

**EXAMINING AND COMPARING THE PERCEPTIONS OF OBESITY
BETWEEN CANADIANS AND NIGERIANS: A CROSS-SECTIONAL STUDY**

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Abstract

Obesity prevalence has increased globally in the past fifty years and is predicted to increase further. Disease perception may profoundly impact health outcomes by influencing individual behaviour. This study examines and compares the perceptions of obesity between Canadians and Nigerians.

Adults from Canada (n=878; mean age = 47.6years; mean body mass index [BMI] = 36.4 kg/m²) and Nigeria (n=516; mean age = 39.9years; mean BMI = 26.1 kg/m²) completed an online survey assessing levels of agreement with perceptions of obesity and weight bias.

Whilst there were significant large to medium differences in the agreement with obesity messages (p<0.001), there were significant but small differences in the perceived causes of obesity (p<0.001). Both countries showed high levels of support for many obesity interventions.

Canada and Nigeria showed differences and similarities in their levels of agreement with different measures of obesity perception and weight bias.

Keywords: obesity, overweight, BMI, Nigeria, Canada.

Dedication

This thesis is dedicated to God, whose Spirit challenged me to bear the burden of the quest for a prosperous Africa.

My Family: To my lovely wife, Laretta, and our children; Toluwani and Oluwaseyi, for their unwavering love, support, and sacrifices. Your belief in my abilities and your constant encouragement has been the driving force behind my academic pursuits.

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List of Symbols, Nomenclature or Abbreviations

| | |
|---------------|---|
| BMI | Body Mass Index |
| CDC | Centre for Disease Control |
| CNCR | Cross-National Comparative Research |
| CPGs | Canadian Adult Clinical Practice Guidelines |
| CSEP | Canadian Society for Exercise Physiology |
| DALYs | Disability Adjusted Life Years |
| DEXA | Dual-energy X-ray absorptiometry |
| EASO | European Association for the Study of Obesity |
| GNI | Gross National Income |
| MANOVA | Multivariate Analysis of Variance |
| MSSU | Maritime SPOR SUPPORT Unit |
| NBHRF | New Brunswick Health Research Foundation |
| NCDs | Non-Communicable Diseases |
| NICE | National Institute for Health and Care Excellence |
| OECD | Organization for Economic Cooperation and Development |
| SDoH | Social Determinants of Health |
| SIGN | Scottish Intercollegiate Guidelines Network |
| WHO | World Health Organization |

Chapter 1: Introduction

Background

Overweight and obesity have been defined as abnormal or excessive fat accumulation that presents a risk to health (World Health Organization [WHO], 2021a). Obesity has been classified as a chronic and often progressive disease (Obesity Canada, 2022b), like diabetes or high blood pressure. According to the WHO (2021a), about 1.9 billion adults, 18 years and above, worldwide were considered to have overweight in 2016, while about 650 million adults were estimated to have obesity.

Obesity is a complex chronic health condition, which is caused by a combination of physiological, behavioural, psychological, or environmental factors (Obesity Canada, 2022a; Omer, 2020). There is no single cause of obesity which is the result of individual susceptibility; genetic, metabolic, behavioural, and complicated by the environment (WHO, 2022a) and the latter is considered to be the proximate cause of substantial obesity prevalence (CMAJ, 2020).

Understanding how obesity is perceived and what people think about it across different regions can provide crucial insights into how elevated weight can be prevented and managed. As pervasive as overweight is, there is misinformation born out of belief systems and magnified by culture (Chaput et al., 2014), entertainment, and fashion industries (Rudd et al., 2015; Nuttall, 2015). A recent survey study in New Brunswick, Canada, (Dombrowski et al., 2021) reveals that most respondents consider behaviour to be the main cause of obesity while the environment was seen as the least important contributing factor. The perception of obesity being caused by dietary intake and physical inactivity is common in many cultures.

Cross-country studies have been conducted among countries with similar attributes such as the Organization for Economic Cooperation and Development (OECD) countries (Sassi et al., 2009) or within the same geographical regions such as a study by Bliznashka et al. (2021) of the Sub-Saharan Africa consisting of Ghana, Tanzania, and Malawi but the focus of these studies has been more on obesity prevalence and less on the perceptions of the disease. Although the former has provided the basis for comparing the prevalence of obesity across countries and regions, the study of obesity perception will provide a new set of knowledge on how outcome variables will respond to divergent groups of people (Canadians and Nigerians), and in this case, could contribute to global efforts geared toward managing overweight and its attendant health effects. Studies like these are usually implicitly comparative and seek to identify commonalities and differences between countries and infer from the findings (Baistow, 2000).

Canada and Nigeria are different in several regards: Nigeria is classified as a lower-middle-income country, while Canada is a high-income country (World Bank, 2021a). Canada's population, 38 million, is about one-fifth of that of Nigeria, which was estimated to be about 206 million people (World Bank, 2019). Other differences between the two countries are literacy rates, poverty rates, social and economic status, culture, and belief systems among others. Examining how citizens from different cultural contexts perceive obesity can provide insights into more universal views of obesity as well as differences in obesity perceptions. This research will inform initiatives geared toward implementing evidence-based guidelines for obesity prevention and management in different cultural contexts.

The majority of Canadian adults are estimated to have overweight or obesity while Nigeria has an increasing number of people with obesity and at the same time people who are affected with underweight, especially in the Northern part of the country. In a systematic review of 35 studies (n=52,816) from four journals on obesity in Nigeria, it was estimated that the prevalence of overweight and obesity in Nigeria are 25% and 14.3% respectively (Adeloye et al., 2021). These estimates are less than in Canada, which has been estimated to have 36.3% overweight while 26.8% were estimated to have obesity (Statistics Canada, 2019).

This research aims to examine and compare the perceptions of Canadians and Nigerians concerning overweight and obesity. Understanding how individuals perceive the condition would inform the development of interventions and support tailored to individual needs and preferences. This study is a continuation of previous research conducted in New Brunswick, Canada (Dombrowski et al., 2021) which examined the perceptions of 1104 New Brunswickers on weight loss support. Most respondents considered obesity to be a major health challenge and believed that behaviour is mostly responsible for this condition. This is an attitude that has the potential to increase the stigma and discrimination of those living with obesity and may prevent the seeking and accepting of evidence-based weight management support in those who might benefit from it.

Purpose

Examining the perception of obesity between Canadians and Nigerians through a cross-sectional survey is expected to yield insights into cultural, public health, and social factors related to obesity. These insights can inform policies, interventions, and healthcare practices to improve the well-being of these populations and potentially others with similar characteristics. Here are some key purposes and benefits of such a study:

- **Understanding cultural variations:** This research allows for an exploration of how different cultures perceive obesity. Canadians and Nigerians have different cultural backgrounds, dietary habits, and lifestyles. Studying their perceptions can provide insights into how culture shapes views on health and body image.
- **Public health implications:** Obesity is a significant global public health issue. Understanding how different populations perceive it can inform the development of culturally sensitive health interventions and policies. For instance, if one group tends to stigmatize obesity more than the other, interventions may need to focus on reducing this stigma.
- **Identifying knowledge gaps:** The survey can reveal differences in knowledge about obesity between the two populations. This can help tailor health education efforts to address specific misconceptions or gaps in understanding in each group.

Significance

Increasingly, public health researchers are encouraged to establish international collaborations and undertake cross-national comparative studies by the European Commission's Framework Programmes (Salway et al., 2011). As of today, there is no

such study that compares Canadians' perception of obesity with that of another country e.g., Nigeria. As our scientific understanding of the causes and consequences of obesity grows, it is especially important to track how the public thinks about the condition. People have "lay theories" (Furnham and Manning, 1997) about the causes and consequences of obesity that can differ markedly from the comparatively complex and nuanced scientific perspectives on obesity that have developed in recent years (Thibodeau and Flusberg, 2017).

Policymakers can use the study's insights to inform the creation of policies that better address the unique needs and challenges related to obesity perception and management in their respective countries. This can lead to more effective public health strategies. Also, this research can contribute to the academic understanding of cultural influences on health perceptions and behaviours. It can serve as a foundation for further studies in cross-cultural psychology, public health, and sociology, advancing the knowledge in these fields.

Chapter 2: Literature Review

Obesity

Definition

There are different definitions of obesity, with basic denominators for each of them. The WHO defined obesity as abnormal or excessive fat accumulation that presents a risk to health (WHO, 2021a). The Scottish Intercollegiate Guidelines Network (2010) defined obesity as a disease process characterized by excessive body fat accumulation with multiple organ-specific consequences that impair health and social well-being (Brown et al., 2020). Purnell stated that overweight and obesity occur when excess fat accumulation (regionally, globally, or both) increases the health risk (Purnell, 2000). Shekar & Popkin (2020) define obesity as an imbalance between energy consumed and energy expended. The definition proposed by Aditya & Wilding (2011) is an excessive amount of body fat associated with an increased risk of medical illnesses and premature death.

The common factors of these obesity definitions are the presence of excess body fat and an increased risk to health. As the knowledge of obesity increases, evidence suggests that it is not just about the total body fat mass, but the localization and location of the excess fat. For instance, intra-abdominal and viscera fat have a strong association with the risk of diabetes and cardiovascular diseases (Aditya & Wilding, 2011). Bouchard (1991) proposed four types of obesity on the topography of the adipose tissue and its association with a variety of metabolic characteristics. Type I or generalized obesity is characterized by excess body fat without concentration in any given area of the body. Type II is characterized by increased subcutaneous fat on the trunk and abdominal area. Type III is characterized by increased visceral obesity and Type IV or gynoid obesity is

characterized by increased femoral-gluteal obesity (Bouchard, 1991). Apart from type I, the other types have to do with excessive accumulation of fat in some areas of the body and this implies that a body fat content may exhibit different anatomical distribution characteristics.

The challenges of excess fat and its impact on unfavourable medical conditions have been identified as far back as 400 BC; Hippocrates once observed that “sudden death is more common in those who are naturally fat than in the lean” (Gianluca, 2009).

Callaway (Callaway, 1987) stated that obesity is not a single disease, but a variety of conditions resulting from different mechanisms and associated with various types and degrees of risks. The categorization of obesity as a chronic disease by the WHO in 1997; countries and regions such as Portugal in 2004, the United States in 2013, Italy in 2019, and the European Union in 2021 (Burki, 2021) is a major change in how obesity is conceptualized and could potentially change how the public perceives the condition.

In the context of this study, obesity is conceptualized in line with the Canadian Adult Obesity Clinical Practice Guidelines (CPG) which defined it as a complex chronic disease in which abnormal or excess body fat impairs health, increases the risk of long-term medical complications, and reduces lifespan (Whitlock et al., 2009, as cited in CMAJ, 2020).

Obesity Prevalence

Obesity is the fifth most important risk factor contributing to the global disease burden (Shams-White & Deuster, 2017). The increase in obesity prevalence is a global phenomenon (Genoni et al. 2014). Obesity used to be considered a disease present mainly

in developed countries (Ujuanbi & Mezie-Okoye, 2020; Akarolo-Anthony et al., 2014) but studies have shown that it is on the rise both in developed and developing countries (Purnell, 2000; Oyewande et al., 2019).

An estimation study of the prevalence of overweight and obesity for over 25 years in 195 countries (Afshin et al., 2017), which analyzed the Global Burden of Disease data of about 68.5 million people between 1980 and 2015, revealed that since 1980 the prevalence of obesity has doubled in more than 70 countries and has continuously increased in most other countries. According to Olshansky et al. (2005), the rise in obesity could lead to future declines in life expectancy. This increase has been attributed to environmental factors related to both calorie intake and physical activity (Shekar & Popkin, 2020). By 2030 according to Kelly et al. (2008), the projection of the absolute number of individuals with overweight and obesity will be 2.16 billion and 1.12 billion respectively.

A World Bank's Global Burden of Disease report (Shekar & Popkin, 2020) on the negative economic and health impacts of obesity estimates that overweight or obesity-related disease causes about 4 million deaths a year. In 2015 and on the global level, high BMI was estimated to have contributed to 7.1 percent of deaths from all causes (Afshin et al., 2017). Shekar & Popkin (2000) estimated that overweight and obesity contribute approximately 5% of Disability-Adjusted Life Years (DALYs) from all causes, one DALY represents the loss of the equivalent of one year of full health (Indicator Metadata Registry Details, 2019). Moreover, out of the diseases related to overweight and obesity, cardiovascular disease, type 2 diabetes, and chronic kidney diseases are major

contributors to deaths and DALYs; the second contributor of deaths and second contributor of DALYs respectively (Afshin et al., 2017).

In Canada, for example, it was estimated that obesity and overweight accounted for about 57,000 deaths between 1985 and 2000, with an increase of 5.1% to 9.3% within the same period (Katzmarzyk & Ardern, 2004). In the United States, the age-adjusted prevalence of obesity (BMI between 30 and 35) and severe obesity (BMI \geq 40.0) were 42.4% and 9.2% respectively in 2017/2018 among adults aged 20 and above (Hales et al., 2020), which was an increase from 30.5% and 4.7% in 1999/2000. In the United Kingdom, it was estimated that about 29% of adults and 20% of children have obesity (Society for Endocrinology, 2020). Many low-income and middle-income countries are now facing multiple burdens of disease as they continue to deal with the problems of infectious diseases, undernutrition, and a rapid upsurge in NCD risk factors such as obesity and overweight, especially in urban settings (Shekar & Popkin, 2020; Oyewande et al., 2019).

The global NCD target to halt the increase in the prevalence of obesity between 2010 and 2025 (WHO, 2013) seems unachievable with about three years to the deadline at the time of writing. WorldObesity.org (2020) reported that all countries are off track to meeting the target, and it is estimated that the obesity prevalence will likely double by 2030 (WorldObesity.org, 2020). There is a global decline in the other major global risks such as tobacco use (WHO, 2021b; CDC, 2022a) and childhood malnutrition (Tzioumis & Adair, 2014) in contrast to obesity, which is on the rise. Obesity has been considered an epidemic because of the rapid increase in rates by the Centers for Disease Control and Prevention (CDC, 2012).

Consequences and Costs of Obesity

Obesity is a complex disease (WHO, 2022a) that impairs health, and its effects can generally be summarised to be on people's health, quality of life and lifespan (CMAJ, 2020). Obesity has both financial and social impacts, as well as an impact on future generations (WorldObesity.org, 2020) and it is a risk factor for some diseases including some types of cancers (Obesity Canada, 2022b; Health Canada, 2006; Ng et al., 2014; Censin et al., 2019; WHO, 2022a), osteoarthritis and chronic kidney disease (Ng et al., 2014; Shekar & Popkin, 2020; Censin et al., 2019). Excess body weight is associated with substantial increases in mortality from all causes, especially cardiovascular disease (Khaodhiar et al., 1999), breathing, joint problems (CDC, 2022b), gallbladder disease; dyslipidemia; musculoskeletal conditions such as osteoarthritis; gout; and pulmonary diseases, including sleep apnoea (WHO, 2022a). People who have obesity are more likely to exhibit infertility, depression, complications of pregnancy, and abnormalities of the reproductive hormones (Khaodhiar et al., 1999). In addition, people living with obesity often experience mental health issues and they suffer diverse forms of social bias, prejudice, and discrimination (WHO, 2022b).

Aside from the health implications of obesity, there are direct and indirect costs arising from the disease. On the direct economic impacts, the World Obesity Federation (a not-for-profit global organization focused exclusively on obesity) estimated that the total cost of high BMI to health services globally is US\$990 billion per year (WorldObesity.org, 2020) with the highest costs in the Eastern Mediterranean and America regions. The global economic impact of obesity is roughly \$2.0 trillion, or 2.8 percent of global GDP, roughly equivalent to the global impact of smoking (\$2.1 trillion) or armed violence, war,

and terrorism (\$2.1 trillion) (Dobbs et al., 2014). A systematic review of obesity costs in Canada between 1990 and 2011 (Tran et al., 2013) revealed that aggregated costs of obesity in Canada ranged from 1.27 to 11.08 billion dollars, which accounted for between 2.2% and 12.0% of Canada's total health expenditures.

Shekar & Popkin (2020) suggested that the United States' estimated economic costs of obesity ranged from US\$89 billion to US\$212 billion. The Centers for Disease Control (CDC, 2022b) estimated that the United States obesity healthcare-related cost in 2008 was about \$147 billion, while productivity costs from obesity-related absenteeism ranged between \$3.38 billion and \$6.38 billion respectively. China's obesity-related costs are estimated to be 3.58 and 8.73 percent of the gross national product in 2020 and 2025 (Shekar & Popkin, 2020), while Brazil projects a doubling of the obesity-related health care costs from \$5.8 billion in 2010 to \$10.1 billion in 2050.

On indirect costs, Trogon et al. (2008) in a systematic review grouped obesity-related indirect costs into six categories: costs associated with absenteeism, disability, premature mortality, presenteeism, workers' compensation, and total indirect costs. Janssen (2013) using 2006 data, estimated that obesity accounted for \$3.2 billion in indirect costs (e.g., costs related to disability and lost productivity due to illness or premature death) and \$3.9 billion in direct healthcare costs (e.g., hospitalizations, medications, physician, and emergency room visits). It is difficult to compare the economic impact of obesity across countries because it is being reported in isolation and due to different computational methods adopted by each country (Trogon et al., 2008). Nigeria, however, has a paucity

of information on healthcare services costs related to obesity management (Abubakar et al., 2021).

