purposeful sampling technique was used. The inclusion criteria for the study participants were as follows: (a) over the age of 18 years old; (b) self-identify as a visible minority; and (c) residents living in St. John's and its surrounding areas. Visible minorities can be immigrants, non-immigrants, and permanent/non-permanent residents of Canada. Adults were invited to participate in the study if they self-identified themselves as a visible minority (immigrant or non-immigrant, permanent or non-permanent resident of Canada). According to Statistics Canada, visible minorities are defined as "persons, other than Aboriginal peoples, who are non-Caucasian in race or non-white in color" (Statistics Canada, 2013, p.14). Aboriginal peoples were excluded

from this study as they are not part of Statistics Canada's definition and more importantly this group requires the use of an indigenous lens, which was beyond the scope of the study as well as the training of the researcher. Additionally, aboriginal peoples are a minority, an individual who identifies as aboriginal may not necessarily be a visible minority. If aboriginal people took part in the study, they were excluded from the study and their results were destroyed.

3.2 Research Design and Data Collection

Data for the present study was collected using a structured cross-sectional survey design. The survey collected information on participants' sociodemographic and sociocultural factors, perceived health, smoking status, physical activity participation, barriers to their physical activity participation, and confidence in physical activity participation. Participants were asked about the kinds of physical activities they did as part of their daily lives, and the amount of time they spent being physically active in those activities in the spring/summer. Activities such as walking, running, jogging, dancing, gardening, and playing soccer are considered physically active. Data collection took place in Spring and Summer 2019. Being fluent in English was not an inclusion criterion for the study as to not exclude the growing immigrant population in NL.

In an effort to include people who are not fluent in English or perhaps have limited English reading skills, four different methods of completing the survey questionnaire were offered (see Appendix A: Survey) to participants: (1) self-administered paper survey, (2) self-administered paper survey by proxy, (3) completed as a structured face-to-face survey (one-on-one or with proxy), and (4) a self-administered

online survey. No one requested a hard copy of the questionnaire or to complete the survey as a face-to-face structured interview. All participants completed the survey online via SurveyMonkey. Consent was assumed upon completing the survey, and the survey took approximately 45-minutes to complete.

3.3 Participant Recruitment

Recruitment techniques included: (a) social media networking sites, (b) posters, and (c) advertise through community organizations. International student association groups at Memorial University and multicultural/multifaith organizations in St. John's were contacted through social media networking sites (i.e., Facebook). Recruitment posters were placed at various public areas around Memorial University (e.g., University Centre, The Works, Physical Education Building, Field House, QEII and Health Sciences Libraries), and at community organizations that agreed to display the poster. Multi-faith and multicultural organizations (e.g., Muslim Association of Newfoundland and Labrador), and associations as well organizations and associations providing services for multicultural and immigrant constituents/members were contacted and requested to: (a) post the social media blurb on their social media or website, (b) hang the recruitment poster, and/or (c) agree to distribute paper copies of the survey to interested participants. Table 2 is a list of organizations that were contacted.

Table 2: Community Organizations who were Contacted to Assist with Participant Recruitment

Memorial University Associates/Units	**Multi-Faith and Multi-Cultural Organizations and Associations**	**Public and Not-For-Profit Services and Associations**
Black Student Association	African and Canadian Association of Newfoundland and Labrador	Association for New Canadians
The Memorial Chinese Students and Scholars Association	Chinese Association of Newfoundland and Labrador Multicultural Women's Organization of Newfoundland and Labrador	Atlantic Region Association of Immigrant Serving Agencies Incorporation
Egyptian Student Association	Hindu Temple	ESL-Adult Training Centre Newfoundland and Labrador Families Adopting Multiculturality Incorporation
Hong Kong Student Association	Multicultural Women's Organization of Newfoundland and Labrador	Newfoundland and Labrador Families Adopting Multiculturality Incorporation
International Student Resource Centre	Muslim Association of Newfoundland and Labrador (Mosque)	Newfoundland and Labrador Multicultural Council and Rotary Club Incorporation
Memorial University Iranians	NFLD Sikh Society Gurdwara	Refugee Immigrant Advisory Council
Libyan Student Club	Religious Social Action Coalition	United Way Newfoundland and Labrador
Muslim Student Association		Williams Family Foundation
Memorial University Rotract Club		
Sri Lankan Student's Association Spanish Society		

3.4 Variables and Measures

Participants were asked about the kinds of physical activities they did as part of their daily lives, and the amount of time they spent being physically active in those activities in the spring/summer. Activities such as walking, running, jogging, dancing, gardening, and playing soccer are considered physically active. Sociodemographic and sociocultural factors, physical activity level, perceived barriers and confidence to physical activity were the variables collected via the survey. Considering that language may be a barrier to completing the survey, the wording of the barriers scale was revised to use language appropriate for individuals whose English is a second language. Additionally, the survey was reviewed by the ESL Assistant Director at Memorial University and piloted by five international students who identified as visible minorities.

3.4.1 Sociodemographic, sociocultural and health-related factors

Sociodemographic variables included age, education, student status, employment status, household income, marital status, and size of household). Sociocultural factors included gender, country of citizenship, resident and immigration status, ethnicity, language, and religion. Participants were asked to report their height and weight (to determine BMI) and smoking status. Additionally, participants were asked to report if they currently had any "long-term health conditions." Long-term health conditions are conditions that are expected to last or have already lasted 6 months or more and that were diagnosed by a health professional (e.g., cardiovascular/heart disease, cancer, respiratory/lung disease, arthritis, chronic pain). Sociodemographic, sociocultural and health-related factors were important to assess participants' backgrounds.

3.4.2 Physical activity participation

Participants responded to the IPAQ short-form and thus were asked to report the number of days and average minutes per day spent participating in vigorous and moderate physical activities, as well as the number of minutes spent walking the past 7 days. A total physical activity score (MET min/week) was computed as the sum of the vigorous, moderate, and walking MET min/week scores. Total physical activity (total Metabolic Equivalent of Task (MET) min/week) was the predictor/independent variable. Physical activity participation was measured using the short-form of the International Physical Activity Questionnaire-Short Form (IPAQ) (Hagströmer et al., 2006). The IPAQ was selected because of its high reliability ($r = 0.76$ for the short form; Spearman's $\rho = 0.8$) and criterion validity (Spearman's $\rho = 0.30$) for measuring self-reported physical activity across multiple countries (Bauman et al., 2009; Craig et al., 2003; Hagströmer et al., 2006). The IPAQ scale has been used in various studies involving visible minorities (Dashiti et al., 2014, Mahmood et al., 2019; Perez et al., 2011; Skowron et al., 2008).

The IPAQ is a physical activity questionnaire which asks respondents in the last seven days to report the number of days per week and minutes spent in vigorous intensity physical activity, moderately intense activity, walking for at least 10 min at one time, and hours spent sitting and/or lying down (excluding sleeping) per day. Vigorous, moderate, and walking Metabolic Equivalent of Task (MET) physical activity scores were calculated as well as total physical activity MET-min/week score according to Craig et al. (2003). Total vigorous MET minutes of physical activity was calculated by multiplying the number of minutes in vigorous intensity activity by the number of vigorous intensity

days, multiplied by 8.0 METS. Total moderate MET minutes of physical activity was calculated by multiplying the number of minutes in moderate intensity activity by the number of moderate intense days, multiplied by 4.0 METS. Walking MET minutes per week was calculated by multiplying the number of walking minutes by the number of walking days, multiplied by 3.3 METS. A combined total physical activity MET min/week score was computed as the sum of the vigorous, moderate, and walking MET min/week scores; the outcome variable for the regression models.

Additionally, four questions related to sport, recreation and exercise (yes/no response to walking, bicycling, jogging/running and swimming for fun), four questions on daily activity and activity at home and work were added by the researcher (sit/stand/walk most of the day, amount of hard physical work required in a job (paid or unpaid), and if they usually walk or bike to work, school, or to do errands). These questions were added to provide more descriptive information on participants' physical activity habits and participation.