Causes of Obesity

The cause of the obesity epidemic is multifactorial (CMAJ, 2020; Genoni et al., 2014; Yumuk et al., 2015) and in the academic community, obesity is now widely accepted as a complex and chronic disease. As such, the causes are complex and not linear (Ameye & Swinnen, 2019). Several factors can contribute to excess weight gain, which could primarily be more food intake and/or reduced energy expenditure (Shekar & Popkin, 2020). These factors include eating patterns, physical activity levels, sleep routines, social determinants of health [SDoH] (including income level, race, ethnicity, and physical ability), genetics (Choquet & Meyre, 2011; National Health Service [NHS], 2019), epigenetics (Mahmoud, 2022; Herrera et al., 2011), some illnesses and/or certain medications, among others (CDC, 2022b).

The obesity epidemic is considered an outcome of a multifaceted intricate interaction between environmental factors, genetic susceptibility, and human behaviour (Omer, 2020). In a study by Phan et al. (2020), they used Google Street View (a virtual representation of the surroundings on Google Maps, consisting of millions of panoramic images) to establish a relationship between city environment-built structure indicators (crosswalks, non-single family home buildings, single-lane roads, and visible wires) and health outcomes including obesity and other diseases. The study reviewed 31,247,167 images from Google Street View that were used to create built environment indicators using deep learning techniques. They concluded that crosswalk presence is associated with reduced obesity and premature mortality; visible wires are associated with increased

obesity, decreased physical activity, and increased premature mortality; non-single homes are associated with decreased premature mortality and diabetes, and increased physical activity. In a United Kingdom's Foresight Report (Butland et al., 2007), consideration was given to built-environment as a possible obesity prevention strategy; aside from building facilities for sports and active walking/cycling promotions, the report recommended broader environmental changes in form of quality leadership and policy implementation to introduce interventions such as reduction in commuting distances, buildings design/layout (e.g. prominent and appealing staircases instead of lifts or escalators) and car use reductions. Thus, to reverse the rising obesity trends will require an interdisciplinary research approach among urban planners, public health researchers, and policymakers (Lopez-Zetina et al., 2006).

Obesity Management

In managing obesity, efforts have been geared towards altering the factors in the consumption, expense or storage of calories and other factors that influence the disease. The Canadian Adult Obesity Guidelines (CMAJ, 2020) for example highlight a 5-step patient journey (Sturgiss & van Weel, 2017) in obesity management for healthcare professionals in a bid to eliminate stigma and focus on their patients' health outcomes.

The WHO (Bennett et al., 2020) suggests that the prevention and management of obesity can only be achieved by simultaneously influencing public policies in multiple domains. This includes the general perception of all stakeholders about the disease including people living with obesity, healthcare professionals, policymakers, and the public. Obesity prevention and management require responsibilities at both the individual level and the societal level (CMAJ, 2020; Dombrowski et al., 2021). The fact that an individual

is not entirely responsible for the disease does not shift the prevention and management entirely to the environment.

It has been reported that weight loss maintenance is a greater challenge than weight loss for many people (Lean et al., 2018) partly because it entails permanent adaptation to eating less despite living in the same environments or conditions in which they developed obesity. The study by Dombrowski et al. (2021) reported that about 20% of the respondents classified themselves as successful at weight loss and maintenance compared to about 50% that were successful at weight loss but not successful at weight loss maintenance.

In formulating obesity management strategies, evidence-based interventions should be embraced. In a study for paediatric weight management which considered the benefits and barriers of home visits (Gehring et al., 2018), it was discovered that about 89% of the 50 families interviewed were interested in home visits and considered them a convenient option for managing paediatric obesity. Increasingly, customized national, regional, and individual management strategies are required for effective obesity management. That is one of the reasons a comparative study of the perception of obesity is germane across countries.

Obesity management from an individual point of view, as documented in the evidence chapter of the Canadian Guideline on psychological and behavioural interventions, suggests that psychological and behavioural interventions for obesity management include three main components which are dietary goals, exercise/activity goals and psychological & behaviour change strategies to support the goals (Vallis et al., 2020).

Brown et al. (2020) suggested that nutrition recommendations for adults of all body sizes

should be personalized to meet individual values, preferences, and treatment goals to support acceptable and affordable long-term adherence. On physical activity, every adult irrespective of weight status should engage in 30-60 minutes or more of moderate to vigorous-intensity aerobic physical activity on most days of the week, engage in strength-resistant activities at least twice a week and reduce daily sedentary time for overall health quality (Boulé and Prud'homme, 2020). The Canadian Society for Exercise Physiology (CSEP) also recommends at least 150 minutes of moderate to vigorous aerobic physical activities per week, muscle strengthening activities and several hours of light physical activities including standing (Ross et al., 2020). There are no weight status-specific activity recommendations, so these apply regardless of one's weight cultural background, or socioeconomic status.

Pharmacotherapy is recommended to maintain weight loss achieved through health behaviour changes and to prevent weight regain; and it is also recommended in conjunction with health behaviour changes for people living with prediabetes and overweight or obesity (Pedersen et al., 2020), especially for patients who have been unsuccessful with diet and exercise alone (Apovian et al., 2015).

Regarding bariatric surgery, the CPG recommended that bariatric surgery (Biertho et al., 2020) should be considered for individuals with a BMI of 40kg/m^2 and above or those with a BMI of 35kg/m^2 and above with at least one adiposity-related disease due to its effectiveness to significantly improve the quality of life.

From the societal perspective, national and regional interventions have been considered including changing the current food and activity environment (Dombrowski, 2021), taxing foods that are dominant contributors to obesity (Lean et al., 2018), making healthy

food more easily accessible (Lean et al., 2018). Moreover, primary health care management has been emphasized as instrumental to achieve patient-centred care in obesity management. Healthcare providers are expected to initiate patient-centred conversations and promote a holistic approach to weight and health focusing on health behaviours and addressing root causes of weight gain, with care to avoid stigmatizations (Campbell-Scherer et al., 2020) which includes incorporating various technology-based management strategies (Tytus et al., 2020) to complement the already provided face-to-face care.

Obesity Measurement

It is difficult to measure excess body fat directly, thus obesity is often defined as excess body weight as measured by body mass index (BMI), which is calculated as weight in kilograms divided by height in meters squared (Office of the Surgeon General, 2010) and it is used to express weight adjusted for height. Although BMI has limitations as a measure (Nigam et al., 2013), it has been considered to be a useful indicator of overweight and obesity, especially in population and public health studies.

Such limitations include the fact that BMI is not a direct measure of body fat or health quality, it does not indicate body fat distribution, it has no means of distinguishing between men and women or accounting for ethnic differences, and it is less accurate in certain populations especially the elderly, people with physical disability or during pregnancy (Rueda-Clausen et al., 2020). Also, BMI does not take into consideration the difference between muscles and fats, especially in muscle builders, their BMIs will be overstated. That is why waist circumference is used in conjunction with BMI to determine the health risks associated with overweight and obesity. Despite their

limitations, BMI and waist circumference remain screening tools to estimate weight status with potential health risks (CMAJ, 2020; CDC, 2020; Society for Endocrinology, 2020) and not diagnostic tools, it is useful in public health analysis, however, at an individual's level, there is a need for further diagnosis to confirm the actual status of body fat in one's body by healthcare professionals before a conclusion can be reached about having obesity or not.

Aside from the BMI method, there are more accurate methods and equipment that measure body fats with higher accuracy; Dual-energy X-ray absorptiometry (DEXA) is a widely used means of indirect body composition analysis for gauging total body water and hydro-densitometry, underwater weighing (Nigam et al., 2013). Although DEXA is considered accurate, the cost of the equipment, trained staff, and specialized facilities limit its accessibility. Bod Pod is another computerized device that measures weight and volume to determine body density and calculate the percentage of body fat (Mayo Clinic, 2022).

Weight distributions have been a subject of debate (Nuttall, 2015), but will not be the focus of this study. This study will adopt the four categories of body weight – underweight, normal weight, overweight or obesity (instead of the six WHO's nutritional status classifications as shown in Table 2.1) for comparison with other studies and the (Dombrowski et al., 2021; Gregory et al., 2008;).

Table 2.1*Classification of obesity in adults according to BMI and risk of obesity-related diseases*

| Obesity Classification | WHO's Nutritional status | BMI (kg/m ²) | Associated risk |
|------------------------|--------------------------|--------------------------|---|
| Underweight | Underweight | <18.5 | Low (but the risk of other health problems increased) |
| Normal | Normal | 18.5 – 24.9 | Normal |
| Overweight | Pre-obesity | 25.0 – 29.9 | Increased |
| Obesity | Obesity Class I | 30.0-34.9 | Moderate |
| | Obesity Class II | 35.0-39.9 | Severe |
| Extreme obesity | Obesity Class III | >= 40.0 | Very severe |

(Aditya & Wilding, 2011; WHO, 2021c).

Language

The social consequences of living with obesity can be severe, and consequently, the choice of language used in describing people with elevated weight is important in the discussion of obesity. The choice of sensitive, non-stigmatizing (Puhl, 2020) and people-first language in obesity discussion is encouraged in Canada (Kirk, 2020; Hussey, 2017), in Europe led by the European Association for the Study of Obesity (EASO, 2016), and in the United States (Stanford & Kyle, 2018). The focus of the choice of language is to avoid stigmatization. Since obesity is a disease and not an identity, this study will use phrases such as “people with obesity or overweight” rather than “obese or overweight people”.

Perception of obesity

Perceptions

The conclusion that obesity can negatively impact health and disease processes is undisputed. Recently, research has begun to explore lay theories of obesity, the mental models of how non-experts think about the causes and consequences of the condition (Thibodeau and Flusberg, 2017), to develop public measures and messages to prevent and manage obesity tailored to individuals' views.

The perception that behaviour and psychology are the sole factors responsible for causing obesity is at variance with evidence that considers society to be a critical contributing factor (Obesity Canada, 2022a). Obesity is often considered a simple health issue that requires a linear solution (Das & Khan, 2019). Some individuals consider people with obesity as being too lazy to move around or as gluttons who would not control their appetites (Brewis et al., 2011). Thinking that obesity reduction merely requires eating less and moving more can be detrimental, may fuel the bias toward people living with obesity, and can lead to social stigmatization, discrimination, psychological problems, and other social vices (Office of the Surgeon General, 2010), and prevents the provision of evidence-based care (Ramos et al., 2014; Thibodeau & Flusberg, 2017).

Mental Models and Lay Theories of Obesity

Mental models have evolved over years in modern history since 1943 when Kenneth Craik described them as 'small scale models' of reality (Westbrook, 2006) and they have different definitions as described by various theorists from diverse disciplines (Rook, 2013). Rook (2013) in his interdisciplinary literature review (employing system dynamics, psychology, cognitive science, and organization learning perspectives) defined

the individual mental model as “a concentrated, personally constructed, internal conception, of external phenomena (historical, existing, or projected), or experience, that affects how a person acts” (Rook, 2013, p. 43). Mental models are comprised of interrelated memories, conceptual knowledge, and causal beliefs that create an understanding of how something works in the real world and form expectations about future events (Holtrop et al., 2021).

Mental models are important for the individuals who hold them because they consider those models to have a value and reality of their own (Westbrook, 2006). Westbrook opined that individuals believe in the models, oftentimes without direct reference to their accuracy or level of completeness and can find it difficult to give them up (Westbrook, 2006). These mental models drive expectations, preferences, and reasoning in any interaction with the system or process represented, the more reason it is difficult to change what people think and how they perceive things.

Lay theories are defined as the theories that people use in their everyday affairs (Ramírez et al., 2013). They assist people to understand and make predictions about their social world as well as social needs to form and maintain relationships and psychological needs to feel in control and good about themselves (Ramírez et al., 2013). People's implicit theories about human attributes structure the way they understand and react to human actions and outcomes (Dweck et al., 1995). As we advance in scientific efforts, the understanding of the causes and consequences of obesity grows, and it is important to track how the public thinks about the health condition (Thibodeau & Flusberg, 2017). The concepts of mental models and lay theories are typically used interchangeably in the

literature, and both refer to simplified representations of the understanding of how the world functions.

Since there is a strong connection between individuals and mental models, any successful adoption and implementation of evidence-based interventions must require changing actors' models, the manner of interventions or how the implementation strategies are presented or implemented (Holtrop et al., 2021). Shared mental models, overlapping mental representations of knowledge by individuals (Van den Bossche et al., 2011), can enhance communication and enable a team to identify common perspectives on tasks, goals, and roles (Herrmann et al., 2019).

In an integrative review of the literature on lay theories of obesity by Thibodeau and Flusberg (2017), they described different lay theories of obesity focusing on trait-level beliefs, causal models of obesity, and personal narratives—that have important implications for public health:

- Trait theories: These implicit theories refer to two different assumptions people may make about the malleability of personal attributes. One is a belief that a valued personal attribute is a fixed, non-malleable trait-like entity (entity theory) while the other is a belief that such an attribute can be changed or developed (incremental theory) (Dweck et al., 1995).
- Entity theories: People who hold an “entity theory” of intelligence (also known as ‘fixed mindset’), think about the intellect as something hard-wired or rigid while those who hold an “incremental theory” (also known as a ‘growth mindset’) believe their intellectual abilities can grow through effort and hard work


(Thibodeau & Flusberg, 2017). In obesity prevention and management, incremental theorists are likely to take personal responsibility for their condition in contrast to entity theorists, who believe there is little they can do about it. Similarly, an incremental lay theory of smoking entails the belief that smoking behaviour can change while an entity theory entails the belief that much of the control is out of the individuals' grasp (Fitz et al., 2015).

- Causal theories: This class of theories considers the causal origins of obesity. There is a general perception that individuals are responsible for having obesity as documented in a recent study by Dombrowski et al. (2021). Also, a study by Barry et al. (2009) examined how respondents' (N=1009) demographic and health characteristics, political attitudes, and agreement with seven obesity metaphors affect the support for sixteen policies to reduce obesity rates. Table 2.2 reports the respondents' assessment of how well each of the metaphors explained increasing obesity in America, with 'sinful behaviour' having higher individual blame and the 'toxic food environment' having the lowest blame.
- Disease theories: In a bid to reduce obesity stigmatization, obesity was categorized as a disease (Burki, 2021). The classification although could mitigate the stigma associated with having overweight and fosters an entity theory of obesity, reducing a source of motivation for engaging in health behaviours that can help people lose weight; it thus seems to downplay the personal responsibility associated with obesity condition (Thibodeau & Flusberg, 2017).

Table 2.2

Ranking of Causal Beliefs

| # | Obesity Metaphor | Individual Blame |
|---|------------------------|------------------|
| 1 | Sinful behaviour | High blame |
| 2 | Addiction | |
| 3 | Time crunch | |
| 4 | Eating disorder | |
| 5 | Disability | |
| 6 | Industry manipulation | |
| 7 | Toxic food environment | Low blame |



- Personal narrative: The way of thinking about obesity as a result of poor lifestyle decisions (Thibodeau & Flusberg, 2017) became problematic as it failed to factor in those causes of obesity outside of one’s control. Thibodeau & Flusberg (2017) suggested that reading personal testimonials about successful weight loss efforts may assist people to build a more positive mental model of obesity.

Understanding the societal mental models and how obesity perceptions are similar or different across regions could enhance improved interventions and serve as inputs in global policy formulation.

Guidelines for obesity management

Obesity Guidelines

There are different guidelines developed in response to obesity prevalence by different countries, regions, and associations. The Canadian Obesity Clinical Practice Guideline

(CMAJ, 2020) for example, is a patient-centred framework for healthcare professionals, patients, and policymakers with healthcare professionals as the target users primarily in Canada.

European Guidelines for Obesity Management in Adults (Yumuk et al., 2015) emphasize the review of patients' obesity comprehensive history review, physical examination, and laboratory assessment; and the need to develop customized strategies and evidence-based interventions with a focus on realistic goals and lifelong multidisciplinary management.

Other guidelines are the United Kingdom's NICE Obesity Guidelines (NICE, 2014), the United States CDC's Obesity Prevention Strategies & Guidelines (CDC, 2018), Clinical Guidelines for Weight Management in New Zealand Adults (Ministry of Health, 2017) and Pharmacological Management of Obesity Guideline Resources (Apovian et al., 2015).

Canadian Adult Obesity Clinical Practice Guidelines

The Canadian Adult Obesity Clinical Practice Guidelines (CPGs) were developed by over Sixty Canadian health professionals, researchers and individuals living with obesity; after assessing over 550,000 published peer-reviewed articles to provide evidence and experience-based, a patient-centred framework which produced eighty (80) recommendations for healthcare professionals, patients, and policymakers (Obesity Canada, 2020). The guidelines contain 19 chapters with topics ranging from perception changes about obesity, obesity management, technology impact on obesity, and its impact on indigenous people among others.

The CPGs prioritize patients' health improvement and general wellbeing overweight loss or weight management. The guidelines aim for a paradigm shift in obesity management from 'eat less, move more' and weight-loss strategies toward improving patient-centred health outcomes (Kirk et al., 2020). The guidelines provide a guide for the patient's journey in obesity management summarized below:

1. The need for health professionals to ask for permission to discuss the obesity challenge.
2. The need for health professionals to assess an individual's story.
3. Provide personalized counselling and advice on managing obesity.
4. Collaborate on a personalized, sustainable action plan.
5. Provide necessary support to assist with drivers and barriers identification and how to overcome them.

One of the major changes in the 2020 version of the CPGs (CMAJ, 2020) is the significant focus on patient-centred care and the reduction of weight bias & stigma in healthcare; thus, using these lenses to guide the development of recommendations. Pilot adaptation of these guidelines is being implemented in Chile and Ireland in a bid to encourage global evidence-based patient care solutions (Hussey, 2021).

Cross-cultural research

Increasingly, there is a need for cross-country or cross-cultural collaborations to proffer global and multifaceted solutions to various health issues facing global citizens today, such as COVID-19 and monkeypox. COVID-19, a disease that was first reported in China in 2019 (WHO, 2020; WHO, 2022c;), in less than three years has had over 530

million incidents and has claimed over 6 million lives globally (WHO, 2022c).

Monkeypox is a disease which is usually confined to Africa and is now present in at least 22 countries (The Economist, 2022). These conditions highlight the global connectedness of individuals across countries, continents, and cultures.

Cross-country comparisons are challenging but can be insightful (Markus, 2020; Baistow, 2000). Sometimes referred to as Cross-National Comparative Research, it is a study that assumes that the same constructs are measured in the same way across the various nations under study (Cieciuch et al., 2019). Cross-country comparative studies present opportunities to learn from other climes; one can either learn about others, learn from others, learn about oneself, or learn with others (Baistow, 2000). Such studies provide insights with the opportunity to see situations from different perspectives to potentially improve policies, interventions, environments, or certain subjects of interest.

Challenges of Cross-cultural research

One of the major concerns for comparative studies is getting comparable data (Markus, 2020). According to Markus, one needs to pay attention to how the data is collected which will form the basis of the analysis and if there are differences, they should be addressed in the analysis. Another challenge is that of sampling and data representation, and the need to ensure that the data used for analysis is a true representation of the population (Baistow, 2000). Efforts must be taken to ensure representativeness within the countries of interest. Cross-cultural research often raises concerns about how policies and practices can be transplanted to another context without losing their meaning, and to mitigate these concerns, care should be exercised in the explanation and interpretation of results.

To overcome some of the challenges, it is essential to satisfy the measurement invariance (measurement equivalence) assumption that using the same questionnaire in different groups does measure the same construct in the same way (Cieciuch et al., 2019; Baistow, 2000). This is important to draw meaningful conclusions from the study.

Cross-country research in Canada

There are several cross-country research studies involving Canada and many countries across various regions. The topics range from finances (Afik et al., 2019), education (Mirabella et al., 2022), health (Varghese, 2019) among others and they have provided comparative assessments and/or program validations on different areas. For example, a qualitative comparative study on drug and alcohol dependence (Zamboanga et al., 2021), which measured alcohol consequences and identified at-risk students across Argentina, Australia, Canada, the United States and New Zealand was initially validated among the United States university students but later extended to other countries. The purpose of the study was to test whether the Brief Young Adult Alcohol Consequences Questionnaire (B-YAACQ) similarly measures alcohol consequences across university students from the identified countries and to examine differences in how specific alcohol consequences are experienced by the students while accounting for cross-country differences in overall alcohol consequences. The results suggested that 12 out of 24 B-YAACQ items exhibited similar reliability and difficulty among university students in the five countries while the majority of items (21 of 24) exhibited comparable reliability across all countries.

Nigeria and Canada on the Perception of Obesity

This study will examine and compare the perception of obesity between Canada and Nigeria. No research has examined public perceptions of obesity in Canada compared to

Nigeria at the time of writing. A search of Worldcat’s database titles, a repository of about 10 thousand global libraries with over 290 million resources (Worldcat.org, 2022) through the University of New Brunswick’s library (<https://lib.unb.ca/>), for specific search criteria: “weight Nigeria Canada” and “obesity Nigeria Canada” in the title did not provide any result relating to obesity perception study between Canada and Nigeria.

Comparison between Canada and Nigeria

Obesity prevalence in Canada and Nigeria

The comparison of the population and obesity prevalence between Canada and Nigeria is presented in Table 2.3.

Table 2.3

The summary of the population and obesity prevalence

| | Canada | Nigeria |
|-----------------------|------------|-------------|
| Population | 38 million | 215 million |
| Obesity prevalence | 26.8% | 14.3% |
| Overweight prevalence | 36.3% | 25.0% |
| Poverty rate | 11.2% | 40% |

Canada is estimated to have 36.3% of the population with overweight and 26.8% with obesity, giving a combined total population with increased health risks due to excess weight of 63.1% in 2018 (Statistics Canada, 2019). Between 1985 and 2011, the prevalence of obesity in Canada increased by about 30% from 6.1% to 18.3% (Twells et al., 2014). Statistics Canada (Statistics Canada, 2005) reported that in 1978/79 the

number of adults (18 and older) with obesity in Canada was about 14% which increased to 23% in 2004 (an estimated number of about 5.5 million people) and about 27% in 2018 translating to about 7.3 million adults.

Nigeria has an estimated 14.3% of the population living with obesity (Adeloye et al., 2021). In a cross-sectional study by Akarolo-Anthony et al. (2014), with random workers and visitors at the Federal Secretariat Complex (a government worksite), the prevalence of obesity in Abuja (Nigerian capital city, an urban area) revealed that about 38% of respondents had overweight challenge, 26% were living with obesity while 36% have normal weight. These numbers are as high as in developed countries.

Canada and Nigeria are different in a couple of factors – Canada has a population of about 38 million (Statistics Canada, 2022) while Nigeria has an estimated population of about 215 million people (National Population Commission, 2022). On weight distribution, Canada has a higher percentage of people with obesity, in comparison to Nigeria. Cross-cultural studies could present unpredictable results, for example, a quantitative cross-country comparison study (Bliznashka et al., 2021) of dietary patterns and obesity among adult women in sub-Saharan African countries - Ghana, Malawi, and Tanzania, revealed that different countries' patterns of diets and obesity differ significantly despite the close proximities of the countries. By considering the cultural, economic, and landscape diversities between Canada and Nigeria, the outcome of this study is unpredictable.

The disproportionately higher rates of obesity among poorer individuals have been attributed to higher unemployment, lower education levels, and irregular meals

(Żukiewicz-Sobczak et al., 2014). Canada has a poverty rate of 11.2% (Employment and Social Development, 2021), while Nigeria has a poverty rate of about 40% (National Bureau of Statistics, 2020).

Health Systems in Canada and Nigeria

Healthcare systems

The Canadian Health System is considered one of the best among the OECD countries. It provides access to health care based on need rather than the ability to pay (Martin et al., 2018) through the Medicare initiative, which was born in 1947 and has now gone through various transformations, and as of 2012, 94% of the surveyed 2,207 considered the Canadian universal health care an important source of collective pride (CTV News, 2012). The system otherwise called the “public insurance systems” or “single-payer” model – essentially relies on the government (or an agency of government) to pay for essential health services. This is sometimes referred to as “universal healthcare”, as it applies to all residents, and it is meant to be comprehensive in terms of covering all medically necessary services.

Nigeria's health system is a combination of publicly funded healthcare providers, private, and public insurance systems. The Nigerian government recently signed the National Health Insurance Authority Act (NHS, 2022) into law, a framework that mandates every resident to obtain health insurance (the implementation is still in its infancy). In Canada, healthcare services provided in long-term care facilities are paid for by the provincial and territorial governments (with room and board costs paid for by individuals), whereas in Nigeria individuals largely bear healthcare costs including obesity. A report by NOIPolls

(2021) showed that about 77% of Nigerians had no health insurance coverage based on the public opinion poll conducted against the 100% coverage for Canadian citizens and residents.

In comparing obesity interventions between Canada and Nigeria; the existence of comprehensive evidence-based clinical guidelines in Canada (Pearce, 2022) might inform members of the public and health professionals about the complexities of obesity as a chronic condition. Nigeria currently does not have clinical obesity guidelines. Section 5 of the Nigerian National Nutritional Guideline on NCD's Prevention, Control, and Management (The Federal Ministry of Health, 2014) provides recommendations to prevent and manage overweight/obesity at the individual level, the guideline is a general guideline for non-communicable diseases (NCD) management in Nigeria and not specifically for obesity management.

Other Indicators between Canada and Nigeria

Economic Indicators

The summary economic indicators between Canada and Nigeria are presented in Table 2.4. According to the 2021 World Bank's country classification by income level (Nada et al., 2021), using Gross National Income (GNI - which is the total amount of money earned by a country) per capita in current USD, the countries are classified into four different categories. The low-income countries (GNI less than 1046), lower-middle-income countries (GNI between 1046 and 4095), upper-middle-income countries (GNI between 4,096 and 12,695) and high-income countries (GNI above 12,695). For comparison, Canada is classified as a high-income country with a GNI of 43,440 while

Nigeria is classified as a lower-middle-income country with a GNI of 2,000 (World Bank, 2021a). Although the difference in GNI has been significant between the two countries since 1999, the ratio of the Canadian and Nigerian GNI has shrunk from 46.11 to 21.72 in 2021. As per the economy size, Canada has a Gross Domestic Product (GDP) of \$1,645,423.41 while Nigeria has a GDP of \$432,293.78 (World Bank, 2021b).

Table 2.4

The Summary of the Economic Indicators between Canada and Nigeria

| | Canada | Nigeria |
|--|-------------|---------------------|
| 2021 World Bank's country classification | High-income | Lower-middle-income |
| Gross National Income (GNI) | 38 million | 215 million |
| Gross Domestic Product (GDP) | 26.8% | 14.3% |
| Health budgets as a percentage of GDP | 10.79% | 3.89% |

Obesity varies with income but in a non-linear manner. According to Ameye and Swinnen (2019), obesity increases with income in poor countries, it has no relationship with income in middle-income countries and decreases with income in rich countries. In a particular country, studies show that the relationship between obesity and economic class is also non-linear; obesity is high among richer groups in low-income countries, somehow evenly distributed in middle-income countries, and high among the poor in high-income countries (Ameye & Swinnen, 2019). In terms of health budgets as a percentage of GDP, Nigeria has about 3.89% while Canada has 10.79% using 2018 data.

The current study, therefore, aims to examine and compare the perception of obesity among Canadians and Nigerians in relation to demographics (gender, educational qualification, employment status, self-reported BMI etc.). The comparison of knowledge of obesity between two countries with different weight distributions will aid our understanding of the chronic disease and could aid in the formulation of interventions to reduce and manage it.

Article Thesis

Chapter 3 of the thesis will be submitted to the Canadian Journal of Public Health for publication. SO drafted the research ethics application, created the initial research materials (advertisement, topic guide, and information and consent form), collected the data, curated the data, conducted the data analysis, and prepared the manuscript with regular input from his supervisors. SUD and GTG conceptualized the research project and provided regular input.

Chapter 3: Article

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Abstract

Background

Obesity prevalence has increased globally in the past fifty years and is predicted to increase further. Disease perception may impact health outcomes by influencing individual behaviour, treatment adherence, psychological well-being, and stigma reduction. Comparisons between different contexts can give rise to reflection on actions, results, or situational understanding. This study examines and compares perceptions of obesity between Canadians and Nigerians.

Methods

Sample of adults from Canada (n=878; mean age = 47.6±12.8 years; mean body mass index [BMI] = 36.4±11.1 kg/m²) and Nigeria (n=516; mean age = 39.9±9.2years; mean BMI = 26.1±6.9 kg/m²) completed an online survey. Multivariate analysis of variance assessed the levels of agreement with obesity educational messages, perceived causes of obesity, and weight bias while Chi-square tests were used to assess the levels of agreement with weight management interventions between Canadians and Nigerians.

Results

Whilst there were significant large to medium differences in the agreement with obesity messages between Canadians and Nigerians (p<.001), there were significant but small differences in the perceived causes of obesity (p<.001) across most causes. Both countries showed high levels of support for many obesity interventions and generally exhibited positive attitudes toward body acceptance & size diversity.

Conclusion

Canada and Nigeria showed differences and similarities in their levels of agreement with perceived causes of obesity, weight management interventions support and weight bias, while they showed the highest level of differences for the obesity messages.

Introduction

The prevalence of overweight and obesity has increased globally in children, adolescents, and adults from 1975 to 2016 (Abarca-Gómez et al., 2017), with over 40% of adults and 20% of children (aged 5-17) classified as having overweight or obesity (Eberwein et al., 2020). Obesity prevalence has doubled since 1980 in more than 70 countries and has continuously increased in most other countries (Olshansky et al. 2005). In 2008, the World Health Organization (WHO) classified obesity as a global epidemic (WHO Consultation on Obesity, 1997). It was estimated that the economic impacts from obesity will grow to 3.6% of GDP on average if there are no significant changes to the current status and the impacts will affect all countries in a similar magnitude irrespective of the income classification whether low-, middle-, or high-income (Okunogbe et al., 2022).

Obesity is a complex chronic health condition, which is caused by a combination of physiological, behavioural, psychological, or environmental factors (Obesity Canada, 2022a; Omer, 2020). There is no single cause of obesity which is the result of individual susceptibility, genetic, metabolic, and behavioural factors, which are all in turn influenced by the environment (WHO, 2022a; CMAJ, 2020). Furthermore, parental weight status before and around the time of conception (preconception) is a risk factor for overweight and obesity in childhood and beyond (Hieronimus & Ensenauer, 2021; Barker et al., 2018).

The perception that obesity is caused primarily by dietary behaviours and physical inactivity is common in many cultures (Chaput et al., 2014). A survey study (Dombrowski et al., 2021) in New Brunswick, Canada (n=1104), showed that most respondents consider behaviour to be the main cause of obesity while the environment

was seen as the least important contributing factor. Similarly, in an online survey conducted in 11 countries (Caterson et al., 2019), people living with obesity (n=14,502) and healthcare professionals (n=2,785) showed that most participants agree obesity is a disease, about 80% of people living with obesity assume complete responsibility for their weight loss efforts, while fewer than 50% of healthcare professionals consider genetics as a barrier for weight loss. Another survey study (Sharma et al., 2019) including people living with obesity (PwO), healthcare professionals (HCPs) and employers (n= 2,545) showed that 60% of PwO, 94% of HCPs and 71% of employers (71%) consider obesity as a chronic medical condition, while they reported diverse perceptions of the quality of their interaction during obesity management discussions. An evidence-based understanding of cross-cultural obesity perceptions could provide insights that can inform targeted health education and awareness campaigns aimed at promoting healthy body image and weight management practices.

People living with overweight or obesity frequently face stigma and discrimination, which may be harmful to their mental and physical health (Puhl & Heuer, 2010).

Prospectively, weight-related stigma is linked to increased mortality and other chronic diseases (Tomiyama et al., 2018). Once the stereotypes are internalized, they can leave affected individuals to live with blame for their weight and the perception that weight stigmatization is justifiable (Puhl & Heuer, 2010). One of the measures taken to reduce weight stigmatization was by categorizing obesity as a disease (Burki, 2021), a suggestion that is still a subject of debate to date (Rosen, 2014; Luli et al., 2023).

Fat Attitudes Assessment Toolkit (FAAT), developed to incorporate fat-positive attitudes, is a non-stigmatizing way of measuring contemporary fat attitudes and beliefs

in quantitative research (Cain et al., 2022). The FAAT was developed in response to criticism faced by previous questionnaires (e.g., Attitudes Toward Obese Persons Scale, Beliefs About Obese Persons Scale and Obesity Perception Survey); the criticisms include assessment of mostly negative attitudes, which does not allow for the possibility that people may hold positive evaluations of fat people, and the choice of stigmatizing language engaged in the questions. (Lacroix et al., 2017; Cain et al., 2022).

The perceptions towards obesity may have an important influence on health behaviours (Zelenyté et al., 2021) and could assist in providing support for measures to help those interested in losing weight. The 2023 World Obesity Day held on March 4, 2023, had its theme tagged “Changing Perspectives: Let’s Talk About Obesity”, an attempt aimed to use constructive conversations to correct misconceptions, end stigmas, and positively transform health outcomes (World Obesity Day, 2023). A study that extended the implicit theory (beliefs about people's potential for change, growth, and development) approach to weight management and expectancy theory (Burnette, 2010), hypothesized that individuals with a fixed mindset are unlikely to self-regulate effectively after dieting setbacks compared to those with growth mindsets. Individuals with fixed mindsets reported less persistence following setbacks when compared to individuals with growth mindsets, which suggests that the implicit theoretical approach might be of assistance in the expectations and motivations for weight loss.

The Canadian Adult Obesity Clinical Practice Guidelines (CPGs) is a patient-centred framework designed by over 60 professionals for healthcare professionals, patients, and policymakers to provide an improved obesity prevention and management framework with a focus on positive health outcomes and weight bias stereotypes reduction. The

framework includes 80 recommendations and 19 chapters, which include weight bias reduction, obesity management, prevention, and harm reduction among others (CMAJ, 2020). Efforts are ongoing to adapt the CPGs to other countries, Chile for example adopted 76 out of 80 CPGs recommendations, adapted one and created an additional 12 recommendations, which reduced the time needed to create a new set of guidelines altogether (Yudith et al., 2022). A similar adaptation was undertaken in Ireland which published the adapted version in 2022 (Breen et al., 2022).

A review of policymakers on the accuracy of obesity perceptions and policies (Cooper, 2014) in eleven countries, including Canada and the United States, revealed that 66% of the policymakers did not have a clear idea of the prevalence of obesity, 84% did not know the prevalence of overweight, and 78% did not know the BMI cut-off point for obesity. This demonstrated the importance of perception studies to identify knowledge gaps among stakeholders which might assign obesity prevention and management a lower priority in national or regional healthcare management. Canada, a high-income country is estimated to have an overweight and obesity prevalence of 36.3% and 26.8% respectively (Statistics Canada, 2019) while Nigeria (a lower-middle-income country) has an overweight and obesity prevalence of 25% and 14.3% respectively (Adeloye et al., 2021). Understanding how obesity is perceived and what people think about it across different regions could provide crucial insights into how elevated weight can be managed and prevented, while aiding the adaptation of CPGs to other contexts.

Aim and Objectives

This current research examines the similarities and differences in the perception of obesity between Canadians and Nigerians. The specific study objectives were:

1. To examine and compare the level of agreement with educational messages in relation to obesity and weight management between Canadians and Nigerians.
2. To examine and compare the perceived causes of obesity between Canadians and Nigerians.
3. To examine and compare the level of agreement with weight management interventions and considerations between Canadians and Nigerians.
4. To examine and compare the perceptions towards weight biases between Canadians and Nigerians.