3.4.3 Physical activity barriers

Barriers to physical activity represent attitudes and beliefs about physical activity (Eyler, 2003). Barriers to physical activity among participants was assessed using the Exercise Benefits/Barriers Scale (EBBS) (Sechrist et al., 1987). Participants were asked how often they experience 36 items (e.g., lack of interest, lack of motivation, lack of resources or skills, weather, lack of family or friend support) as barriers to their physical activity on a 5-point Likert scale (1 = "strongly disagree", 2 = "disagree", 3 = "neither agree nor disagree", 4 = "agree", 5= "strongly agree"). A total barriers score was

computed with higher scores indicating greater perceived barriers to physical activity; with scores ranging from 36 (low perceived barriers) to 360 (high perceived barriers). This questionnaire has been found to be reliable and valid with coefficients ranging from 0.81 to 0.95 (Sechrist et al., 1987; Victor et al., 2012) and has good internal consistency (r = 0.81; Brown, 2005). The EBBS has been used in previous studies with visible minorities (Dashiti et al., 2014). Participants were asked to state their agreement to the perceived barriers to physical activity. The questionnaire consists of 24 items which were categorized into three domains of barriers: (1) personal and physiological such as lack of interest and lack of motivation (12 items); (2) physical and environmental such as lack of resource or skills (8 items); and (3) weather and social environmental such has lack of family or peer support (4 items). Twelve more items were added in the questionnaire by the researcher. These items included questions on participants' cultural beliefs, language barriers, and their fear of being discriminated by recreation staff. Much of the existing research suggests that people from different cultures display unique landscape preferences and environmental attitudes and values which, in turn, shape their physical activity preferences, motivations, attachments, meanings, and participation patterns (Buijs et al., 2009; Jay & Schraml, 2009; Johnson et al., 2004; Kloek et al., 2013). There is evidence to support that minority groups experienced a variety of adaptation challenges that entailed acculturative stress such as language barriers, a lack of cultural understanding, racial discrimination, and limited social network (Buijs et al., 2009; Jay & Schraml, 2009; Johnson et al., 2004; Kloek et al., 2013). One item in the questionnaire was added, addressing the fear of participating in physical due to unattended dogs. Each item is scored on a Likert scale ranging from 1 to 5 (1 = 'strongly disagree',2 = 'disagree',3 =

'neutral',4 = 'agree', and 5 = 'strongly agree'). A summed total barriers score was computed with scores ranging from 24 to 120. All these items are positive statements, which means that higher scores reflect the higher likelihood that the item is a barrier. Additionally, two questions were added by the researcher to explore participants' top five barriers and five facilitators to physical activity participation in order to help understand the common barriers and facilitators. .

3.4.4 Confidence in physical activity participation

Self-efficacy related to physical activity participation was measured using the Exercise Self-Efficacy Scale by McAuley (1993). The Exercise Self-Efficacy Scale assesses an individual's beliefs in their ability to continue exercising three times per week at moderate intensities for 40+ minutes per session in the future. The scale has demonstrated excellent reliability with internal consistency of 0.92 (Resnick & Jenkins, 2000). The scale was revised by the researcher and included moderate intensities for 30+ minutes per session in the future for one, four, six, and eight weeks. While reducing the number of items (i.e., removing weeks two, three, four, and seven) would impact the validity of the scale, this was done to reduce participant burden. For each item, participants indicated their confidence to execute the behaviour on a 100-point percentage scale comprised of 10-point increments, ranging from 0% (not at all confident) to 100% (highly confident). Total exercise self-efficacy scores were calculated by summing the confidence ratings and dividing by the total number of items (four) in the scale, resulting in a maximum possible efficacy score of 100.

3.5 Data Analysis

The data was analyzed using computer-assisted software, i.e., SPSS (Statistical Package for the Social Sciences) version 23. Data were screened for missing values and outliers prior to running statistical analyses. Following the initial data screening, descriptive statistics were analyzed, and appropriate bi-variate correlations were calculated to determine the association of individual and environmental factors with total physical activity participation. Next, a series of regression models were conducted. First, a stepwise forward regression model was tested with total physical activity participation as the outcome variable. Sociodemographic and sociocultural variables, exercise self-efficacy, and physical activity barrier items (predictor variables) that had a significant association to physical activity participation, as determined by bivariate correlations, were then entered. In the stepwise forward method, the predictor with the highest correlation with the outcome variable is entered (the "best" predictor"). If this "best" predictor" significantly improves the model, then it is retained, and the predictor with the second-highest partial correlation is entered. This process continued until a new predictor no longer improves the model or all predictors had been entered. This model determined which correlates were most salient to physical activity participation. Assumptions of multiple regression were explored prior to model testing including normality (Kolmogorov-Smirnov test), multi-collinearity (variance inflation factor (VIF) and tolerance) and homoscedasticity (regression plots; Field, 2013). To determine the fit of the regression models R^2 and adjusted R^2, F-ratio, standardized residuals, and influential cases (i.e., Cook's distance) were explored.

A second multiple regression model was analyzed was planned using a stepwise hierarchical method, again with physical activity participation as the outcome variable. However, the first model found no association between sociodemographic and sociocultural variables, exercise self-efficacy, and physical activity participation. Thus, the data was insufficient to assess the strength of the association between individual versus environmental factors and physical activity participation. (or modifiable versus non-modifiable).

CHAPTER 4: RESULTS

The following chapter presents the results compiled for this study. First, the descriptive analyses are discussed: sociodemographics, sociocultural, health-related factors, physical activity participation, barriers to physical activity participation and confidence in physical activity participation. Second, bivariate correlations of the association between predictors and physical activity participation are presented. The results of the regression analysis are presented to determine if there is a relationship between physical activity and individual and environmental barriers to physical activity participation.

4.1. Response Rate and Missing Data

All participants chose to complete an online survey. Between May 2019 and July 2019, a total of 75 people participated in the study. Data were screened for missing values and outliers. Seventeen participants started the online survey but only completed demographics or stopped after the first couple of pages and had more than 20% missing data and were excluded from the analyses. Thus, only 58 participants completed the entire survey, and 52 participants had complete data on all variables of interest.

4.2 Descriptive Analysis

4.2.1 Sociodemographic and sociocultural sample description

Descriptive statistics were performed to obtain sample characteristics for sociocultural variables (see Table 3). Approximately half (51.9%) of the sample was female and 23.4% of the sample was male, while 24.7% of the sample did not state their gender. In terms of ethnicity, 53.2% of the sample were South Asians (e.g., East Indian, Pakistani, Sri Lankan, etc.). In this sample, 10.4% were Canadian citizen by birth, and 33.8% were Canadian by naturalization. Permanent resident status reveals that 39.0% of the population were Canadian citizens, 10.4% were permanent residents, and 45.5% were landed immigrants who immigrated after 2005. The average year of immigrating to Canada was 2009. One participant had refugee status. One quarter (24.7%) of the sample were non-Canadians. In this sample, 57.1% of the participants' mother tongue was a language other than English, and 27.3% of respondents spoke English as their main language at home, and 44.2% of respondents spoke other languages such as Arabic, Bengali, Hindi, Urdu, and Punjabi. More than half of the sample (66.2%) spoke English well enough to speak with another person and 5.2% spoke both English and French.

Descriptive statistics were performed to obtain sample characteristics for sociodemographic variables (see Table 4). Mean age for the sample was 31.6 years (*SD* = 14.49; *SE* = 2.41). In terms of education, 44.2% of the respondents had some post-secondary education, 18.2 % had a university degree, and 26.0 % had a graduate degree; these figures are lower than the average Canadian population (Statistics Canada, 2016.

About two-thirds (40%) of the sample were students. The majority of the sample (36.4%) were never legally married/single, 26% of the sample were married or had common-law partners, 5.2% of the sample were divorced, and 2.6% of the sample was widowed. Employment statistics reveal that 20.8% of participants were working full time (30 hours or more per week), and 22.1% of the sample was unemployed and looking for a job. In terms of annual household income, 27.3% of the sample had a household income of equal to or less than $39,999 and 15.6% of the population had an income of $80,000 or more; over a tenth (16.9%) of the sample refused to answer. In terms of living alone or with someone else 11.7% lived alone, 11.7% lived with two or more people, 11.7% lived with three people, 13.0% lived with four people, 10.4% lived with five people, and 11.7% lived with 6 or more people.

4.2.2 Health-related factors

Health statistics reveal that 58.5% of the sample rated their health as good or better. Over half of the sample do not smoke (69.4%) (see Table 5). Longitudinal epidemiological studies indicate that higher levels of physical activity reduced the odds of initiating smoking or increasing smoking (Leatherdale et al., 2008). In general, 15.6% of the sample rated their health as excellent, 16.9% rated their health has very good, 26.0% rated their health has good, 10.4% rated their health has fair, and 1.3% rated their health as poor. In terms of BMI, 3.9% of the population were underweight, 14.3% of the sample were normal weight, 11.7% of the population were overweight, and 7.8% of the population were obese. About a third (33.8%) of the cases reported missing data on long term health conditions: 7.8% of the sample had asthma, 2.6% had arthritis, 6.5% had back

problems, 3.9% had high blood pressure, 1.3% had chronic bronchitis, 2.6% had diabetes, 5.2% had a thyroid condition, 1.3% had kidney dysfunction, and 2.6% had liver disease or gall bladder problems. The most prevalent long-term health conditions included asthma, back problems, and thyroid conditions.

4.2.3 Physical Activity Participation

Overall, the average, the sample was participating in 3038.01 MET min/week (*SD* = 2341.97; *SE* = 341.61). On average, participation in vigorous physical activity for participants was 1467.75 MET min/week (*SD* = 1691.37; *SE* = 241.62), in moderate physical activity was 644.89 MET min/week (*SD* = 1188.38; *SE* = 169.77) and in time spent walking was 812.54 MET min/week (*SD* = 971.53; *SE* = 138.79).

Participants were asked additional questions related to sport, recreation, exercise, daily activity, and activity at home and work. Participation in static activities such as watching TV was 511.60 (*SD* = 867.95). On average, participants spent more time in activities such as preparing food (*M* = 225.00, *SD* = 342.47), cooking (*M* = 93.75, *SD* = 132.80) and washing up and caring for children (M = 232.50, *SD* = 673.1). Among the 44 respondents who answered the question, 68.2% walked, and 20.5% bicycled for fun. Almost a third of these respondents (29.5%) reported jogging or running, and 22.7% went swimming. A great deal of hard physical work was required in 14.6% of respondents' jobs (paid or unpaid), 14.9% indicated a moderate amount of hard physical work, while 19.5% had little. and 39% had no hard, physical work as part of their job duties. In terms of daily activities related to moving around, 40.5% sat during most of the day, 16.7%

stood during most of the day, and 33.3% indicated walking during most of the day. Over half of the sample (54.8%) did not usually walk or bike to work, school or to do errands.

4.2.4 Perceived barriers to physical activity

Overall scores reveal that the sample had low perceived barriers to physical activity (M = 81.78; SD = 19.04, SE = 3.37; Table 6). Sticking to anything (M = 3.25; SD = 1.36), being able to get started (M = 3.21; SD = 1.38), weather (M = 3.18; SD = 1.22) and time (M =3.03; SD = 1.28) were reported as the strongest barriers to participation in physical activity. The weakest barriers were physical activity not being good for health (M = 1.46; SD = 0.614), exercise being risky because of getting older (M = 1.46; SD = 0.621) and having health problems that prevent from being physically active M = 1.93; SD = 0.981). Participants were asked to report the top 5 facilitators and barriers to participation in physical activity. The top 5 commonly reported barriers were: time (17%), laziness (12%), weather (10%), motivation (7%), and culture (4%). Research has shown that cultural variables and language barriers are related to both the adoption and maintenance of physical activity (Lim et al., 2007). The top 5 commonly reported facilitators were: having friends to participate with (12.5%); having discretionary time (6.8%), good weather (6.8%), making physical activity a priority (4.5%), and motivation (4.5%).

4.2.5 Confidence in physical activity participation

On average, participants were moderately confident in their ability to continue physical activity three times per week (for 30 minutes) at moderate intensities as indicated by their total self-efficacy score (M = 58.22; SD = 27.54). On average participants reported that they were moderately confident to participate in physical

activity three times per week at moderate intensity, for 30+ minutes for the next week (M = 67.38; SD = 30.55), the next four weeks (M = 57.63; SD = 29.90), the next six weeks (M = 55.00; SD = 29.20), and the next eight weeks (M = 52.89; SD = 30.03).

4.3 Bivariate Associations Between Physical Activity Barriers and Participation

Bivariate associations between sociodemographic and sociocultural variables, exercise self-efficacy, barriers to physical activity, and physical activity participation were examined. Appropriate correlations were conducted for the level of measurement and normality (i.e., Spearman, Point-Biserial) for all variables that were at the ordinal level of measurement or higher: sociodemographics (i.e., age, education, student status, employment status, household income, marital status, and size of household), sociocultural (i.e., gender, country of citizenship, resident and immigration status, ethnicity, language), exercise self-efficacy, and total exercise barriers, and with the outcome of total physical activity participation (see Table 7). This determined which predictors should be included in the regression model. None of the sociodemographic or cultural variables or exercise self-efficacy were significantly correlated with total physical activity participation (i.e., MET min/wk). Similarly, sociodemographics, sociocultural, exercise self-efficacy, were correlated with the 36 exercise barrier items.

4.3.1 Sociodemographic Variables

Age was not significantly associated with total physical activity participation (i.e., MET min/wk). Age was however, associated with several barriers to exercise items. Being older was positively and moderately related to perceiving the following barriers to exercise: that exercise can be risky (r = .38, p < .05), looking funny when doing physical

activities ($r = .38$, $p < .05$), not enjoying physical activities ($r = .39$, $p < .05$), thinking that physical activity is not good for their health ($r = .48$, $p < .01$), perceiving that intensity of exercise required to get health benefits are too high for them ($r = .34$, $p < .05$), body shape not allowing them to do physical activities ($r = .34$, $p < .05$), perceiving that physical activity takes too much time away from taking care of children/family ($r = .49$, $p < .01$), and perceiving that facilities do not have staff who speak languages other than English/French ($r = .36$, $p < .05$).

Education, employment, and student status were not significantly associated with total physical activity participation (i.e., MET min/wk). A greater level of education was positively associated with perceiving that physical activity takes too much time away from taking care of children/family ($r = .40$, $p < .05$). When looking at the correlations with employment status, the results indicate a negative association with greater perceived self-efficacy to exercise ($r = -.33$, $p < .05$). Being employed was moderately and negatively associated with having health problems getting them from being physically active ($r = -.43$, $p < .01$), with perceiving physical activity to be hard and tiring ($r = -.36$, $p < .05$), and with wanting to get more physically activity, but can't make themselves stick to anything ($r = -.37$, $p < .05$). Being a student was associated with not knowing how to use sports equipment or specialties in doing physical activity ($r = .32$, $p < .05$). Greater income was associated with perceiving oneself to look funny when doing physical activity ($r = -.33$, $p < .05$) and perceiving facilitates to not have staff trained to make people from all cultures feel welcome ($r = -31$, $p < .05$). Income and marital status were not associated with total physical activity nor were sociodemographics associated with any of the perceived barriers to physical activity.

4.3.2 Sociocultural Variables

Gender was not significantly associated with total physical activity participation (i.e., MET min/wk). Being female was moderately and negatively related to thinking they are not talented in doing physical activity (r = -.34, p < .05) and positively related to perceiving that physical activity takes too much time away from taking care of children/family (r = .34, p < .05), and with fear of unattended dogs (r = .41, p < .05). When looking at the correlation between a participants' resident and immigrant status, and year of immigration were not associated with total physical activity participation or barriers to exercise except for a shorter time since immigration being positively related to visible minorities reporting not having the energy to do physical activity as a barrier (r = .44, p < .05).

Language variables were not significantly associated with total physical activity participation (i.e., MET min/wk) but were with a couple of barriers to physical activity items. Having a mother language other than English was negatively associated with reporting being too lazy to do physical activities (r = -.39, p < .05) and wanting to be more active but not being able to get started (r = -.31, p < .05). Speaking a language other than English at home was negatively related to perceiving that exercise facilities do not have staff trained to make people from other cultures welcome (r = -.31, p < .05), and perceiving that facilities do not have staff who speak languages other than English or French (r = -.39, p < .05).

4.3.3 Exercise Self-Efficacy

Exercise self-efficacy was not significantly associated with total physical activity participation (i.e., MET min/wk) but was associated with several barriers to physical activity items. Visible minorities who had greater exercise self-efficacy had lower perceived barriers to the following items: feeling pain during exercise (r = -.33, p < .05), physical activity is hard and tiring (r = -.39, p < .05), too lazy to do physical activity (r = -.35, p < .05), lacking will-power in performing physical activity (r = -.50, p < .01), not having friends to do physical activity together (r = -.41, p < .05), not knowing how to use sports equipment or specialties in doing physical activity (r = -.36, p < .05), not thinking they can make time to include physical activity in their regular schedule (r = -.43, p < .01), none of their family/friends like to do anything active (r = -.41, p < .01), not being able to get started being physically active (r = -.60, p < .01), not being able to make themselves stick to anything (r = -.51, p < .01), and never having learned the skills for any sport (r = -.32, p < .05).