Methods

Design

The current study used an online cross-sectional survey design.

Inclusion criteria

The participants in the study were adults residing in either Canada (19+ years old) or Nigeria (18+ years old). There was no exclusion based on gender orientation and everyone was encouraged to complete the survey regardless of their weight status.

Recruitment and Procedures

Data collection was carried out using the Qualtrics online platform. The survey was advertised on social media platforms; Facebook, Twitter, and LinkedIn, through both paid and unpaid adverts. Individuals were invited to participate, and data collection began on March 13th, 2023, through June 5th, 2023. Two versions of the survey were created for Canadian and Nigerian participants which were customized for each country, e.g., location was assessed as provinces for Canada and states for Nigeria.

Measures

The demographic information assessed include age, gender, race, province/state, environment (urban or rural), height, weight, level of education, employment status and relationship. For a copy of the full questionnaire used in this study see Appendix A.

Below outlines the measures used in this study.

Obesity education message agreement

Agreement with obesity education messages was assessed using measures based on a short (1 min, 13 sec) public educational video developed by Obesity Canada (Obesity Canada, 2022a). The key messages were translated into six statements about obesity and obesity management and participants rated the level of agreement from 1 (strongly disagree) to 5 (strongly agree). The statements were “*Obesity is a disease*”, “*Our bodies evolved to be hard-wired against weight loss*”, “*Body weight has more to do with genetics, our environment and what we were exposed to in the womb than our choices about exercise and food*”, “*Obesity has no cure*”, “*Weight-based stigma and discrimination make obesity complications worse*” and “*Weight loss may not be possible even with regular vigorous exercise and reduced calories*”. Each country’s mean agreement scores per measure were computed to compare their levels of agreement.

Higher scores indicate a higher level of agreement with obesity education key messages.

Perceived causes of obesity

The 21-item perceived causes of obesity scale was used to assess how much participants agree with factors that cause overweight and obesity, the responses were rated between 1 (strongly disagree) and 5 (strongly agree). The Perceived Causes of obesity scale consists of 7 subscales, 6 of which were based on a previous study (Dombrowski et al., 2021)

while the 'Preconception' subscale was developed to reflect research evidence on the link between preconception nutrition and health behaviours and obesity (Barker et al., 2018).

The mean scores were computed for all seven subscales to compare the level of agreement by country. Higher scores indicate a higher level of agreement with the various causes of obesity.

The perceived causes of obesity are discussed below: the 'Psychology' subscale consists of 3 items ($\alpha = .77$) and assesses the level of agreement with psychology as one of the factors causing obesity (e.g., "*Low self-esteem*"), the 'Physiology' subscale consists of 3 items ($\alpha = .62$) and assesses degree to which respondents agree with physiology as one of the factors causing obesity (e.g., "*Genetics/Inheritance*"), the 'Behaviour activity' subscale consists of 3 items ($\alpha = .75$) and assesses degree to which respondents agree with behaviour activity as a perceived cause of obesity (e.g., "*Not moving enough in general*"), the 'Behaviour eating' subscale consists of 3 items ($\alpha = .70$) and assesses degree to which respondents agree with behaviour eating as one of the factors causing obesity (e.g., "*Eating too much*"), the 'Environment food' subscale consists of 3 items ($\alpha = .50$) and assesses degree to which respondents agree with food environment as one of the factors causing obesity (e.g., "*Lack of healthy food options available*"), the 'Environment exercise' subscale consists of 3 items ($\alpha = .66$) and assesses degree to which respondents agree with exercise environment as one of the factors causing obesity (e.g., "*Lack of space available for activity*"), and the 'Preconception' subscale consists of 3 items ($\alpha = .73$) and assesses degree to which respondents agree with preconception as one of the factors causing obesity (e.g., "*Mother's health at conception*").

Weight management intervention support

The support for 22 weight management interventions was assessed by respondents indicating whether they were ‘In favour’ or ‘Against’ the intervention suggestions. The intervention list was based on a previous study (Dombrowski et al., 2021).

Intervention suggestions were grouped into three categories. The first category ‘Taxation, Availability and Manufacturing’ included 7 suggestions such as “*Limiting the amount of fat, sugar or salt that is added to food and drink by manufacturers*” and “*Putting tax on high-fat and sugary foods, which increases their price*”. The second category ‘Advertising, Sponsorship and Packaging’ included 7 suggestions such as “*Including health warning labels on packaging for food high in fat, sugar, or salt*” and “*Banning advertisements for sugary drinks*”. The third category ‘Support Services’ included 8 suggestions such as “*Providing education to health care professionals in weight loss strategies*” and “*Providing greater access to weight loss surgeries (e.g., bariatric surgeries)*”.

Weight stigma

The 49-item FAAT toolkit (Cain et al., 2022) was used to assess weight stigma and attitudes toward ‘fatness and fat people’. Responses ranged from 1 (strongly disagree) to 5 (strongly agree). The FAAT consists of 9 subscales: The ‘Empathy’ subscale consists of 7 items ($\alpha = .85$) and assesses the degree to which respondents recognize and empathize with the negative evaluations that fat people face in everyday life (e.g., “*Fat people face discrimination in many areas of life*”), the ‘Activism Orientation’ subscale consists of 7 items ($\alpha = .89$) and assesses the agreement with the idea that the

discrimination faced by ‘fat people’ is serious and unacceptable (e.g., “*Discrimination due to fatness leads to a denial of human rights*”).

The ‘Size Acceptance’ subscale consists of 6 items ($\alpha = .87$) and assesses the level of accepting and celebrating bodies of all sizes (e.g., “*Size acceptance is an important social movement*”), the ‘Attractiveness’ subscale consists of 5 items ($\alpha = .82$) and assesses perceived attractiveness of fat people (e.g., “*Fat people are attractive*”), the ‘Critical Health’ subscale consists of 5 items ($\alpha = .76$) and assesses the agreement with critiques around health and fatness (e.g., “*Fat people are not necessarily unhealthy*”), the ‘General Complexity’ subscale consists of 6 items ($\alpha = .84$) and assesses attributions for fatness that reflect factors outside of individual control (e.g., “*There are genetic factors that cause people to be fat*”), the ‘Socioeconomic Complexity’ subscale consists of 3 items ($\alpha = .78$) and assesses individual’s agreement with fatness attributions that reflect social and economic disparities (e.g., “*There are factors relating to social disadvantage that result in people being fat*”), the ‘Responsibility’ subscale consists of 6 items ($\alpha = .81$) and assesses the degree to which respondents agree with internal attributions for fatness (e.g., “*Fatness is the result of lifestyle factors*”). and the ‘Body Acceptance’ subscale consists of 4 items ($\alpha = .89$) and assesses how participants appraise their own bodies within the broader social context (e.g., “*I feel happy about my weight*”).

Fat acceptance composite score includes the average of empathy, activism orientation, size acceptance, attractiveness, and critical health subscales, which reflect ideas that align with critical fat perspectives. Higher scores on these subscales and fat acceptance indicate more positive evaluations of fat people.

Complexity attribution composite score includes the combination of general complexity, socioeconomic complexity, and responsibility subscales which reflect the attributions made for fatness that are both within and outside of personal control. Higher scores on these subscales and complexity attribution indicate more complex understandings of external factors that influence fatness and body weight. The mean scores of the measures were computed for each subscale to determine the overall subscale scores.

Health Status

Self-reported health status was assessed using two items (i.e., “*In general, would you say your health is?*” and “*Compared to other persons your age, would you say your health is?*”), with answers coded as “*Poor*” (1), “*Fair*” (2), “*Good*” (3), “*Very Good*” (4), and “*Excellent*” (5) response (Ware et al., 1993).

Ethical Approvals

This study received ethical approval from the University of New Brunswick Fredericton Research Ethics Board (REB), on file as REB 2022-206 and the Nigerian Federal Capital Territory (FCT) Human Research Ethics Committee, on file as FHREC/2022/01/225/14-11-22.

Analysis and synthesis

The data was analyzed using SPSS version 29, Process Macro 4.2. Chi-square tests were conducted to compare weight loss attempts and weight management interventions between Canada and Nigeria, corrections were adjusted for using Bonferroni adjustments. Multivariate analysis of variance (MANOVA) was conducted to compare the agreement with obesity education message, perceived causes of obesity and weight bias between

Canada and Nigeria with partial Eta squared values computed to assess the effect sizes. The 'Unknown' category for all measures was excluded from all analyses.

For completers vs. non-completers analysis, Chi-square tests were conducted to compare the gender, relationship, race, employment, education, and health status between completers and non-completers while multivariate analysis of variance test was conducted to compare the difference in age and BMI between completers and non-completers for both countries.

For obesity education message agreement and perceived causes of obesity, "*Strongly agree*" and "*Agree*" were coded as "*Agree*", "*Strongly disagree*" and "*Disagree*" coded as "*Disagree*" while "*Neither agree nor disagree*" was coded as "*Neutral*". These categories were used for data visualization only.

Results

Demographics

Table 3.1 displays the participant demographics split by country (for demographics split by gender and country see Appendix B). For the Canadian sample, a total of 1105 eligible individuals initiated the survey, and 878 (79.5%) participants completed it. Out of the 878 completed responses, most participants were female (n=781, 89.0%), identified as white (n=685, 77.2%), were married or in a relationship (n=565, 64.4%), and had completed some post-secondary education (n=773, 88.0%). Most completers were employed (n=629, 71.6%), lived in urban locations (n=554, 63.1%), had their weight status based on body mass index (BMI kg/m²) classified as 'obese' (n=610, 69.5%) and identified their health status as 'good' (n=383, 43.6%).

For the Nigerian sample, a total of 754 eligible individuals initiated the survey, and 516 (68.4%) participants completed it. Out of the 516 completers, most participants were male (n=300, 58.1%), identified as black (n=507, 98.3%), married or in a relationship (n=351, 68.0%), and had completed some post-secondary education (n=505, 97.8%). Most were employed (n=458, 88.8%) and lived in urban locations (n=476, 92.2%). Most had their weight status based on BMI classified as 'healthy weight' (n=176, 34.1%), followed by overweight (n=172, 33.3%) and most identified their health status as 'very good' (n=182, 35.3%).

Table 3.1*Descriptive Information of Participants from Canada and Nigeria*

| Participant Characteristics | Canada | Nigeria |
|-----------------------------|-------------|------------|
| | n=878 | n=516 |
| | n (%) | n (%) |
| Age (mean, SD) | 47.55±12.8 | 39.93±9.2 |
| BMI (Mean, SD) | 36.42±11.05 | 26.07±6.91 |
| Gender | | |
| Female | 781 (89.0) | 209 (40.5) |
| Male | 81 (9.2) | 300 (58.1) |
| Other | 11 (1.3) | 6 (1.2) |
| Unknown | 5 (0.6) | 1 (0.2) |
| Relationship status | | |
| Married | 565 (64.4) | 351 (68.0) |
| Single | 213 (24.3) | 143 (27.7) |
| Widowed/Divorced | 91 (10.4) | 18 (3.5) |
| Others | 2 (0.2) | 1 (0.2) |
| Unknown | 7 (0.8) | 3 (0.6) |
| Highest Education | | |
| High School | 101 (11.5) | 6 (1.2) |
| Post-secondary | 217 (24.7) | 10 (1.9) |
| Some Graduate | 556 (63.3) | 495 (95.9) |
| Unknown | 4 (0.5) | 5 (1.0) |
| Environment | | |
| Urban | 554 (63.1) | 476 (92.2) |
| Rural | 321 (36.6) | 39 (7.6) |
| Unknown | 3 (0.3) | 1 (0.2) |
| BMI (Kg/m ²) | | |
| Underweight (<18.5) | 7 (0.8) | 31 (6.0) |
| Healthy weight (18.5-24.9) | 106 (12.1) | 176 (34.1) |
| Overweight (25.0-29.9) | 131 (14.9) | 172 (33.3) |
| Obese (>30.0) | 610 (69.5) | 112 (21.7) |
| Unknown | 24 (2.7) | 25 (4.8) |
| Race | | |
| Indigenous | 20 (2.3) | 0 (0.0) |
| White | 679 (77.2) | 0 (0.0) |
| Black | 115 (13.1) | 507 (98.3) |
| Others | 56 (6.4) | 4 (0.7) |
| Unknown | 8 (0.9) | 5 (1.0) |

| | | |
|--|------------|------------|
| Employment | | |
| Student | 38 (4.3) | 21 (4.1) |
| Employed | 629 (71.6) | 458 (88.8) |
| Unemployed | 25 (2.8) | 13 (2.5) |
| Others | 182 (20.7) | 15 (2.9) |
| Unknown | 4 (0.5) | 9 (1.7) |
| Health Status | | |
| Excellent | 44 (5.0) | 102 (19.8) |
| Very good | 166 (18.9) | 182 (35.3) |
| Good | 383 (43.6) | 178 (34.5) |
| Fair | 231 (26.3) | 50 (9.7) |
| Poor | 52 (5.9) | 4 (0.8) |
| Unknown | 2 (0.2) | 0 (0) |
| Health Status compared to others your age. | | |
| Excellent | 48 (5.5) | 111 (21.5) |
| Very good | 158 (18.0) | 179 (34.7) |
| Good | 323 (36.8) | 182 (35.3) |
| Fair | 233 (26.5) | 35 (6.8) |
| Poor | 114 (13.0) | 8 (1.6) |
| Unknown | 2 (0.2) | 1 (0.2) |

Note. a. N=1394. b. “Other” gender includes non-binary and those preferring to self-describe gender.

Completer Non-Completers Analysis

The differences between completers and non-completers by country are presented in Table 3.2. For the Canadian sample, 79.5% (n=878) completed it while 20.5% (n=227) did not complete the survey; for the Nigerian sample, 68.5% (n=516) completed it while 31.5% (n=237) did not complete it.

For the Canadian participants, there were non-significant differences between the completers and non-completers for age, BMI, environment, education, relationship, and health status ($p > .05$), however, there was a significant difference between the completers and non-completers for gender ($p = .03$), race ($p < .001$), and employment ($p < .001$). A detailed comparison of significance is in Appendix C.

Similarly, for Nigerian participants there were non-significant differences between the completers and non-completers for mean BMI, environment, relationship, gender, employment, and health status ($p > .05$), however, there was a significant difference between the completers and non-completers for age ($p = .004$), race ($p < .001$) and education ($p < .001$). A detailed comparison of significance is in Appendix D.

Table 3.2*Completers and Non-completers by Country*

| Participant Characteristics | Canada | | Nigeria | |
|--|------------------|-----------------|-----------------|------------------|
| | Completers | Non-Completers | Completers | Non-Completers |
| | n=878 (79.5) | n=227 (20.5) | n=516 (68.5) | n=237 (31.5) |
| | n (%) | n (%) | n (%) | n (%) |
| Gender | | | | |
| Female | 781 (89.0)* | 147 (64.8)* | 209 (40.5) | 88 (37.1) |
| Male | 81 (9.2) | 28 (12.3) | 300 (58.1) | 100 (42.2) |
| Others | 11 (1.3) | 1 (0.4) | 6 (1.2) | 6 (2.5) |
| Unknown | 5 (0.6) | 51 (22.5) | 1 (0.2) | 43 (18.1) |
| Age (mean, SD) | | | | |
| | 47.55 ±12.8 | 46.26 ±11.90 | 39.93 ±9.2* | 38.30 ±10.51* |
| BMI (mean, SD) | | | | |
| | 36.42 ± 11.05 | 34.96 ±11.45 | 26.07 ±6.91 | 25.92 ±7.29 |
| Relationship status | | | | |
| Married | 565 (64.4) | 100 (44.1) | 351 (68.0) | 95 (40.1) |
| Single | 213 (24.3) | 39 (17.2) | 143 (27.7) | 52 (21.9) |
| Widowed/Divorced | 91 (10.4) | 14 (6.2) | 18 (3.5) | 7 (3.0) |
| Others | 2 (0.2) | 0 (0.0) | 1 (0.2) | 0 (0.0) |
| Unknown | 7 (0.8) | 74 (32.6) | 3 (0.6) | 83 (35.0) |
| BMI^a(Kg/m²) | | | | |
| Underweight | 7 (0.8) | 0 (0.0) | 31 (6.0) | 13 (5.5) |
| Healthy weight | 106 (12.1) | 22 (9.7) | 176 (34.1) | 58 (24.5) |
| Overweight | 131 (14.9) | 33 (14.5) | 172 (33.3) | 49 (20.7) |
| Obese | 610 (69.4) | 100 (44.1) | 112 (21.7) | 37 (15.6) |
| Unknown | 25 (2.8) | 72 (31.7) | 25 (4.8) | 80 (33.8) |
| Race | | | | |
| Indigenous | 20 (2.3)** | 2 (0.9)** | 0 (0.0)** | 0 (0.0)** |
| White | 679 (77.3) | 126 (55.5) | 0 (0.0) | 0 (0.0) |
| Black | 115 (13.1) | 39 (17.2) | 507 (98.3) | 182 (76.8) |
| Others | 56 (6.4) | 6 (2.6) | 4 (0.8) | 7 (3.0) |
| Unknown | 9 (1.0) | 54 (23.8) | 5 (1.0) | 48 (20.3) |
| Employment | | | | |
| Student | 38 (4.3)** | 5 (2.2)** | 21 (4.1) | 7 (3.0) |
| Employed | 629 (71.6) | 115 (50.7) | 458 (88.8) | 142 (59.9) |
| Unemployed | 25 (2.8) | 6 (2.6) | 13 (2.5) | 5 (2.1) |
| Others | 182 (20.7) | 26 (11.5) | 15 (2.91) | 0 (0.0) |
| Unknown | 5 (0.6) | 75 (33.0) | 9 (1.7) | 83 (35.0) |

| | | | | |
|-------------------|------------|------------|------------|------------|
| Highest Education | | | | |
| High School | 101 (11.5) | 20 (8.8) | 6 (1.2)** | 6 (2.5)** |
| Post-secondary | 217 (24.7) | 37 (16.3) | 10 (1.9) | 6 (2.5) |
| Some Graduate | 556 (63.3) | 98 (43.2) | 496 (95.9) | 140 (59.1) |
| Unknown | 5 (0.6) | 72 (31.7) | 5 (1.0) | 84 (35.9) |
| Environment | | | | |
| Urban | 554 (63.1) | 108 (47.6) | 476 (92.2) | 164 (69.2) |
| Rural | 321 (36.6) | 64 (28.2) | 39 (7.6) | 18 (7.6) |
| Unknown | 3 (0.3) | 55 (24.2) | 1 (0.2) | 55 (23.3) |
| Health Status | | | | |
| Excellent | 44 (5.0) | 10 (4.4) | 102 (19.8) | 42 (17.7) |
| Very good | 166 (18.9) | 26 (11.5) | 182 (35.3) | 38 (16.0) |
| Good | 383 (43.6) | 64 (28.2) | 178 (34.5) | 61 (25.7) |
| Fair | 231 (26.3) | 42 (18.5) | 50 (9.7) | 12 (5.1) |
| Poor | 52 (5.9) | 13 (5.7) | 4 (0.8) | 1 (0.4) |
| Unknown | 2 (0.2) | 72 (31.7) | 0 (0.0) | 83 (35.1) |