4.4 Regression Analysis

4.4.1 Assumptions of regression

Assumptions of multiple regression were explored prior to model testing. Results of the Kolmogorov-Smirnov test revealed that total physical activity participation did not follow a normal distribution ($D_{(58)} = 0.150$, p = .01); thus bootstrapping was applied to regression models. Based on the coefficients output, collinearity statistics, obtained VIF value of multi-collinearity results revealed that there was a multicollinearity of 1 and 1.028. The VIF value obtained was between 1 to 10, and thus, it can be concluded that

there was no multicollinearity. According to the regression plot, the results revealed that there was homoscedasticity.

4.4.2 Most salient barriers to PA participation

The bi-variate associations indicated that total physical activity participation (i.e., MET min/wk) was not significantly associated with any of the sociodemographic, sociocultural, or exercise self-efficacy. Thus, it was decided to not include these variables in the model and to focus on the specific barriers to exercise. A stepwise forward regression model was tested with total physical activity participation as the outcome variable with 36 barriers to physical activity as the predictor variables. Only two barrier items were found to be significant and positively and highly correlated to physical activity: *physical activity taking too much time away from taking care of family members* and *not being talented in physical activity*. All other barrier items were found to have insignificant partial correlations and thus did not improve the model (see Table 8).

Taking too much time away from taking care of family members was the strongest barrier to physical activity ($\beta = 0.42$, $t = 2.538$, $p = .017$). To determine the fit of the regression models, standardized residuals and influential cases (i.e., Cook's distance) were explored as well as *F*-ratio, R^2, and adjusted R^2. This model (Model 1) was a significant fit ($F_{(1,57)} = 6.439$, $p = .017$) and accounted for 15% ($R^2 = 0.177$; $R^2_{adj} = 0.149$) of the variance in total physical activity participation. *Not being talented in doing physical activity* was the next most salient barrier ($\beta = 0.339$, $t = 2.131$, $p = .042$). Model 2, with both barriers in the model, was a significant fit ($F_{(2,56)} = 5.870$, $p = .007$) and accounted for 24% ($R^2 = 0.288$; $R^2_{adj} = 0.239$) of the variance in total physical activity

participation. The strength of *taking too much time away from taking care of family members* as a barrier slightly increased ($\beta = 0.477$) in Model 2. The R^2 change from Model 1 to 2 was .111; thus, having both barriers in the model (as opposed to one barrier) improved the model fit by 11.1%.

4.4.3 Strength of modifiable environmental and individual factors influencing PA participation

A second multiple regression model using a stepwise hierarchical method had originally been planned. This model would determine the strength of the association between modifiable environmental and individual factors and physical activity participation, after controlling for non-modifiable factors. Considering that only two barriers, as described above, were significantly associated with total physical activity in the stepwise forward regression model this second regression model was not conducted. Both of these barriers are modifiable individual factors.

Table 3: *Sociocultural factors of sample (*n = *58)*

Sociocultural Factors	% (*n*)	Sociocultural Factors	% (*n*)
Gender		**Country born**	
Female	40 (51.9)	Bangladesh	4 (5.2)
Male	18 (23.4)	Canada	7 (9.1)
Other	--	Egypt	1 (.13)
Ethnicity		Ethiopia	1 (1.3)
Arab	4 (5.2)	India	1 (1.3)
Black	4 (5.2)	Iran	1 (1.3)
Chinese	--	Iraq	1(1.3)
Filipino	--	Italy	1(1.3)
Japanese	--	Kuwait	1(1.3)
Korean	--	Lebanon	1(1.3)
Latin American	--	Nigeria	1(1.3)
South Asian	41 (53.2)	Pakistan	25 (32.5)
Southeast Asian	--	Saudi Arabia	5 (6.5)
West Asian	1 (1.3)	Sudan	1 (1.3)
White	5 (6.5)	UAE	2 (2.6)
Other	1 (1.3)	USA	3 (3.9)
		Zimbabwe	1 (1.3)
Language at home		**Speak English/ French**	
English	21 (27.3)	No	--
French	--	English only	51 (66.2)
Other 34(44.2)		French only	--
		Both English and French	4 (5.2)

Table 4: Sociodemographic factors of sample (n = 58)

Sociodemographic Factors	% (*n*)	Sociodemographic Factors	% (*n*)
Education		**Employment**	
Less than high school diploma	2 (2.6)	Employed, full-time	16 (20.8)
High school diploma or equivalency certificate	14 (18.2)	Employed, part-time	15 (19.5)
Trade certificate or diploma	1 (1.3)	Unemployed and looking	17 (22.1)
College, CEGEP or other non-university certificate	2 (2.6)	Unemployed and unable to work	4 (5.2)
University certificate	1 (1.3)	Retired	--
Bachelor's degree	14 (18.2)	**Household income**	
Graduate or post- graduate degree	20 (26.0)	No income or less than $20,000	10 (13.0)
Student Status		$20,000 to $39,000	11 (14.3)
No	24 (31.2)	$40,000 to $59,000	3 (3.9)
Yes, part-time	7 (9.1)	$60,000 to $79,000	5 (6.5)
Yes, full-time	24 (31.2)	$80,000 or more	12 (15.6)
Marital status		Don't know/Refuse to answer	13 (16.9)
Never legally married (single)	28 (36.4)	**Household Size**	
Legally married/Common-law	19 (24.7)	Live alone	9 (11.7)
Separated, but still legally married	1 (1.3)	2 people	9 (11.7)
Divorced	4 (5.2)	3 people	9 (11.7)
Widowed	2 (2.6)	4 people	10 (13.0)
		5 people	8 (10.4)
		6 or more people	9 (11.7)

Table 5: Health-related factors of sample (n = 52)

Presence of Long-term Health Conditions	**% (*n*)**	**Presence of Long-term Health Conditions**	**% (*n*)**
Asthma	6 (7.8)	Arthritis	2 (2.6)
Osteoporosis	--	Back problems	5 (6.5)
High blood pressure	3 (3.9)	Chronic bronchitis	1 (1.3)
Emphysema	--	COPD	--
Diabetes	2 (2.6)	Heart disease	--
Cancer	--	Suffer from effects of stroke	--
Thyroid condition	4 (5.2)	Kidney dysfunction or disease	1 (1.3)
Liver disease or gallbladder problems	2 (2.6)	**Perceived Heath Status**	**% (*n*)**
		Excellent	12 (15.6)
		Very good	13 (16.9)
		Good	20 (26.0)
		Fair	8 (10.4)
		Poor	1 (1.3)

Table 6: Descriptive Statistics of Barriers to Physical Activity Participation (*n* = 52)

Barrier Items	**M**	**SD**	**SE**
I don't have energy to do PA (I)	2.28	0.99	0.17
I feel pain during exercise (I)	2.37	1.29	0.19
I have health problems that keep me from being physically active (I)	1.93	0.98	0.17
I am getting older so exercise can be risky (I)	1.46	0.62	0.10
PA is hard and tiring(I)	2.37	1.21	0.21
I look funny when doing physical activities(I)	1.62	0.75	0.13
Exercise facilities or sports area do not have staff trained to make people from all cultures feel welcome (E)	2.28	1.11	0.19
I am not interested in doing exercise or physical activities(I)	2.09	0.99	0.17
I don't enjoy physical activities or exercise (I)	2.15	1.11	0.19
I think other fun activities with friends or family members are more fun than exercise or physical activities (I)	3.18	1.17	0.20
I think PA is not good for my health (I)	1.40	0.61	0.10
I'm afraid of hurting myself (I)	1.90	1.02	0.18
I'm too lazy to do physical activities(I)	2.93	1.43	0.25
Intensity of exercise required to get health benefits are too high for me (I)	2.09	0.89	0.15
I think I'm not talented in doing physical activities (I)	2.09	1.02	0.18
I lack will-power in performing physical activities (I)	2.84	1.34	0.23
My body shape doesn't allow me to do physical activities (I)	1.62	0.60	0.10
I am afraid of being discriminated due to my cultural heritage (I)	1.65	0.70	0.12
My family members or friends don't encourage me to do physical activities (I)	1.96	0.93	0.16
I don't have free time to exercise or do physical activities (I)	3.03	1.28	0.22
PA takes too much time away from taking care of my children or family members (I)	2.37	1.15	0.20
There are no exercise facilities or places to do physical activities in my residential areas, such as parks, walking trails, bike paths, recreation centres, playgrounds or public swimming pools (E)	2.00	0.91	0.16
Exercise facilities or sports areas are too far and I don't have transportation (I)	1.87	0.83	0.14
Exercise facilities or sports areas do not accommodate my cultural beliefs (E)	2.09	1.08	0.19
Exercise facilities do not have staff who speak languages other than English or French (E)	2.03	0.86	0.15
I don't know how to use sports equipment or specialties in doing physical activities (I)	2.12	1.09	0.19
I don't have money to go to sports facilities such as gymnasium or to buy sports equipment or clothes (I)	2.18	0.96	0.17
I don't think I can make time to include PA in my regular schedule (I)	2.75	1.13	0.20

None of my family members or friends like to do anything active(I)	1.90	0.85	0.15
I've been thinking about getting more PA, but I can't seem to get started (I)	3.21	1.38	0.24
Barrier Items	**M**	**SD**	**SE**
I want to get more PA, but I just can't seem to make myself stick to anything (I)	3.25	1.36	0.24
I don't get enough PA because I have never learned the skills for any sport (I)	2.34	1.18	0.20
I don't get enough sleep to do some PA(I)	2.5	1.16	0.20
I don't participate in PA because I have a fear of unattended dogs (E)	2.09	1.30	0.23

I = individual factor; E = environmental factor

Note: Participants were asked how often they experience given items as barriers to their physical activity on a 5-point Likert scale (1 = "strongly disagree", 2 = "disagree", 3 = "neither agree nor disagree", 4 = "agree", 5= "strongly agree").

Table 7: Bi-Variate Correlations of Predictor Variables, Barriers to Exercise, and Physical Activity Participation

Variables	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. Gender	-.04	-.20	-.26	-.07	.00	-.13	-.13	-.01	-.17	.02	-.04	-.10	-.06	.16	.05	.02	.05	.47**	.03
2. Age		.07	-.31*	-.25	-.29	-.46*	-.14	.08	.20	-.07	.66**	-.74**	.13	-.27	.86**	-.15	-.07	.19	-.11
3. What country a citizen of			.16	-.73**	--	--	.47**	.56**	.47**	-.18	-.02	.11	--	.15	.03	.21	-.03	-.20	.18
4. **Permanent resident of Canada**				.33*	.49**	.65**	.14	.19	.12	.02	-.10	.40**	-.16	-.18	-.30*	-.281*	-.10	.20	.10
5. Landed immigrant in Canada					-.07	.10	.04	-.19	-.35*	.08	-.16	.22	.17	-.34*	-.32*	-.21	-.14	.29	-.08
6. Year landed immigrant						.89**	-.08	.04	.08	-.08	-.19	.17	.03	.06	-.20	.08	.34	.18	.30
7. **Year immigrate to Canada**							-.16	.22	.17	-.02	-.30	.42*	-.09	.19	-.33	.28	.25	.00	.12
8. Ethnicity								.31*	.00	-.18	-.02	.19	.13	.01	-.21	.13	-.13	-.43*	-.08
9.Mother language									.54**	-.21	.12	.02	-.20	.21	.05	.22	-.14	.05	-.22
10. Language speak at home										-.21	.17	-.16	-.17	.18	.10	.08	.04	-.26	-.18
11.Speak English or French well enough											-.21	-.04	.09	-.16	.10	-.08	.15	.25	.12
12. Education												-.40**	-.02	-.08	.40**	-.13	.06	.12	.03
13. Student													-.07	.10	-.60**	.06	-.31	.06	.21
15**. Employment status**														-.18	.15	-.23	.33*	-.18	.08
15. **Household income**															-.12	.32*	.10	-.24	-.11
16. **Marital Status**																-.17	-.04	.24	-.11

Variables	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
17. **People live with**																	-.12	-.22	-.19
18. Self-Efficacy																		-.26	.09
19. **Barriers to Exercise**																			.21
20. **Physical Activity (**																			

* $p < .05$, ** $p < .01$, *** $p < .001$

Table 8: Stepwise Regression of Barriers to Exercise on Physical Activity Participation (METS min/wk)

	Unstandardized Coefficients		Standardized Coefficients			
Model 1	*ß*	Std. Error	Beta	*t*	*p*	$F_{(df1, df2)}$; *p*
Physical activity taking too much time away from taking care of family members						
$R^2 = .177$; $R^2_{adj} = .149$	3315.497	1306.593	.420	2.538	.017	$6.439_{(1, 57)}$; .017
	Unstandardized Coefficients		Standardized Coefficients			
Model 2	*ß*	Std. Error	Beta	*t*	*p*	$F_{(df1, df2)}$; *p*
Physical activity taking too much time away from taking care of family members	3759.364	1253.134	.477	3.000	.005	
Not being talented in physical activity	3007.427	1411.313	.339	2.131	.042	
$R^2 = .288$; $R^2_{adj} = .239$						$5.870_{(2, 56)}$; .017

outcome variable = total physical activity participation (MET min/wk)

CHAPTER 5: DISCUSSION

The purpose of this survey-based study was to explore the individual (physiological and psychological) and environmental (social, policy, and physical) barriers that affect physical activity in visible minorities living in urban, St. John's, NL. This chapter discusses the results of the study. The strengths and limitations of the present study and future recommendations are presented.

5.1 Physical Activity Participation

Physical activity participation was measured using the IPAQ short-form; total physical activity score (MET min/week) was computed as the sum of the vigorous, moderate, and walking MET min/week scores. Overall, the average, the sample was participating in 3038.01 MET mins/week (*SD* = 2341.97; *SE* = 341.61). This average is very high and also has high variability; this can suggest a measurement error.

Participants participated the most in vigorous physical activity (1467.75 MET mins/week), followed by walking (812.54 MET mins/week), and finally, moderate physical activity (644.89 MET mins/week). Participants were asked additional questions related to sport, recreation, daily activity, and activity at home and work. A great deal of hard physical work was required in 14.6% of respondents' jobs (paid or unpaid), 14.9% indicated a moderate amount of hard physical work, while 19.5% had little, and 39% had no hard, physical work as part of their daily activities. Many participants spent much of their day standing, walking, and doing household chores.

None of the sociodemographic or cultural variables or exercise self-efficacy were significantly correlated with total physical activity participation (met min/wk). Research

has found that women, compared to men, have lower levels of physical activity (Crespo et al., 2001; Marquez & McAuley, 2006). This gender discrepancy is often higher among visible minorities (Ceria-Ulep et al., 2011; King et al., 2000). In the current study, despite having an equal gender distribution, being female was related to lower physical activity scores but was not statistically significant. The majority of studies find that age to be inversely related to physical activity levels (Biddle et al., 2005; Sallis et al., 2000). While this age was negatively related to physical activity levels, it was not significant. Similarly, education, income, and marital status were not significantly associated with physical activity though were in the expected direction. Lack of significant association with sociodemographic and sociocultural variables is odd; lack of statistical power and measurement error could be the reason for these results.

5.2 Perceived Barriers to Physical Activity

Participants were asked how often they experience 36 barriers to their physical activity on a 5-point Likert scale. A total barriers score was computed with higher scores indicating greater perceived barriers to physical activity. Overall scores reveal that the sample had low perceived barriers to physical activity (M = 81.78; SD = 19.04, SE = 3.37). In the current study, family-related variables were rated as low or moderate. Viewing physical activity as taking participation as taking too much time away from taking care of my children or family members was one of the stronger barriers reported. Not being talented in physical activity, physical activity being tiring, feeling lazy, not being able to get started, other activities with friends/family are more fun, weather, and time were among the strongest barriers to participation in physical activity. Lack of motivation and difficulty initiating participation and perceived lack of time are common personal barriers to physical activity among adults (Cerin et al., 2010; Reichert et al., 2007). Weather is also a common barrier to physical activity (Reichert et al., 2007). Among visible minorities, the weather has been found to be one of the more frequently reported barriers (Gothe & Kendall, 2016; Henderson & Ainsworth, 2003; Taylor et al., 2008; Nies, Vollman, & Cook, 1999; Wilcox et al., 2000). In this study, constraints that were related to socio-cultural factors (e.g., not having staff or facilities who were sensitive to cultural differences or feeling discriminated against) were not perceived to be very strong barriers.

Research has shown that cultural variables that influence perceptions of physical activity are related to both the adoption and maintenance of physical activity (Lim et al.,

2007). For example, in some cultural settings, physical activity performed by females is considered culturally inappropriate (Henderson et al., 1996). While socio-cultural variables were not significantly associated with total physical activity levels, they were associated with several of the more salient barriers to physical activity. This study found that being female was moderately and negatively related to thinking they are not talented in doing PA. Being female was also positively related to perceiving that PA takes too much time away from taking care of children/family and fear of unattended dogs. A shorter immigration time was positively associated with reporting not having the energy to do physical activity as a barrier. Having a "mother" language other than English was positively correlated with being lazy to do physical activities and wanting to be more active and not being able to get started. Language barrier was negatively associated with barriers to physical activity and perceiving that exercise facilities do not have staff trained to make people from other cultures feel more welcome and having staff trained at exercise facilities to speak languages other than English or French.