Note. *p < .05. **p < .01. a. BMI Underweight (<18.5), Healthy weight (18.5-24.9), Overweight (25.0-29.9) and Obese (>30.0)

Research objective 1: Obesity education message

Table 3.3 outlines the level of agreement with six education obesity messages. There were significant differences between Canadians and Nigerians in the level of agreement, with Canadians showing a higher level of agreement with all six messages compared to Nigerians (ps<.001), with effect sizes ranging from large (1 item – “*Weight loss may not be possible even with regular vigorous exercise and reduced calories*” [$\eta^2=.169$]) to medium (3 items – “*Obesity has no cure*” [$\eta^2=.112$]; “*Our bodies evolved to be hard-wired against weight loss*” [$\eta^2=.066$]; “*Weight-based stigma and discrimination can make obesity complications worse*” [$\eta^2=.070$]) to small (2 items – Obesity is a disease [$\eta^2=.044$]; “*Body weight has more to do with genetics, our environment and what we were exposed to in the womb than our choices about exercise and food*” [$\eta^2=.011$]).

Overall, the participants from Canada and Nigeria showed the highest mean level of

agreement for the same two items ranked within country (“*Weight-based stigma and discrimination can make obesity complications worse*” and “*Obesity is a disease*”) and both countries showed the lowest level of endorsement for the statement suggesting that obesity has no cure (Table 3.3).

Table 3.3

Average Level of Agreement with Obesity Education Messages for Canadian and Nigerian Participants Ranked by Level of Endorsement (Canada)

| Rank | Item | Canada | | Nigeria | | F(1, 1378) | p | η^2 |
|------|--|--------|------|---------|------|------------|-------|----------|
| | | M | SD | M | SD | | | |
| 1 | Weight-based stigma and discrimination can make obesity complications worse (5) | 4.43 | .95 | 3.80 | 1.33 | 104.32 | <.001 | .070 |
| 2 | Obesity is a disease (1) | 3.77 | 1.19 | 3.19 | 1.44 | 62.86 | <.001 | .044 |
| 3 | Weight loss may not be possible even with regular vigorous exercise and reduced calories (6) | 3.38 | 1.32 | 2.15 | 1.33 | 280.76 | <.001 | .169 |
| 4 | Our bodies evolved to be hard-wired against weight loss (2) | 3.29 | 1.20 | 2.62 | 1.23 | 97.17 | <.001 | .066 |
| 5 | Body weight has more to do with genetics, our environment and what we were exposed to in the womb than our choices about exercise and food (3) | 3.04 | 1.17 | 2.77 | 1.38 | 15.37 | <.001 | .011 |
| 6 | Obesity has no cure (4) | 2.51 | 1.22 | 1.66 | 1.04 | 173.46 | <.001 | .112 |

Note. $N = 1394$ ($n = 878$ for Canada and $n=516$ for Nigeria). Scale is 1 (strongly disagree) to 5 (strongly agree).

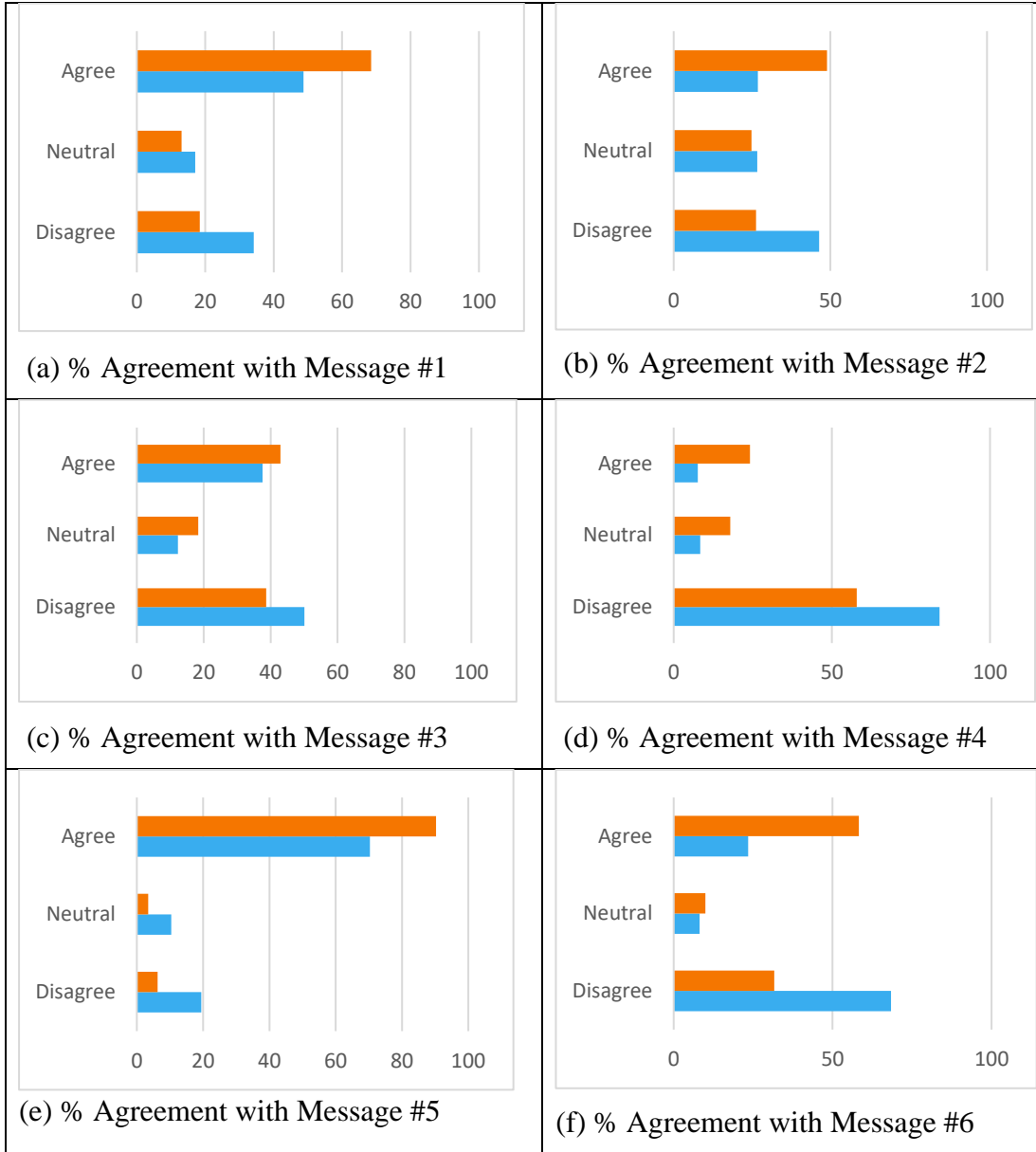
Figure 3.1 (a-f) visualizes the percentage agreement with individual obesity messages by country. Canadian respondents showed higher percentages of agreement with all messages. The largest discrepancy can be seen for the item (Message #6) “*Weight loss may not be possible even with regular vigorous exercise and reduced calories*” with 58% vs. 23% agreement between Canadian and Nigerian respondents respectively, while 32% and 68% respectively disagreed with the message.

The highest level of agreement was found for the message (#5) that “*Weight-based stigma and discrimination can make obesity complications worse*” with 90% and 70% agreement for Canadian and Nigerian participants respectively. Three messages showed less than 50% agreement for Canadian participants (#2: “*Our bodies evolved to be hard-wired against weight loss*”, #3: “*Body weight has more to do with genetics, our environment and what we were exposed to in the womb than our choices about exercise and food*”, #4: “*Obesity has no cure*”), with the lowest level of agreement for both Canadian and Nigerian participants for the message that obesity has no cure with 24% and 8% respectively endorsing this message.

Figure 3.1

Percentage Level of Agreement with Individual Obesity Messages

■ Canada % ■ Nigeria %



Note. #1: Obesity is a disease, #2: Our bodies evolved to be hard-wired against weight loss, #3: Body weight has more to do with genetics, our environment and what we were exposed to in the womb than our choices about exercise and food, #4: Obesity has no cure, #5: Weight-based stigma and discrimination can make obesity complications worse, #6: Weight loss may not be possible even with regular vigorous exercise and reduced calories.

■ Canada % ■ Nigeria %

Research Objective 2: Perceived Causes of Obesity

Table 3.4 outlines the level of agreement with seven subscales for causes of obesity. There were statistically significant differences between Canadians and Nigerians in ‘Physiology’, ‘Psychology’, ‘Behaviour Eating’, ‘Behaviour Activity’, ‘Environment Food’, and ‘Preconception’ perceived causes of obesity ($p < .005$) and a non-significant in ‘Environment Exercise’ ($p = .791$). All effect sizes were small ($\eta^2 < 0.016$), except for ‘Psychology’ with a large effect size ($\eta^2 = 0.169$), where the highest level of agreement was found in Canadian participants with a mean of 4.28. Nigerians showed the highest agreement with ‘Behaviour eating’ with a mean of 4.17. Both countries displayed high average scores for physiological and behavioural (activity and eating) factors and low scores for preconception and environment (food and exercise) factors.

Table 3.4

Average Level of Agreement with Perceived Causes of Obesity for Canadian and Nigerian Participants Ranked by Level of Endorsement (Canada)

| Rank | Obesity Cause | Canada | | Nigeria | | F (1,1370) | p | η^2 |
|------|----------------------|--------|------|---------|------|------------|-------|----------|
| | | M | SD | M | SD | | | |
| 1 | Psychology | 4.28 | 0.70 | 3.51 | 1.01 | 278.87 | <.001 | .169 |
| 2 | Physiology | 4.11 | 0.64 | 3.96 | 0.73 | 15.44 | <.001 | .011 |
| 3 | Behaviour Activity | 4.11 | 0.76 | 3.95 | 0.92 | 12.22 | <.001 | .009 |
| 4 | Behaviour Eating | 3.98 | 0.81 | 4.17 | 0.83 | 16.85 | <.001 | .012 |
| 5 | Environment Food | 3.66 | 0.84 | 3.43 | 0.90 | 22.97 | <.001 | .016 |
| 6 | Environment Exercise | 3.42 | 0.88 | 3.41 | 0.97 | 0.070 | .791 | .000 |
| 7 | Preconception | 2.80 | 0.84 | 2.66 | 0.92 | 7.769 | .005 | .006 |

Note. N = 1394 (n = 878 for Canada and n = 516 for Nigeria).

Figure 3.2 visualizes the percentage agreement with the perceived causes of obesity by country. Agreements in both countries were high for ‘physiology’ (93% Canada, 85% Nigeria), ‘behaviour eating’ (86% Canada, 89% Nigeria), and ‘behaviour activity’ (90% Canada, 81% Nigeria). High levels of agreement were found for the ‘food environment’ (73% Canada, 67% Nigeria) and the ‘activity environment’ (64% Canada, 63% Nigeria). Similarly low agreement was found for preconception as a cause for obesity (30% Canada, 28% Nigeria), with most participants disagreeing that this is a cause for obesity (37%, Canada 52% Nigeria). There was a wide gap in agreement for psychology, with 94% of Canadians agreeing with this explanatory factor compared to 67% of Nigerians.

Figure 3.2

■ Canada % ■ Nigeria %

Percentage Agreement of Participants with the Perceived Cause of Obesity



■ Canada % ■ Nigeria %

Research Objective 3: Weight Management Interventions Support

Table 3.5 shows the level of support for 22 weight management interventions by country, and Figures 3.3 through 3.5 visualize the percentage agreement with interventions by country and grouped by intervention categories.

Taxation, Availability and Manufacturing

There were statistically significant differences in the level of agreement between Canada and Nigeria for all 7 interventions in the ‘taxation, availability and manufacturing’ category ($p < .03$) as shown in Table 3.5.

Nigerians showed higher levels of endorsement for all interventions in this category except for one (“*Limiting the placement of unhealthy products near checkouts*”; Canada's 59% and Nigeria's 51%). Participants from both Canada and Nigeria showed varying levels of support for policy measures aimed at taxation, availability, and manufacturing of sugary foods. Both countries showed the highest level of endorsement for “*Limiting the amount of fat, sugar or salt that is added to food and drink by manufacturers.*” (85% Canada, 89% Nigeria) and the lowest level of agreement for “*Limiting the number of fast food and take-out shops in an area.*” (39% of Canadians and 45% of Nigerians). The visual display of the comparison of Canadians and Nigerians for interventions in this category and their levels of significance is shown in Figure 3.3.

Table 3.5

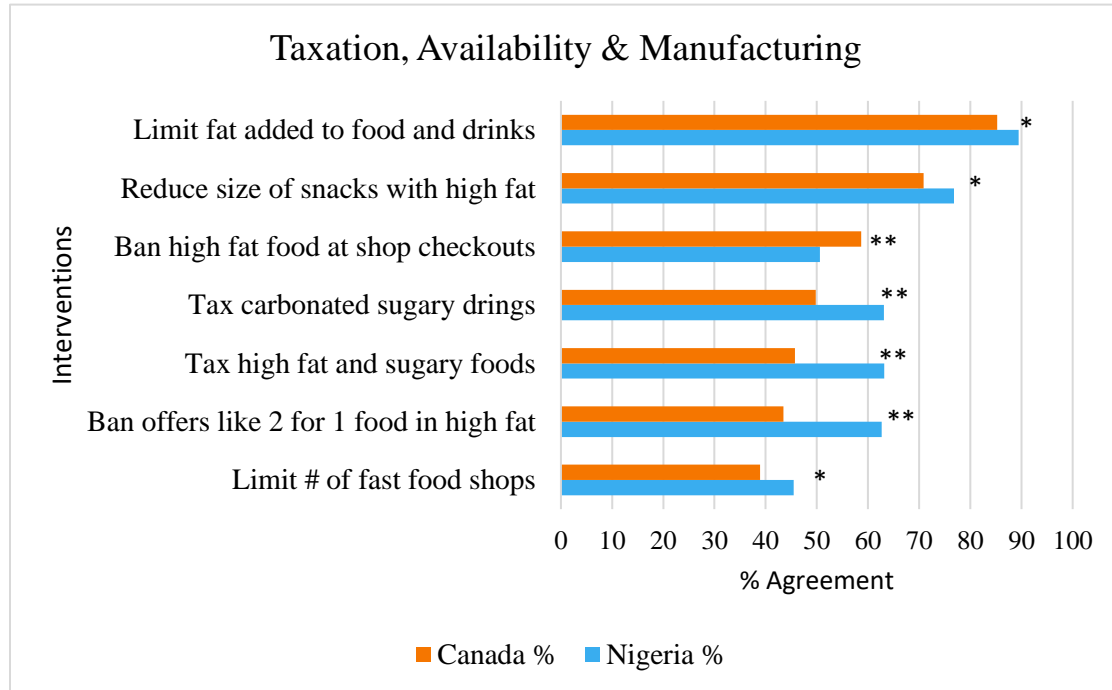
Pearson Chi-Square Statistics between Canada and Nigeria for Weight Management Intervention Support.

| Rank | Intervention | % Agreement | | N | X ² | p |
|--|---|-------------|---------|------|----------------|-------|
| | | Canada | Nigeria | | | |
| Taxation, Availability and Manufacturing | | | | | | |
| 1 | Limiting the amount of fat, sugar or salt that is added to food and drink by manufacturers. | 85.24 | 89.46 | 1377 | 4.96 | .026 |
| 2 | Reducing the standard size of snacks or drinks high in fat, sugar, or salt. | 70.86 | 76.83 | 1380 | 5.81 | .016 |
| 3 | Banning shops from placing food high in fat, sugar, or salt next to checkouts. | 58.70 | 50.59 | 1380 | 8.53 | .003 |
| 4 | Putting tax on carbonated sugary drinks, which increases their price. | 49.77 | 63.10 | 1378 | 22.90 | <.001 |
| 5 | Putting tax on high-fat and sugary foods, which increases their price. | 45.71 | 63.17 | 1380 | 39.09 | <.001 |
| 6 | Banning offers such as 2 for 1 for food high in fat, sugar, or salt. | 43.48 | 62.65 | 1380 | 47.11 | <.001 |
| 7 | Limiting the number of fast food and take-out shops in an area. | 38.95 | 45.47 | 1381 | 5.64 | .018 |
| Adverts, Sponsorship and Packaging | | | | | | |
| 1 | Including health warning labels on packaging for food high in fat, sugar, or salt. | 81.79 | 96.46 | 1381 | 61.85 | <.001 |
| 2 | Banning the use of children's cartoon characters or sports personalities on packaging for food and drink high in fat, sugar, or salt. | 73.48 | 58.02 | 1376 | 35.00 | <.001 |

| | | | | | | |
|------------------|--|-------|-------|------|--------|-------|
| 3 | Including labels on food and drink with the exercise needed to burn its calories | 65.71 | 93.53 | 1382 | 136.44 | <.001 |
| 4 | Limiting branding of food high in fat, sugar or salt and sugary drinks (e.g., plain food packaging). | 59.50 | 66.47 | 1378 | 6.60 | .010 |
| 5 | Banning sponsorship of food and drink high in fat, sugar or salt at sporting events and programs | 51.43 | 51.68 | 1378 | 0.01 | .928 |
| 6 | Banning advertisements for sugary drinks | 50.97 | 45.92 | 1376 | 3.26 | .071 |
| 7 | Banning advertisements for food high in fat, sugar, or salt | 49.37 | 48.41 | 1377 | 0.12 | .732 |
| Support Services | | | | | | |
| 1 | Making healthier food and drink options cheaper | 98.51 | 96.64 | 1380 | 5.28 | .022 |
| 2 | Providing education to health care professionals in weight loss strategies | 96.80 | 97.81 | 1379 | 1.19 | .276 |
| 3 | Providing more free weight management courses for people who want to lose weight | 94.97 | 97.42 | 1378 | 4.86 | .028 |
| 4 | Involving dieticians more in weight loss strategies | 94.52 | 96.06 | 1383 | 1.62 | .203 |
| 5 | Providing greater access to remote weight loss strategies (e.g., internet-delivered support) | 93.04 | 94.27 | 1382 | 0.80 | .371 |
| 6 | Providing greater access to weight loss medication | 85.37 | 83.76 | 1377 | 0.74 | .388 |
| 7 | Involving pharmacists more in weight loss strategies | 74.91 | 76.98 | 1380 | 0.64 | .423 |
| 8 | Providing greater access to weight loss surgeries (e.g., bariatric surgeries) | 66.51 | 60.00 | 1377 | 5.90 | .015 |

Figure 3.3

Percentage Level of Agreement Comparison Chart for Measures in Taxation, Availability & Manufacturing Category



Note. *p < .05. **p < .01.