Sociodemographic variables were also related to several of the perceived barriers to physical activity. Level of education was positively correlated with perceiving that physical activity takes too much time away from taking care of children/family which is consistent with previous research (Eun-Ok & Nyoung, 2001). When looking at student status, being a student was correlated with not knowing how to use sports equipment or specialties when doing physical activity. Previous research has found similar knowledge barriers among visible minority university students (Li & Stokolska, 2006). As with previous research (Winter et al., 2004), this study also found employment status and income to be positively related to physical activity levels. Employment statistics revealed

that being employed was moderately and negatively associated with having health problems getting them from being physically active, with perceiving PA to be hard and tiring, and with wanting to get more physically activity, but can't make themselves stick to anything.

To determine the most salient barriers to physical activity, a stepwise forward regression model was tested with total physical activity participation as the outcome variable with 36 barriers to physical activity as the predictor variables. Only two barrier items were found to be significant and positively and highly correlated to physical activity: physical activity taking too much time away from taking care of family members (ß = 0.42) and not being talented in physical activity (ß = 0.339). These two barrier items accounted for 20% of the variance in total weekly physical activity levels. Previous research has found that family responsibilities tend to be prevalent and strong barriers to physical activity among visible minorities (Eun-Ok & Nyoung, 2001; Gothe & Kendall, 2016; Jones & Nies, 1996). Viewing one-self as not being talented enough may suggest a lack of confidence to do physical activity (Reichert et al., 2007) or lack of experience in physical literacy.

5.4 Limitations and Future Research

The results of this study need to be interpreted in light of its limitations. A cross-sectional, self-report survey was used. Being cross-sectional, this study can only provide associations, not causation, and does not allow interpretations about the direction of the effects (Field, 2013). A major limitation of cross-sectional studies; however, is that since exposure and outcome are simultaneously accessed, it is not possible to infer a temporal association or establish cause and effect (Field, 2013). We don't know, for example, if greater barriers to physical activity were the cause of lower physical activity participation.

The results of this study have low generalizability. This study is limited to visible minorities living in St. John's, NL, and thus, results may not be comparable to other cities, provinces, or rural areas. However, research on visible minorities living in NL is limited in general, and the population of visible minorities in St. John's is continually growing. Future research should consider studying examining factors that affect physical activity in visible minorities living in rural NL and elsewhere. Comparing factors experienced by urban versus rural visible minorities is also an important future research direction. For example, Taylor et al. (2018) examined socio-ecological factors influencing 892 children's perceptions of barriers to physical activity in Ontario, Canada. They found that children's perceived barriers to physical activity differed between place/physical environment (i.e., large urban city, urban small-town, rural small-town, or rural).

Volunteer based sample is also a limitation of the study in terms of ethnicity and student status (Newman & Robson, 2009). Half of the study participants were South

Asian Muslims. This limits the generalizability of findings to other visible minority populations. Additionally, 40% of the sample were students. The population statistics on the number of visible minorities living in St. John's is unknown. The high response from students could suggest sample bias or that many visible minorities live in St. John's to attend a post-secondary institution; likely, both are true. Methods of recruitment likely contributed to these biases. Recruitment techniques included advertisements through International student association groups at Memorial University multicultural/multifaith organizations in St. John's. As a Muslim and a graduate student, the organizations and communities that I am a member of assisted me the most with the recruitment. St. John's in a smaller urban city; there could also be a response bias towards people who knew me or recognized my name in the recruitment materials.

A very small sample size and missing data are recognized as significant limitations of this study. Only seventy-five individuals started the online survey; 17 people started the online survey but only completed demographics or stopped after the first couple of pages. Thus, only 58 participants completed the survey, and 52 participants had complete data for multivariate analysis. A limitation of a small sample size is that it can increase the chance of type II errors (chance of assuming true as a false premise; Faber & Fonseca, 2014), and it is thus unable to detect significance. The small sample size is primarily due to the difficulties experienced during recruitment. Data for this study was collected during the spring and summer. Summer is often not an ideal time to collect data due to people being away and on holidays. Additionally, students are often not on campus during this time period. Another issue with this time period for data collection is that it included the month of Ramadan; Muslims would have been less likely

to respond to the survey during this period. I would recommend future research planning data collection around summer and religious holidays. As previously stated, the organizations that I am a member of assisted me the most with data collection. Many of the non-profit organizations I contacted did post posters, but understandably did not have the time or staff to help. I would recommend that future researchers network with and develop stronger relations with community organizations before approaching them for assistance with recruitment. The period of data collection could not be extended due to time restrictions and limited resources. Visible minorities are a population that can be very difficult to recruit for research; community access and logistical challenges are greater in locations with a smaller visible minority population (Quay et al., 2017).

Language barriers and cultural factors may have both reduced the response rate and increased missing data. The response rate among visible minorities is often low due to language barriers in reading recruitment materials and misgivings in participating in research (Quay et al., 2017). Among those respondents who completed the demographic portion of the survey, 27.3% of respondents spoke English as their main language at home, and more than half of the sample (66.2%) spoke English well enough to talk with another person. Language barriers could, however, have been an issue for those missing data. The survey was revised by an English as a second language instructor to assist with question clarity and use of appropriate words and was pilot studied among several visible minorities whose first language was not English. Future research is needed to develop and standardize physical activity related scales that are more appropriate for individuals whose first language is not English.

Low response rate and missing data could have been due to fear of lack of personal privacy or security within this vulnerable population (Quay et al., 2017). Twenty-percent of respondents didn't complete the socio-demographic section of the survey, and among those who did, there was a lot of missing data. For example, 28% of individuals did not report income, and 44% of participants did not report immigration year (44% of cases). Potential sensitive data is often underreported among vulnerable groups who are more at risk of revealing such information (Kadango, 2015).

The validity and reliability of the scales used in this study have both strengths and limitations. Best efforts were made to select the most appropriate tools for this population. Physical activity scores, has measured by the IPAQ, were highly variable as indicated by the large standard deviation and error scores. While some studies have used the Physical Activity Barriers Questionnaire among visible minorities (e.g., Dashiti et al., 2014), there have been no studies to examine its psychometrics and cultural validity among this population. In the current study, the wording of the questionnaire was revised so that simple English language terms. Additionally, I added 12 items to the scale based on a review of literature of commonly reported barriers among visible minorities in qualitative research. These items included questions on participants' cultural beliefs, language barriers, and their fear of being discriminated by recreation staff. While modifying a scale could reduce the validity of the scale (Thorndike, 1991), including barrier items that were socio-culturally appropriate for this population would also increase the validity of the scale. Future research is needed to develop and test measurement tools that are sensitive and specific to visible minority minorities.

Qualitative research for future research can help address some of the challenges described.

5.4 Conclusion

Recruitment was challenging in this study. Future researchers should educate themselves about the issues and challenges of studying vulnerable populations and visible minorities in particular. I suggest that future researchers develop reciprocal relationships with a number and variety of multi-cultural and multi-faith organizations who can help facilitate recruitment. Networking with and getting to know key leaders in these communities would be an asset. Future researchers could attend events hosted by local multicultural organizations to invite research participation (e.g., disseminate survey invitations or hard-copies of the survey). Future research should conduct data collection during several different time periods throughout the year and for an extended period of time. Data collection for the present study lasted for two months; future researchers should continue data collection for a longer period (Dillman, 2000). Providing some sort of compensation to participants would increase response (Dillman, 2000).

Future research should explore factors that affect physical activity in specific sub-groups among visible minorities. For example, earlier, I suggested exploring experiences of visible minorities living in rural versus urban areas. Future research should also compare factors that hinder physical activity among different ethnic and culturally visible minority groups. For example, do people who identify as being South East Asian experience any significant factors that do not hinder participation among African-Canadians, and vice versa. Finally, it has been observed that different cultural and

societal expectations for women appear to affect physical activity participation (Corbin et al., 2003). Future research is needed to explore further gender differences in physical activity barriers among visible minorities.

The primary objective of the thesis was to determine factors influencing physical activity participation among visible minorities. Based on previous research, it was concluded that physical activity among different ethnic/racial minority groups is essential and research in this area is limited. The most significant results of the current study are perhaps the lessons learned.