Adverts, Sponsorship and Packaging

There were statistically significant differences between Canadians and Nigerians for the items “Including health warning labels on packaging for food high in fat, sugar, or salt.”, “Banning the use of children’s cartoon characters or sports personalities on packaging for food and drink high in fat, sugar, or salt.”, “Including labels on food and drink with the exercise needed to burn its calories”, and “Limiting branding of food high in fat, sugar or salt and sugary drinks (e.g., plain food packaging).” interventions (ps<.02) and a non-significant in “Banning sponsorship of food and drink high in fat, sugar or salt at sporting events and programs”, “Banning advertisements for sugary drinks” and

“Banning advertisements for food high in fat, sugar, or salt” interventions ($p>.07$) as summarized in Table 3.5.

Comparing Canada's and Nigeria's levels of support for adverts, sponsorship and packaging reveals differing levels of support, while both countries showed similar levels of support for measures such as banning advertisements for sugary drinks (Canada 51% and Nigeria 46%) and banning sponsorship of unhealthy food at sporting events (Canada 51% and Nigeria 52%), Nigeria demonstrates higher levels of support for measures such as including labels with exercise requirements (94% against Canada's 66%) and including health labels on packaging (96% against Canada's 82%). On the other hand, Canada exhibits stronger support for measures like banning the use of children's cartoon characters or sports personalities on packaging (73% against Nigeria's 58%). Figure 3.4 shows the percentage level of agreement comparison chart for measures in the 'Adverts, Sponsorship and Packaging' category.

Figure 3.4

Percentage Level of Agreement Comparison Chart for Measures in Adverts, Sponsorship & Packaging category



Note. * $p < .05$. ** $p < .01$.

Support Services

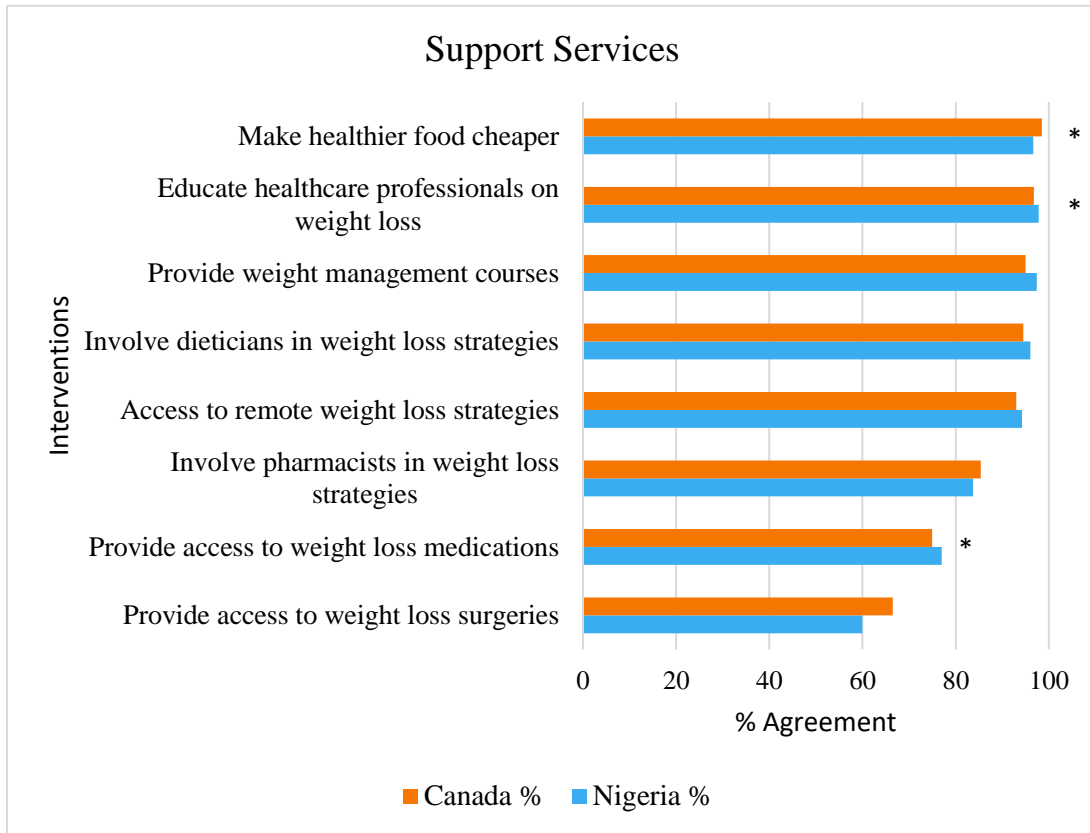
There were statistically significant differences between Canadians and Nigerians in “Making healthier food and drink options cheaper”, “Providing more free weight management courses for people who want to lose weight”, and “Providing greater access to weight loss surgeries (e.g., bariatric surgeries)” interventions ($ps < .03$) and a non-significant in “Providing education to health care professionals in weight loss strategies”, “Involving dieticians more in weight loss strategies”, “Providing greater access to remote weight loss strategies (e.g. internet delivered support)”, “Providing

greater access to weight loss medication” and *“Involving pharmacists more in weight loss strategies”* support services interventions ($p > .20$) as summarized in Table 3.5.

Both Canada and Nigeria exhibited similar levels of strong support for most measures, involving pharmacists in weight loss strategies (Canada’s 85% against Nigeria’s 84%), dieticians in weight loss strategies (Canada’s 95% against Nigeria’s 96%) and offering free weight management courses (Canada’s 95% against Nigeria’s 97%). Canada showed higher levels of support for providing greater access to weight loss surgeries (67% against Nigeria’s 60%), while there were similar levels of agreement for “access to weight loss medication” (Canada’s 75% and Nigeria’s 77%). Both countries displayed high support for making healthier food and drink options more affordable (Canada’s 99% against Nigeria’s 97%). Figure 3.5 shows the percentage level of agreement comparison chart for measures in the ‘Support Services’ category.

Figure 3.5

Percentage Level of Agreement Comparison Chart for Measures in the “Support Services” Category



Note. * $p < .05$. ** $p < .01$.

Research objective 4: Analysis of Weight Bias

Table 3.6 outlines the level of agreement with nine subscales of the FAAT toolkit and two composite subscales ('Fat Acceptance' and 'Complexity Attribution'). There were significant differences between Canadians and Nigerians in the level of agreement of all subscales ($p < 0.001$), with Canadians showing a higher level of agreement with eight out of nine subscales compared to Nigerians except for 'Body Acceptance' where Nigerians agreed more (mean score of 4.06 compared to Canadians' 2.46). The effect sizes ranged from large (2 subscales - Body acceptance [$\eta^2 = .366$]; Socioeconomic Complexity [$\eta^2 = .193$]) to medium (3 subscales - Responsibility [$\eta^2 = .133$]; Empathy [$\eta^2 = .108$]; Critical Health [$\eta^2 = .083$]) to small (4 subscales - General Complexity [$\eta^2 = .052$]; Attractiveness [$\eta^2 = .018$]; Activism [$\eta^2 = .016$]; Size Acceptance [$\eta^2 = .011$]). The composite scale, Attribution Complexity, has a large effect size [$\eta^2 = .169$] while Fat acceptance has a small effect size [$\eta^2 = .055$]

Table 3.6

Multivariate Analysis of Variance Statistics between Canada and Nigeria for FAAT Subscales.

| Rank | FAAT Subscales | Canada | | Nigeria | | F(1,1360) | p | η^2 |
|------------------|--------------------------|--------|------|---------|------|-----------|-------|----------|
| | | M | SD | M | SD | | | |
| 1 | Empathy | 4.44 | 0.63 | 3.96 | 0.74 | 164.21 | <.001 | .108 |
| 2 | General Complexity | 4.42 | 0.57 | 4.13 | 0.68 | 75.18 | <.001 | .052 |
| 3 | Socioeconomic Complexity | 4.15 | 0.75 | 3.36 | 0.85 | 325.84 | <.001 | .193 |
| 4 | Critical Health | 4.15 | 0.74 | 3.69 | 0.73 | 122.50 | <.001 | .083 |
| 5 | Size Acceptance | 4.08 | 0.83 | 3.91 | 0.85 | 14.52 | <.001 | .011 |
| 6 | Activism | 4.06 | 0.90 | 3.83 | 0.83 | 21.54 | <.001 | .016 |
| 7 | Attractiveness | 3.43 | 0.82 | 3.19 | 0.81 | 25.19 | <.001 | .018 |
| 8 | Responsibility | 2.99 | 0.85 | 3.63 | 0.64 | 208.14 | <.001 | .133 |
| 9 | Body acceptance | 2.46 | 1.12 | 4.06 | 0.83 | 786.14 | <.001 | .366 |
| Composite Scales | | | | | | | | |
| 1 | Fat acceptance | 4.03 | 0.65 | 3.72 | 0.61 | 79.14 | <.001 | .055 |
| 2 | Attribution Complexity | 4.29 | 0.57 | 3.74 | 0.64 | 277.50 | <.001 | .169 |

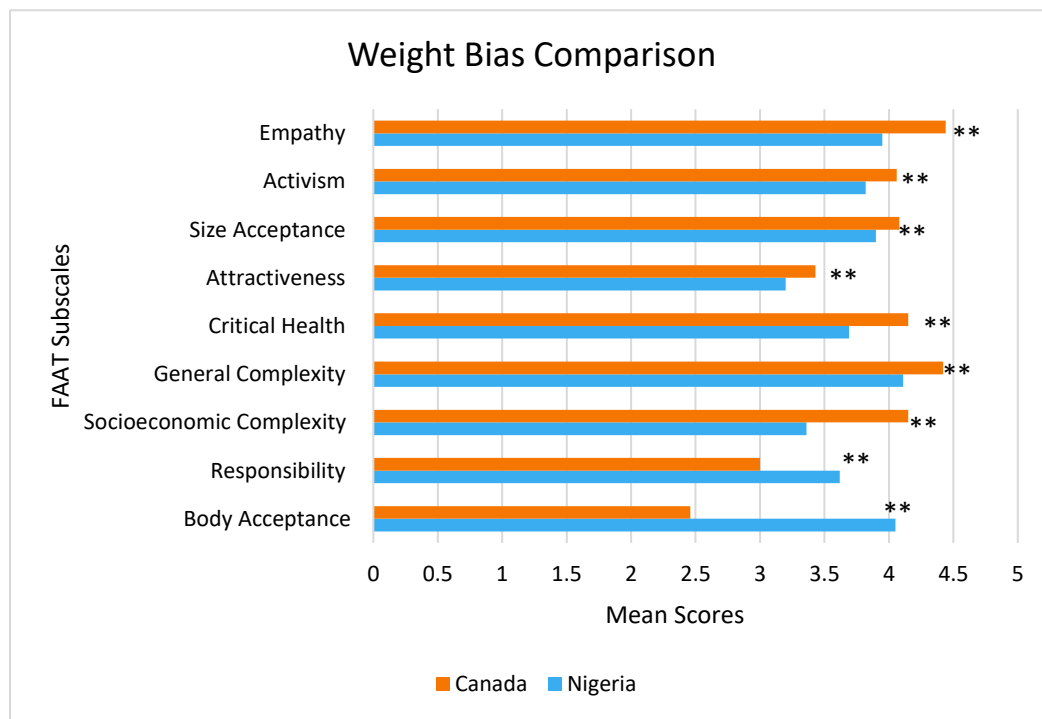
Participants from both Canada and Nigeria showed significant differences in attitudes towards body weight and the complexity of attributing weight-related factors. For Canada, the mean score for fat acceptance was 4.03 (SD = 0.65), indicating a relatively higher level of acceptance towards body weight diversity compared to the mean score of 3.71 (SD = 0.61), suggesting a lower level of acceptance. Similarly, in terms of

attribution complexity, Canada demonstrates a mean score of 4.29 (SD = 0.57), indicating a higher level of recognizing the multifaceted factors that contribute to weight-related issues, compared to a lower mean score of 3.74 (SD = 0.64) for Nigeria, implying a lower level of complexity in attributing weight-related factors.

Overall, the participants from Canada showed the highest mean level of agreement for ‘Empathy’ and ‘General Complexity’ while Nigerians showed the highest mean level of agreement for ‘Body acceptance’ and ‘General Complexity’. On the lowest mean level of agreement, Canadians agreed the least with ‘Body Acceptance’ while Nigerians agreed the least with ‘Attractiveness’ (Table 3.6). The mean comparisons of weight bias between Canada and Nigeria are shown in Figure 3.6.

Figure 3.6

Weight Bias Comparison (Means)



Note. * $p < .05$. ** $p < .01$.

Discussion

Principal Findings

The current cross-cultural comparison study between Canadians and Nigerians has found several differences as well as similarities in the perceptions of obesity and weight management.

Comparing the agreement to the six educational messages targeted at the Canadian population, there were some differences between Canadians and Nigerians, with Canadians showing stronger levels of agreement with all messages. However, the level of agreement showed room for improvement in both countries, including Canadian participants, who showed less than half of the participants agreeing with 3 out of 6 educational messages. For example, less than one-quarter of the participants from both countries agreed with the message “*Obesity has no cure*”. Both countries showed the highest level of agreement with the message that “*Weight-based stigma and discrimination can make obesity complications worse*”.

Participants from both Canada and Nigeria endorsed multiple causes of obesity, with physiology and behaviour considered as the main explanations in both countries, while ‘Activity’, ‘Eating environment’ and ‘Preconception’ were considered as less important factors causing obesity.

Both participant groups showed high levels of endorsement for interventions which support individuals to lose weight. Nigerians showed more agreement with government interventions in the form of taxation, food availability controls and adverts to regulate the food environment while both countries agreed almost in equal proportions on the provision of support interventions necessary to lose weight.

Participants from both countries generally exhibited positive attitudes toward body acceptance and size diversity, Canadian participants demonstrated higher scores in empathy, activism, size acceptance, attractiveness, critical health, general complexity, and socioeconomic complexity. Nigerian participants however showed higher levels of agreement with responsibility and body acceptance.

Strengths and Weaknesses

Currently, there are no studies which compare individual perceptions of obesity between Canada and any other country, especially a country that is culturally different like Nigeria. Understanding the differences in obesity perceptions across different cultures may help identify differences as well as similarities and more universal perceptions concerning the global condition of obesity. Further strengths of the current study are the varied assessment of obesity perceptions, including agreement with current educational messages, perceptions on causes, including new evidence on pre-conception, alongside agreement with interventions and weight bias using a newly developed positively framed assessment tool.

Limitations should be accounted for when interpreting the findings of this study, the samples are convenience samples and are not representative of the whole population but might depict individuals with an interest in the subject of obesity. The demographics of the participants are different when compared between Canada and Nigeria with respect to age (Canada's mean, 47 years vs Nigeria's mean 40 years), BMI (Canada's mean 36 vs Nigeria's mean of 26), environment (63.1% of Canadian participants live in urban area compared to Nigerians' 92%), education (63% of Canadians are graduates compared to 92% of Nigerians), and health status (71% of Canadians considered their health status as

good, very good or excellent compared to 94% of Nigerians). Self-reported health status although a subjective measure is an indicator of overall health status (Statistics Canada, 2023) and a strong predictor of mortality (Wuorela et al., 2020).

The Canadian sample consists mainly of women (88.9%) and therefore might not represent obesity perceptions of Canadian men; although more Canadian men have higher levels of overweight and obesity, 69.4% of men compared to 56.7% of women (Statistics Canada, 2019). Also, 69.4% of Canadian participants were categorized as having obesity, which is higher when compared to 2018 general population estimates of 26.8% with obesity (Statistics Canada, 2019). Similarly, overweight and obesity in this study for Nigerians were 33% and 28% respectively, which is higher than 25% and 14.3% respectively (Adeloye et al., 2021) reported in 2021. The Nigerian participants had about 92% urban dwellers and about 8% rural dwellers, which underrepresented rural dwellers when compared to Nigeria's 46% rural dwellers (The United Nations, 2019), this might be due to rural dwellers' lower access to the internet and subsequently the online survey.

The current study assessed perceptions regarding educational messages around obesity which were primarily targeted at Canadians, although the content of messages is universally relevant and generally translated beyond the Canadian context. The development of the educational messages assessment tool was based on a short educational video and bespoke to this survey and has not been tested for validity and reliability.

The internal consistency for some of the perceived causes of obesity subscales was suboptimal. The Cronbach's alpha coefficient for the 'Physiology' ($\alpha = .62$),

'Environment food' ($\alpha = .50$) and 'Environment exercise' ($\alpha = .66$) subscales fall below the commonly accepted threshold of 0.70 for satisfactory reliability.

The positive framing of the relatively new FAAT scale in an attempt to address the previous scales' anti-fat rhetoric and negative appraisals of fatness might have a leading effect which could affect the participants' judgement to be biased towards some of the measures.

Relation to Other Studies

Perceived Causes of Obesity

The Canadian endorsement of diverse causes of obesity in this study agrees with similar studies. The New Brunswickers survey study (Dombrowski et al., 2021), a study of the perception of obesity in New Brunswick province in Canada, showed more participants assigning higher weights to 'Behaviour' (86%) and 'Psychology' (80%) as causes of obesity, while 'Physiology' (58%) and 'Environment' (38%) were considered the least. A slight deviation in this study, where Canadians considered 'Psychology' (93%), and 'Physiology' (93%) before 'Behaviour' (88%) as the most explanation, while 'Environment' (69%) and 'Preconception' (30%) were considered the least factors responsible for obesity. Table 3.7 shows the diverse agreement with various perceived causes of obesity by the three sets of participants (New Brunswickers, Canadians and Nigerians).

Table 3.7

Comparing the Perceived Causes of Obesity Among New Brunswickers, Canadians and Nigerians.

| | New Brunswick (%) | Canada (%) | Nigeria (%) |
|---------------|-------------------|------------|-------------|
| Behaviour | 86 | 88 | 85 |
| Psychology | 80 | 93 | 67 |
| Physiology | 58 | 93 | 85 |
| Environment | 38 | 69 | 65 |
| Preconception | N/A | 30 | 28 |

A study that conducted a secondary analysis of previously collected data (n=942) using the Causes of Obesity Questionnaire, showed that 44% of Canadians believed behavioural causes are very important in causing obesity, 38% for environmental causes, 28% for physiological and 27% for psychosocial causes (Forouhar et al., 2023). In another study by Joslyn & Haider-Markel (2019), which reviewed two national surveys of US adults for what they considered as important factors that caused being very overweight; 75% considered ‘Not enough Exercise’ as an important factor, 59% considered ‘Will power’, 50% considered ‘Kinds of Foods Marketed’ and ‘Genetics’ was considered the least factor with 32% in agreement.

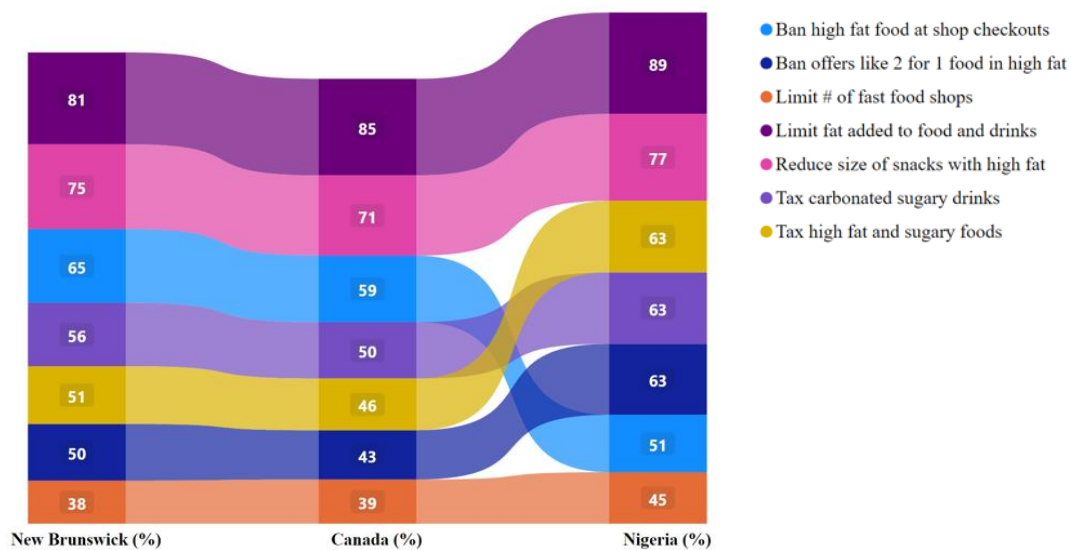
Weight Management Interventions

For weight management intervention support, the New Brunswickers and Canadians agreed in approximately equal proportions with ‘Taxation, Availability and Manufacturing’ with their agreements ranked similarly (Figure 3.7). They all agreed with “Limiting the amount of fat, sugar or salt that is added to food and drink by

manufacturers” and “Reducing the standard size of snacks or drinks high in fat, sugar, or salt” the most while agreeing the least with “Limiting the number of fast food and take-out shops in an area”.

Figure 3.7

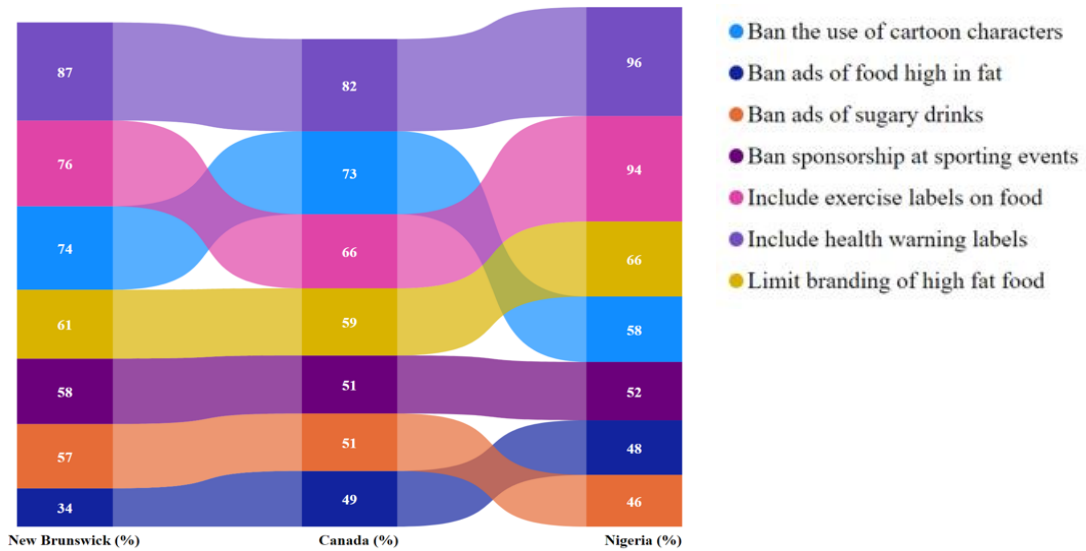
Percentage Agreement Comparison for “Taxation, Availability and Manufacturing” Intervention Category Among New Brunswickers, Canadians and Nigerians.



The Canadians agreed with approximately equal proportion with New Brunswickers on the interventions in the ‘Adverts, Sponsorship and Packaging’ category as shown in Figure 3.8. They all agreed the most with “Including labels on food and drink with the exercise needed to burn its calories” interventions while agreeing the least with “Banning advertisements for sugary drinks” and “Banning advertisements for food high in fat, sugar, or salt.” interventions.

Figure 3.8

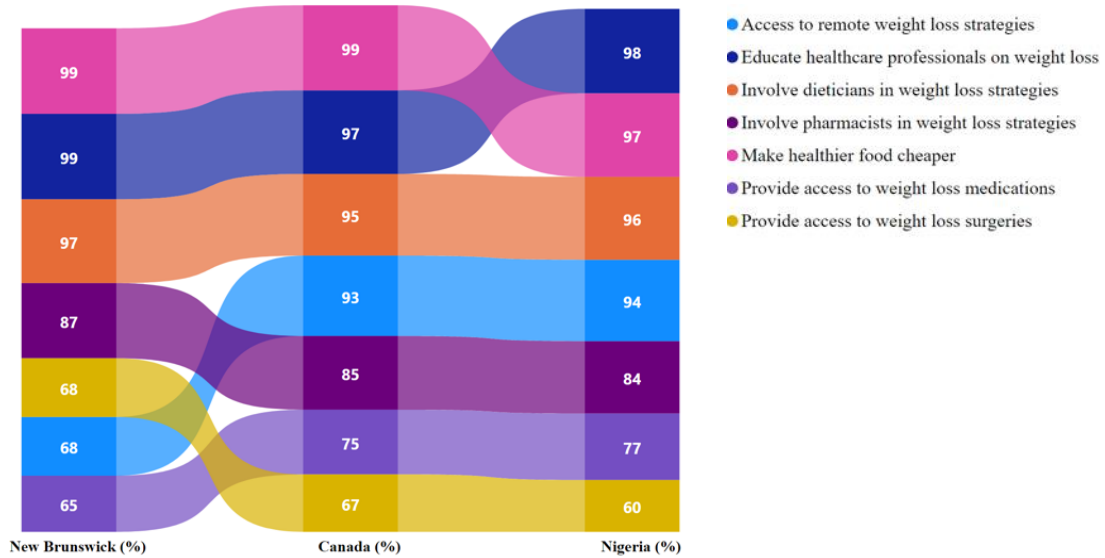
Percentage Agreement Comparison for “Adverts, Sponsorship and Packaging” Intervention Category Among New Brunswickers, Canadians and Nigerians.



Almost all the participants agreed with “*Making healthier food and drink options cheaper*”, “*Providing education to health care professionals in weight loss strategies*”, “*Providing more free weight management courses for people who want to lose weight*” and “*Involving dieticians more in weight loss strategies.*” interventions in the ‘Support Services’ category as shown in Figure 3.9.

Figure 3.9

Percentage Agreement Comparison for the “Support Services” Intervention Category Among New Brunswickers, Canadians and Nigerians.



Body Acceptance

In a study that examined body satisfaction and weight of baby boomer women, those born between 1946 and 1965, from rural and urban Manitoba (N=1083 and mean age 60±5.3 years); 53.0% were satisfied with their appearance and 31.9% were dissatisfied (Hawrylyshen & Lengyel, 2022). When compared with the Canadian participants in this study, mean age 47.6±12.8, 34.0% were satisfied with their bodies while 52.2% were dissatisfied. Although there was no information on the weight status of baby boomer women, their higher body satisfaction with increased age agrees with Tiggemann & McCourt (2013) which concluded that older women have higher body appreciation than younger women.

Another study by Carter et al. (2017) that reviewed the association between internet use and body dissatisfaction among young females (age range 12-29 years), revealed that 19% of the participants were very satisfied with their body, 53% were satisfied and 14.7% were dissatisfied. About 73% satisfaction with their bodies is higher than those of both baby boomer women (53%) and the Canadian participants in this study (34%), which suggests the existence of a complex relationship between age and body satisfaction.

Table 3.8 shows the comparison in the body composition among young females, baby boomer women, and Canadian & Nigerian participants in this study.

Table 3.8

Comparison of the Body Composition Among Young Females, Baby Boomer Women, and Canadian & Nigerian Participants.

| | Young females* (N=2983) | Manitoba ** (N=1083) | Canada (N=969) | Nigeria (N=494) |
|--------------------|----------------------------|-------------------------|-------------------|--------------------|
| Age, mean (years) | NA | 60.0 | 47.6 | 39.9 |
| Age, range (years) | 12-29 | NA | 19-78 | 19-77 |
| Satisfied, % | 72.5 | 53.0 | 34.0 | 83.2 |
| Neutral, % | 12.8 | NA | 13.8 | 8.7 |
| Not satisfied, % | 14.7 | 31.9 | 52.2 | 8.1 |

Note: * Carter et al. (2017); **Hawrylyshen & Lengyel (2022)

Weight Bias

Many studies utilized fat assessment tools that focused on negative appraisals of fatness and fat people when compared to the FAAT that was used in this study, which focused on positive appraisals of elevated weights, making comparison difficult. For example, the Fat Phobia Scale (1-5, with 5 indicating the highest negative attitude) and the Universal Measure of Bias (1 = ‘strongly agree’ to 7 = ‘strongly disagree, with higher scores reflecting greater stigma) were used to assess the levels of explicit weight bias by adults in four countries; Canada, United States, Iceland, and Australia (n=2866). The results from the study showed that there were similar levels of negative weight-biased attitudes demonstrated across the four countries (Puhl et al., 2015).

The Fat Phobia Scale has 14 pairs of adjectives with one positive and one negative, e.g., lazy/industrious, shapeless/shapely, attractive/unattractive etc. (Robinson et al., 1993; Bacon et al., 2001). Although the Universal Measure of Bias has a couple of positive appraisals, there were some negative questions like “Fat people have bad hygiene”, “Fat people are a turn-off”, “I don’t enjoy having a conversation with a fat person” etc.

The FAAT’s size acceptance subscale on the other hand measures questions like “We should celebrate all bodies”, “Rather than fat people changing their bodies; society needs to change the way it responds to fat bodies”, “We need more positive images of fat people in the media” etc. The comparisons of the two studies with the Fat Phobia Scale, Universal Measure of Bias and FAAT are summarized for the Canadian adults as shown in Table 3.9.

Table 3.9

The comparisons of the Fat Phobia Scale, Universal Measure of Bias and FAAT's size acceptance are summarized for the Canadian adults

| Scale | Mean | SD |
|-------------------------------|--------|------|
| Fat Phobia | 3.37* | 0.55 |
| UMB-FAT | 2.50** | 0.89 |
| FAAT's Size Acceptance | 4.08* | 0.83 |
| FAAT's Fat Acceptance | 4.03* | 0.65 |
| FAAT's Attribution Complexity | 4.29* | 0.57 |

*Note: *Likert scale 1-5, **Likert scale 1-7. FAAT's Fat Acceptance higher scores positive evaluations of fat people and FAAT's Attribution Complexity higher scores indicate more complex understandings of factors that influence excess weight.*

Implications for Future Research

Future research might focus on developing and testing interventions and awareness campaigns that are tailored to each country's specific perception patterns. This could help promote healthier attitudes toward body image, weight management, and overall health. Investigating how these perceptions impact public health policies and programs would lead to more targeted and culturally appropriate interventions and this might help identify barriers and facilitators in implementing obesity-related initiatives.

The current study employed a cross-sectional design, providing a snapshot of perceptions at a specific point in time. Future research could adopt longitudinal studies to track changes in perceptions over time; this would help identify trends and potential shifts in attitudes towards obesity in both Nigeria and Canada over time. Also, expanding the

study to include more countries from different regions might provide a broader perspective on how the perception of obesity varies across diverse cultural backgrounds. This global approach can offer insights into common themes and cultural-specific factors that influence these perceptions.

Complementing the quantitative data with qualitative research methods, such as focus groups or interviews, would offer richer insights into the underlying reasons behind specific perceptions. Understanding the ‘why’ behind the numbers might provide a more comprehensive understanding of the issue.

Conclusion

The current study found several similarities and differences in obesity perceptions between Canadian and Nigerian participants. Whilst Canadian participants tended to agree more with current educational messages on obesity, little differences in the perceived causal factors of obesity were found. In general, high levels of support for several interventions to support individuals to lose weight were found, with Nigerian participants overall showing higher levels of support for several interventions. There were positive attitudes toward body acceptance and size diversity indicated in both countries with higher body acceptance in Nigeria and higher size diversity in Canada.

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Disclosure Statement

The authors declare no conflict of interest.

Data Availability Statement

Data are available on reasonable request. Access to data can be arranged through the corresponding author Dr. Stephan Dombrowski (University of New Brunswick, stephan.dombrowski@unb.ca), to discuss data sharing, data requirements and conflicts of interest in line with relevant regulations, including ethics approvals.

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Appendices

Appendix A: Full Questionnaire used in this study.