Developing and testing culturally appropriate scales related to physical activity is needed. This would include both the consideration of language as well as content that may be unique to the experience of visible minorities (e.g., discrimination). Until culturally sensitive scales are tested, survey methods may not be appropriate with this population. If surveys are used, I would recommend planning to recruit participants to participate in a short, face-to-face survey.

The current research is valuable because research in the area of barriers to physical activity in visible minorities is limited. This area of study can be challenging in terms of determining the appropriate research design, selecting appropriate measures, and in recruiting participants; however, it is important for current and future researchers to take on these challenges in order to begin advancing this field of study. The unique experiences of visible minorities Canada needs to be considered in the context of physical activity. Integrating physical activity into the lives of visible minorities should be prioritized.

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APPENDIX A: SURVEY

BARRIERS TO PHYSICAL ACTIVITY IN VISIBLE MINORITIES

Thank you for taking the time to complete this survey. We want to learn about the physical activity patterns of visible minorities and the factors that may keep you from being physically active. There are no correct or right answers to any of the following questions. Please respond to the best of your ability. Please be open and honest in your responding. You may skip any question. You do not have to answer a question if you do not want to and you can stop completing the survey at any time.

You may have a friend or family member assist you in completing the survey if you need help reading or understanding the questions.

A. BACKGROUND INFORMATION

The following are questions about your demographics. Please answer each question by circling the answer or by filling in the space provided.

1. **What is your gender**?

☐ Male ☐ Female ☐ Other

2. **What year were you born?** _____

3. **In what country were you born?** _____

4. **What country are you a citizen of? (check all that apply if you have dual citizenship)**

☐ Canada, by birth ☐ Canada, by naturalization ☐ Other country-specify: _____

5. **Are you a permanent resident of Canada?**

☐ Yes, I am a Canadian citizen ☐ Yes, I am a permanent resident ☐ No

6. **Are you a refugee in Canada?**

☐ Yes ☐ No ☐ Don't Know

7. **Are you now or have you been a landed immigrant in Canada?**

☐ Yes ☐ No ☐ Don't Know

   a. **If yes, in what year did you first become a landed immigrant?**

   b. **If yes, in what year did you first immigrant to Canada?**

8. **Are you an Aboriginal person (First Nations, Métis or Inuit)?**

☐ No, I am not an Aboriginal person

☐ Yes

9. What is your ethnicity?

- ☐ White
- ☐ Japanese
- ☐ Chinese
- ☐ Filipino
- ☐ Korean
- ☐ South Asian (e.g., East Indian, Pakistani, Sri Lankan, etc.)
- ☐ Southeast Asian (e.g., Vietnamese, Cambodian, Malaysian, Loatian, etc.)
- ☐ West Asian (e.g., Iranian, Afghan, etc.)
- ☐ Arab
- ☐ Black
- ☐ Latin American
- ☐ Other, please specify: _____

10. What is your religious preference (religion)?

- ☐ Non-religious
- ☐ Christian
- ☐ Muslim
- ☐ Jewish
- ☐ Other religion, please specify: _____
- ☐ Hindu
- ☐ Sikh
- ☐ Buddhist

11. What is the <u>language</u> that you first learned at home in childhood and still understand (mother tongue)?

- ☐ English
- ☐ French
- ☐ Other, please specify: _____

12. What language do you speak most often at home?

- ☐ English
- ☐ French
- ☐ Other, please specify: _____

13. Can you speak English or French well enough to speak with another person?

- ☐ No, I do not speak English or French
- ☐ English only
- ☐ French only
- ☐ Both English and French

14. What is the highest degree or level of school/education you have completed?

- ☐ Less than a high school diploma or its equivalent
- ☐ High school diploma or a high school equivalency certificate
- ☐ Trade certificate or diploma
- ☐ College, CEGEP or other non-university certificate or diploma (other than trades certificates or diplomas)
- ☐ University certificate or diploma below the bachelor's level

□ Bachelor’s degree (e.g., B.A., B.A.(Hons), B.Sc., B.Ed., LL.B.)

□ Graduate or post-graduate degree (e.g., M.A., M.Sc., M.D., Ph.D).

15. Are you a student, going to school?

☐ No ☐ Yes, part-time student ☐ Yes, full-time student

16. What is your current employment status?

☐ Employed (paid worker), full-time (30 hours or more per week)

☐ Employed (paid worker), part-time (less than 30 hours per week)

☐ Unemployed and looking for a job

☐ Unemployed and not able to work

☐ Retired

17. What is your total household income (Canadian dollars)?

☐ No income or less than $20,000

☐ $20,000 to $39,999

☐ $40,000 to $59,999

☐ $60,000 to $79,999

☐ $80,000 or more

☐ Don't know/Refuse to answer

18. What is your marital status?

☐ Never legally married (single)

☐ Legally married/ Common-law (and not separated)

☐ Separated, but still legally married

☐ Divorced

☐ Widowed

19. Including yourself, how many people do you live with?

☐ 0, I live alone

☐ 1

☐ 2

☐ 3

☐ 4

☐ 5

☐ 5 or more

B. HEALTH BACKGROUND

The following are questions about your health. Please answer each question by circling the answer or by filling in the space provided.

1. How tall are you?

Feet: _____ Inches: _____

OR

Meters: _____ Centimeters: _____

2. How much do you weigh?

Kilograms (Kgs): _____ OR Pounds (lbs): _____

3. Do you <u>currently</u> smoke tobacco cigarettes, cigars or pipes?

☐ Yes

☐ No If no, have you ever smoked tobacco cigarettes, cigars or pipes?

□ Yes □ No

4.

5. In general, would you say your health is... ? (circle one)

Excellent	Very good	Good	Fair	Poor	Agree	Don't know

6. I am interested in knowing any "long-term health conditions" you may have. These are health issues which are expected to last or have already lasted 6 months or more and that have been diagnosed by a health professional. **Do you have any of the following health conditions? Please check all that apply.**

	Yes	**No**	**Don't Know**
Asthma	☐	☐	☐
Arthritis (excluding fibromyalgia)	☐	☐	☐
Osteoporosis	☐	☐	☐
Back problems (excluding fibromyalgia, arthritis, osteoporosis)	☐	☐	☐
High blood pressure	☐	☐	☐
Chronic bronchitis	☐	☐	☐
Emphysema	☐	☐	☐
Chronic obstructive pulmonary disease (COPD)	☐	☐	☐
Diabetes	☐	☐	☐
Heart disease	☐	☐	☐
Cancer	☐	☐	☐
Suffer from the effects of a stroke	☐	☐	☐
Thyroid condition	☐	☐	☐
Kidney dysfunction or disease	☐	☐	☐
Liver disease or gallbladder problems	☐	☐	☐

C. PHYSICAL ACTIVITY

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the **spring/summer**. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for exercise, sport or fun.

Vigorous Physical Activities

Think about all the vigorous activities that you did in the spring/summer. Vigorous physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

1. During the spring/summer, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling?

☐ Days per week

☐ No vigorous physical activities (Skip to question 2)

a. How much time did you usually spend doing **vigorous** physical activities on one of those days?

☐ Hours (hr) plus ☐ Minutes (min) per day

☐ Don't know/Not sure

Moderate Physical Activities

Think about all the **moderate** activities that you did in the spring/summer. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

2. During the **spring/summer**, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking?

☐ Days per week

☐ No moderate physical activities (Skip to question 3)

a. How much time did you usually spend doing **moderate** physical activities on one of those days?

☐ Hours (hr) plus ☐ Minutes (min) per day

☐ Don't know/Not sure

Walking

Think about the time you spent **walking**. This includes at work and at home, walking to travel from place to place, and any other walking that you have done solely for, sport, exercise, or fun in your free time.

3. During the **spring/summer**, how many days did you **walk** for at least 10 minutes at a time?

☐ Days per week

☐ No walking
(Skip to question 4)

b. How much time did you usually spend doing **walking** on one of those days?

☐ Hours (hr) plus ☐ Minutes (min) per day

☐ Don't know/Not sure

Sitting

The last question is about the time you spent **sitting** on weekdays during the **last 7 days**. Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

4. During the **last 7 days**, how much time did you spend **sitting** on a **week day**?

☐ Hours (hr) plus ☐ Minutes (min) per day

☐ Don't know/Not sure

Sports, Recreation and Exercise

5. Do you exercise or play sports regularly?

☐ No (Skip to Question 6) ☐ Yes

a. How long have you exercised or played sports regularly?

_____(years) _____(months)

b. How often do you participate in sport or physical activity?

☐ Daily ☐ Weekly ☐ Monthly ☐ Yearly ☐ Nev

6. Do you **walk** for fun?

☐ No ☐ Yes

7. Do you **bicycle** for fun?

☐ No ☐ Yes

8. Do you go **jogging or running**?

☐ No ☐ Yes

9. Do you go **swimming**?

☐ No ☐ Yes

Daily Activity and Activity at Home and Work

10. Which of the following best describes your daily activities related to moving around?

- □ Sit during most of the day
- □ Stand during most of the day
- □ Walk during most of the day
- □ Don’t know

11. How much hard physical work is required on your job (paid or unpaid)?

☐	Great deal	☐	A little
☐	Moderate amount	☐	None

12. Do you usually walk or bike to work, school, or to do errands?

☐ Yes

☐ No

☐ Sometimes

☐ Unable to walk or bike

☐ Don’t know

13. How many hours a week do you spend your time doing the following household activities?

Household Activity	**Hours**
Preparing food, cooking and washing up?	
Shopping for food and groceries?	
Shopping and browsing shops for other items (e.g. clothes, toys)?	
Cleaning the house?	
Doing laundry and ironing?	
Doing yard work (e.g., digging, shoveling snow, mowing the lawn)	
Caring for children at home?	

D. BARRIERS TO PHYSICAL ACTIVITY PARTICIPATION

1. Below are listed some reasons for not doing physical activity. Please read each of these statements and on the 5-point scale provided (1 = "Strongly Disagree," 5 = "Strongly Agree"), circle the number which best describes how you feel about the statement.

	Strongly Disagree	Disagree	Neither agree Nor Disagree	Agree	Strongly Agree
I don't have energy to do physical activity	1	2	3	4	5
I feel pain during exercise	1	2	3	4	5
I have health problems that keep me from being physically active	1	2	3	4	5
I am getting older so exercise can be risky	1	2	3	4	5
Physical activity is hard and tiring	1	2	3	4	5
I look funny when doing physical activities	1	2	3	4	5
Exercise facilities or sports area do not have staff trained to make people from all cultures feel welcome	1	2	3	4	5
I am not interested in doing exercise or physical activities	1	2	3	4	5
I don't enjoy physical activities or exercise	1	2	3	4	5
I think other fun activities with friends or family members are more fun than exercise or physical activities	1	2	3	4	5
I think physical activity is not good for my health	1	2	3	4	5
I'm afraid of hurting myself	1	2	3	4	5
I'm too lazy to do physical activities	1	2	3	4	5

	Strongly Disagree	Disagree	Neither agree Nor Disagree	Agree	Strongly Agree
Intensity of exercise required to get health benefits are too high for me	1	2	3	4	5
I think I'm not talented in doing physical activities	1	2	3	4	5
I lack will-power in performing physical activities	1	2	3	4	5
My body shape doesn't allow me to do physical activities	1	2	3	4	5
I am afraid of being discriminated due to my cultural heritage	1	2	3	4	5
My family members or friends don't encourage me to do physical activities	1	2	3	4	5
I don't have friends to do physical activities together	1	2	3	4	5
I don't have free time to exercise or do physical activities	1	2	3	4	5
Physical activity takes too much time away from taking care of my children or family members	1	2	3	4	5
There are no exercise facilities or places to do physical activities in my residential areas, such as parks, walking trails, bike paths, recreation centres, playgrounds or public swimming pools	1	2	3	4	5
Exercise facilities or sports areas are too far and I don't have transportation	1	2	3	4	5
Exercise facilities or sports areas do not accommodate my cultural beliefs	1	2	3	4	5
Exercise facilities do not have staff who speak languages other than English or French	1	2	3	4	5
I don't know how to use sports equipment or specialities in doing physical activities	1	2	3	4	5
The weather prevents me to do physical activities	1	2	3	4	5
I don't have money to go to sports facilities such as gymnasium or to buy sports equipment and clothes	1	2	3	4	5
I don't think I can make time to include physical activity in my regular schedule	1	2	3	4	5
None of my family members or friends like to do anything active	1	2	3	4	5
I've been thinking about getting more physical activity, but I just can't seem to get started	1	2	3	4	5
I want to get more physical activity, but I just can't seem to make myself stick to anything	1	2	3	4	5

	Strongly Disagree	Disagree	Neither agree Nor Disagree	Agree	Strongly Agree
I don't get enough physical activity because I have never learned the skills for any sport	1	2	3	4	5
I don't get enough sleep to do some physical activity	1	2	3	4	5
I don't participate in physical activity because I have a fear of unattended dogs	1	2	3	4	5

2. List the top 5 things that keep you from being physically active. What are the strongest barriers to your physical activity?

1.	
2.	
3.	
4.	
5.	

3. List the top 5 things that make it easier for you to be physically active. What are the things that help you to be physically active?

1.	
2.	
3.	
4.	
5.	

E CONFIDENCE IN PHYSICAL ACTIVITY PARTICIPATION

The items listed below are designed to assess your beliefs in your ability to continue physical activity on a three time per week basis at moderate intensities (make you breathe somewhat harder than normal), for **30+** minutes per session in the future. Using the scales listed below please indicate how confident you are that you will be able to continue to participate in physical activity in the future.

For example, if you have complete confidence that you could participate in physical activity three times per week at moderate intensity for **30+** minutes for the next four weeks without quitting, you would **circle 100%**. However, if you had no confidence at all that you could participate in physical activity for the next four weeks without quitting, (that is, confident you would not participate in physical activity), you would **circle 0%**.

Mark your answer by circling a % (percentage):

Not at All Confident					Moderately Confident					Highly Confident
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
I am able to continue to participate in physical activity three times per week at moderate intensity, for 30+ minutes without quitting for the NEXT WEEK										
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
I am able to continue to participate in physical activity three times per week at moderate intensity, for 30+ minutes without quitting for the NEXT FOUR WEEKS										
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
I am able to continue to participate in physical activity e three times per week at moderate intensity, for 30+ minutes without quitting for the NEXT SIX WEEKS										
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
I am able to continue to participate in physical activity three times per week at moderate intensity, for 30+ minutes without quitting for the NEXT EIGHT WEEKS										
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

APPENDIX B: ETHICS APPROVAL

MEMORIAL UNIVERSITY

Interdisciplinary Committee on
Ethics in Human Research (ICEHR)

St. John's, NL Canada A1C 5S7
Tel: 709 864-2561 icehr@mun.ca
www.mun.ca/research/ethics/humans/icehr

ICEHR Number:	**20193098-HK**
Approval Period:	May 6, 2019 – May 31, 2020
Funding Source:	Not Funded
Responsible Faculty:	Dr. Angela Loucks-Atkinson School of Human Kinetics and Recreation
Title of Project:	*Barriers to physical activity in visible minorities*

May 6, 2019

Ms. Maria Khawer
School of Human Kinetics and Recreation
Memorial University of Newfoundland

Dear Ms. Khawer:

Thank you for your correspondence of April 29 and May 6, 2019 addressing the issues raised by the Interdisciplinary Committee on Ethics in Human Research (ICEHR) concerning the above-named research project. ICEHR has re-examined the proposal with the clarification and revisions submitted, and is satisfied that the concerns raised by the Committee have been adequately addressed. In accordance with the *Tri-Council Policy Statement on Ethical Conduct for Research Involving Humans (TCPS2)*, the project has been granted *full ethics clearance* to May 31, 2020. ICEHR approval applies to the ethical acceptability of the research, as per Article 6.3 of the *TCPS2*. Researchers are responsible for adherence to any other relevant University policies and/or funded or non-funded agreements that may be associated with the project.

The *TCPS2* **requires** that you submit an Annual Update to ICEHR before May 31, 2020. If you plan to continue the project, you need to request renewal of your ethics clearance and include a brief summary on the progress of your research. When the project no longer involves contact with human participants, is completed and/or terminated, you are required to provide an annual update with a brief final summary and your file will be closed. If you need to make changes during the project which may raise ethical concerns, you must submit an Amendment Request with a description of these changes for the Committee's consideration prior to implementation. If funding is obtained subsequent to approval, you must submit a Funding and/or Partner Change Request to ICEHR before this clearance can be linked to your award.

All post-approval event forms noted above can be submitted from your Researcher Portal account by clicking the *Applications: Post-Review* link on your Portal homepage. We wish you success with your research.

Yours sincerely,

Kelly Blidook, Ph.D.
Vice-Chair, Interdisciplinary Committee on
Ethics in Human Research

KB/lw

cc: Supervisor – Dr. Angela Loucks-Atkinson, School of Human Kinetics and Recreation