Section 1

Demographics

| Sno | Category | Measure | Scale | Validation |
|-----|-----------------------------|--|------------------|-------------------------|
| | <i>Basic</i> | | | Dombrowski et al., 2021 |
| 1 | <i>details</i> | age | | |
| 2 | | gender | | Dombrowski et al., 2020 |
| 3 | | race | | Dombrowski et al., 2021 |
| 4 | | state/province | | Dombrowski et al., 2021 |
| 5 | | their home location was urban or rural | | Dombrowski et al., 2021 |
| 6 | | how long have you lived | | Dombrowski et al., 2021 |
| 7 | | height | | Dombrowski et al., 2021 |
| 8 | | weight | | Dombrowski et al., 2021 |
| 9 | | level of education | | Dombrowski et al., 2021 |
| 10 | | employment status | | Dombrowski et al., 2021 |
| 11 | | relationship | | Dombrowski et al., 2021 |
| | <i>General</i> | In general, would | | Ware et al., 1993 |
| 12 | <i>Perceived Health</i> | you say your health is | Likert- scale | |
| | | Compared to other persons your age, would you say your | | Ware et al., 1993 |
| 13 | | health is | Likert- scale | |

Section 2

Perception of Obesity

| Sno | Category | Measure | Scale | Validation |
|-----|------------------------------------|---|-----------------|-------------------------|
| 1 | <i>Obesity Canada key messages</i> | Obesity is a disease. | Likert scale | Obesity Canada, 2020 |
| 2 | | Obesity impairs health and social well-being. | Likert scale | Obesity Canada, 2020 |
| 3 | | Our weight has more to do with genetics, our environment than our choices about exercise and food. | Likert scale | Obesity Canada, 2020 |
| 4 | | Obesity has no cure. | Likert scale | Obesity Canada, 2020 |
| 5 | | Weight based stigma and discrimination make obesity complications worse. | Likert scale | Obesity Canada, 2020 |
| 6 | | People living with obesity deserve to be supported without judgement. | Likert scale | Obesity Canada, 2020 |
| | Condition model | To what extent do you agree that the below are important factors that cause overweight and obesity: | | |
| 9 | <i>Physiology</i> | Genetics/Inheritance | Likert scale | Dombrowski et al., 2021 |
| 10 | | Glands/hormone problems | Likert scale | Dombrowski et al., 2021 |
| 11 | | Slow metabolism | Likert scale | Dombrowski et al., 2021 |
| 12 | <i>Psychology</i> | Low self-esteem | Likert scale | Dombrowski et al., 2021 |
| 13 | | Anxiety/stress | Likert scale | Dombrowski et al., 2021 |
| 14 | | Depression | Likert scale | Dombrowski et al., 2021 |
| 15 | | <i>Behaviour eating</i> | Eating too much | Likert scale |
| 16 | Eating the wrong food | | Likert scale | Dombrowski et al., 2021 |

| | | | | |
|----|--|--|--------------|-------------------------|
| 17 | | Eating too often | Likert scale | Dombrowski et al., 2021 |
| 18 | <i>Behaviour activity</i> | Not enough planned exercise | Likert scale | Dombrowski et al., 2021 |
| 19 | | Not moving enough in general | Likert scale | Dombrowski et al., 2021 |
| 20 | <i>Environment food</i> | Too much time spent sedentary | Likert scale | Dombrowski et al., 2021 |
| 21 | | Too many fast food restaurants | Likert scale | Dombrowski et al., 2021 |
| 22 | | Lack of healthy food options available | Likert scale | Dombrowski et al., 2021 |
| 23 | <i>Environment exercise</i> | Too much food marketing | Likert scale | Dombrowski et al., 2021 |
| 24 | | Lack of space available for activity | Likert scale | Dombrowski et al., 2021 |
| 25 | | Not enough opportunities for activity available | Likert scale | Dombrowski et al., 2021 |
| 26 | <i>Preconception</i> | Environment encouraging lack of activity | Likert scale | Dombrowski et al., 2021 |
| 27 | | Father's health at conception | Likert scale | Barker et al., 2018 |
| 28 | | Mother's health at conception | Likert scale | Barker et al., 2018 |
| 29 | | Exposures during pregnancy | Likert scale | Barker et al., 2018 |
| 30 | <i>Kind of person - entity or growth</i> | The kind of person someone is, is something very basic about them and it can't be changed very much | Likert scale | Carol Dweck, 1999 |
| 31 | | People can do things differently, but the important parts of who they are can't really be changed. | Likert scale | Carol Dweck, 1999 |
| 32 | | Everyone, no matter who they are, can significantly change their basic characteristics. | Likert scale | Carol Dweck, 1999 |
| 33 | | As much as I hate to admit it, you can't teach an old dog new tricks. People can't really change their deepest attributes. | Likert scale | Carol Dweck, 1999 |

| | | | |
|----|---|--------------|-------------------|
| 34 | People can always substantially change the kind of person they are. | Likert scale | Carol Dweck, 1999 |
| 35 | Everyone is a certain kind of person, and there is not much that can be done to really change that. | Likert scale | Carol Dweck, 1999 |
| 36 | No matter what kind of person someone is, they can always change very much. | Likert scale | Carol Dweck, 1999 |
| 37 | All people can change even their most basic qualities. | Likert scale | Carol Dweck, 1999 |

Section 3

Weight Loss Management Intervention Supports

| Sno | Category | Measure | Scale | Validation |
|-----|---------------------------|---|--------|-------------------------|
| 1 | Weight loss program | Have you ever participated in a structured weight loss program? (Includes programs at the moment) | Yes/No | Dombrowski et al., 2021 |
| 2 | Weight loss attempt | Have you ever attempted to lose weight before? | Yes/No | Dombrowski et al., 2021 |
| | Weight loss interventions | Below are suggestions that have been made to support people trying to lose weight. For each, please indicate whether you are in favour or against the suggestion. | | |
| 3 | | Putting tax on high-fat and sugary foods, which increases their price. | | Dombrowski et al., 2021 |
| 4 | | Putting tax on carbonated sugary drinks, which increases their price. | | Dombrowski et al., 2021 |
| 5 | | Reducing the standard size of snacks or drinks high in fat, sugar or salt. | | Dombrowski et al., 2021 |
| 6 | | Limiting the amount of fat, sugar or salt that is added to food and drink by manufacturers. | | Dombrowski et al., 2021 |
| 7 | | Limiting the number of fast food and take-out shops in an area. | | Dombrowski et al., 2021 |
| 8 | | Limiting branding of food high in fat, sugar or salt and sugary drinks (e.g. plain food packaging). | | Dombrowski et al., 2021 |
| 9 | | Banning the use of children's cartoon characters or sports personalities on packaging for food and drink high in fat, sugar or salt. | | Dombrowski et al., 2021 |
| 10 | | Banning sponsorship of food and drink high in fat, sugar or | | Dombrowski et al., 2021 |

| | | |
|----|--|-------------------------|
| | salt at sporting events and programs. | |
| 11 | Banning offers such as 2 for 1 for food high in fat, sugar or salt. | Dombrowski et al., 2021 |
| 12 | Banning advertisements for food high in fat, sugar or salt. | Dombrowski et al., 2021 |
| 13 | Banning advertisements for sugary drinks. | Dombrowski et al., 2021 |
| 14 | Banning shops from placing food high in fat, sugar, or salt next to checkouts. | Dombrowski et al., 2021 |
| 15 | Providing more free weight management courses for people who want to lose weight. | Dombrowski et al., 2021 |
| 16 | Providing greater access to weight loss surgeries (e.g., bariatric surgeries). | Dombrowski et al., 2021 |
| 17 | Providing greater access to remote weight loss strategies (e.g. internet delivered support). | Dombrowski et al., 2021 |
| 18 | Providing greater access to weight loss medication. | Dombrowski et al., 2021 |
| 19 | Providing education to health care professionals in weight loss strategies. | Dombrowski et al., 2021 |
| 20 | Involving pharmacists more in weight loss strategies. | Dombrowski et al., 2021 |
| 21 | Involving dieticians more in weight loss strategies. | Dombrowski et al., 2021 |
| 22 | Including health warning labels on packaging for food high in fat, sugar or salt. | Dombrowski et al., 2021 |
| 23 | Including labels on food and drink with the exercise needed to burn its calories. | Dombrowski et al., 2021 |
| 24 | Making healthier food and drink options cheaper. | Dombrowski et al., 2021 |

Section 4

Weight Bias

| Sno | Category | Measure | Scale | Validation |
|-----|--------------------------|---|--------------|-------------------|
| | Fat Acceptance Composite | Empathy (7 items) | | |
| 1 | | Negative beliefs about body weight lead to negative assumptions about fat people | Likert scale | Cain et al., 2022 |
| 2 | | Fat people face discrimination in many areas of life | Likert scale | Cain et al., 2022 |
| 3 | | It is hard to accept your body if it differs from what the media represents as normal | Likert scale | Cain et al., 2022 |
| 4 | | Weight-based discrimination negatively impacts on well-being | Likert scale | Cain et al., 2022 |
| 5 | | Fat people are treated badly because of the way society depicts fat bodies | Likert scale | Cain et al., 2022 |
| 6 | | Health professionals should be aware of the negative impact of weight stigma | Likert scale | Cain et al., 2022 |
| 7 | | Concern for health is used as an excuse to judge fat people | Likert scale | Cain et al., 2022 |
| | | Activism Orientation (7 items) | | |
| 8 | | We need to take weight-based discrimination as seriously as other forms of discrimination | Likert scale | Cain et al., 2022 |
| 9 | | Activism is necessary because of the discrimination fat people experience | Likert scale | Cain et al., 2022 |
| 10 | | Discrimination due to fatness leads to a denial of human rights | Likert scale | Cain et al., 2022 |
| 11 | | Discussions and programs recognizing diversity need to include body weight | Likert scale | Cain et al., 2022 |
| 12 | | The existence of organizations to lobby for the rights of fat people is a good thing | Likert scale | Cain et al., 2022 |
| 13 | | There is a need for Fat Activism because fat shaming is widespread | Likert scale | Cain et al., 2022 |
| 14 | | We should have public health campaigns that focus on the negative impact of weight stigma and fat shaming | Likert scale | Cain et al., 2022 |

| Size Acceptance (6 items) | | | |
|---------------------------------------|---|--------------|-------------------|
| 15 | Size acceptance should be encouraged | Likert scale | Cain et al., 2022 |
| 16 | Size acceptance is a foundation for making healthy lifestyle choices | Likert scale | Cain et al., 2022 |
| 17 | We should celebrate all bodies | Likert scale | Cain et al., 2022 |
| 18 | Size acceptance is an important social movement | Likert scale | Cain et al., 2022 |
| 19 | Rather than fat people changing their bodies; society needs to change the way it responds to fat bodies | Likert scale | Cain et al., 2022 |
| 20 | We need more positive images of fat people in the media | Likert scale | Cain et al., 2022 |
| Attractiveness (5 items) | | | |
| 21 | Fat people are sexy | Likert scale | Cain et al., 2022 |
| 22 | Fat people are attractive | Likert scale | Cain et al., 2022 |
| 23 | Fat people are sexier than thin people | Likert scale | Cain et al., 2022 |
| 24 | If I were single, I would go out with a fat person | Likert scale | Cain et al., 2022 |
| 25 | Confident fat people are appealing | Likert scale | Cain et al., 2022 |
| Critical Health (5 items) | | | |
| 26 | Body weight isn't a reliable indicator of health | Likert scale | Cain et al., 2022 |
| 27 | Health is not predicted solely by body weight | Likert scale | Cain et al., 2022 |
| 28 | Fat people are not necessarily unhealthy | Likert scale | Cain et al., 2022 |
| 29 | Body Mass Index (BMI) is a poor indicator of health | Likert scale | Cain et al., 2022 |
| 30 | Healthy bodies come in all shapes and sizes | Likert scale | Cain et al., 2022 |
| Attributions outside personal control | | | |
| General Complexity (6 items) | | | |
| 31 | There are biological factors that result in people being fat | Likert scale | Cain et al., 2022 |
| 32 | There are genetic factors that cause people to be fat | Likert scale | Cain et al., 2022 |
| 33 | There are medical factors that cause people to be fat | Likert scale | Cain et al., 2022 |

| | | | |
|---------------------------------------|---|--------------|-------------------|
| 34 | There are factors outside of personal control that contribute to high body weight | Likert scale | Cain et al., 2022 |
| 35 | There are many factors that cause people to be fat | Likert scale | Cain et al., 2022 |
| 36 | There are environmental factors that contribute to people being fat | Likert scale | Cain et al., 2022 |
| Attributions outside personal control | | | |
| Socioeconomic Complexity (3 items) | | | |
| 37 | There are factors relating to social disadvantage that result in people being fat | Likert scale | Cain et al., 2022 |
| 38 | There are factors relating to social inequality that cause people to be fat | Likert scale | Cain et al., 2022 |
| 39 | There are economic factors that contribute to people being fat | Likert scale | Cain et al., 2022 |
| Attributions outside personal control | | | |
| Responsibility (6 items) | | | |
| 40 | Fatness is the result of lifestyle factors* | Likert scale | Cain et al., 2022 |
| 41 | Self-control is important for weight control* | Likert scale | Cain et al., 2022 |
| 42 | Overeating and under exercising are the main reason people are fat* | Likert scale | Cain et al., 2022 |
| 43 | Fat people eat too much “junk food”* | Likert scale | Cain et al., 2022 |
| 44 | Fat people lack willpower* | Likert scale | Cain et al., 2022 |
| 45 | People can control their body weight* | Likert scale | Cain et al., 2022 |
| Self-reflective scale | | | |
| Body Acceptance (4 items) | | | |
| 46 | I feel good about my body | Likert scale | Cain et al., 2022 |
| 47 | I feel happy about my weight | Likert scale | Cain et al., 2022 |
| 48 | My self-esteem is not impacted by my body weight | Likert scale | Cain et al., 2022 |
| 49 | I do not feel defined by my body weight | Likert scale | Cain et al., 2022 |

Appendix B: Descriptive information of the two samples (Canada, n = 878 and Nigeria, n=516).

| Participant Characteristics | Canada | | | | Nigeria | | | |
|-----------------------------|-----------------|---------------|-----------------------------|----------------|-----------------|---------------|-----------------------------|----------------|
| | Female N (%) | Male N (%) | Other ^a N (%) | Total N (%) | Female N (%) | Male N (%) | Other ^a N (%) | Total N (%) |
| Gender | 781 (89.0) | 81 (9.2) | 11 (1.3) | 878 | 209 (40.5) | 300 (58.1) | 6 (1.2) | 516 |
| Age (mean, SD) | 48.65±12.65 | 38.46±9.56 | 37.45±13.92 | 47.55±12.8 | 38.43±9.6 | 41.03±8.8 | 37.2±11.4 | 39.93±9.2 |
| BMI (Mean, SD) | 37.39±10.80 | 27.86± 6.80 | 33.23±21.56 | 36.42±11.05 | 26.94±7.6 | 25.54±6.3 | 22.66±8.0 | 26.07±6.91 |
| Relationship status | | | | | | | | |
| Married | 500 (64.0) | 59 (72.8) | 5 (45.5) | 565 (64.4) | 123 (58.9) | 225 (75.0) | 2 (33.3) | 351 (68.0) |
| Single | 188 (24.1) | 20 (24.7) | 4 (36.4) | 213 (24.3) | 68 (32.5) | 72 (24.0) | 3 (50) | 143 (27.7) |
| Widowed/Divorced | 87 (11.1) | 1 (1.2) | 2 (18.2) | 91 (10.4) | 15 (7.2) | 2 (0.7) | 1 (16.7) | 18 (3.5) |
| Others | 1 (0.1) | 1 (1.2) | 0 (0.0) | 2 (0.2) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 1 (0.2) |
| Unknown | 5 (0.6) | 0 (0.0) | 0 (0.0) | 7 (0.8) | 2 (1.0) | 1 (0.3) | 0 (0.0) | 3 (0.6) |
| Highest Education | | | | | | | | |
| High School | 93 (11.9) | 5 (6.2) | 3 (27.3) | 101 (11.5) | 0 (0.0) | 5 (1.7) | 1 (16.7) | 6 (1.2) |
| Post-secondary | 211 (27.0) | 3 (3.7) | 3 (27.3) | 217 (24.7) | 4 (1.9) | 5 (1.7) | 1 (16.7) | 10 (1.9) |
| Some Graduate | 476 (60.9) | 73 (90.1) | 5 (45.5) | 556 (63.3) | 202 (96.7) | 289 (96.3) | 4 (66.7) | 495 (95.9) |
| Unknown | 1 (0.1) | 0 (0.0) | 0 (0.0) | 5 (0.6) | 3 (1.4) | 1 (0.3) | 0 (0.0) | 5 (1.0) |
| Environment | | | | | | | | |
| Urban | 469 (60.1) | 74 (93.7) | 8 (72.7) | 554 (63.1) | 191 (91.4) | 280 (93.6) | 4 (66.7) | 476 (92.2) |
| Rural | 312 (39.9) | 5 (6.3) | 3 (27.2) | 321 (36.6) | 18 (8.6) | 19 (6.4) | 2 (33.3) | 39 (7.6) |
| Unknown | 0 (0) | 2 (2.5) | 0 (0) | 3 (0.3) | 0 (0) | 1 (0.3) | 0 (0) | 1 (0.2) |
| BMI (Kg/m ²) | | | | | | | | |
| Underweight ^b | 4 (0.5) | 2 (2.5) | 0 (0.0) | 7 (0.8) | 8 (3.8) | 21 (7.0) | 2 (33.3) | 31 (6.0) |
| Healthy weight ^c | 82 (10.5) | 22 (27.2) | 1 (9.1) | 106 (12.1) | 69 (33.0) | 106 (35.3) | 1 (16.7) | 176 (34.1) |
| Overweight ^d | 102 (13.1) | 27 (33.3) | 2 (18.2) | 131 (14.9) | 62 (29.7) | 108 (36.0) | 1 (16.7) | 172 (33.3) |
| Obese ^e | 575 (73.8) | 27 (33.3) | 6 (54.5) | 610 (69.5) | 56 (26.8) | 55 (18.3) | 1 (16.7) | 112 (21.7) |
| Unknown | 17 (2.2) | 3 (3.7) | 2 (18.2) | 24 (2.7) | 14 (6.7) | 10 (3.3) | 1 (16.7) | 25 (4.8) |

| | | | | | | | | |
|---|------------|-----------|----------|------------|------------|------------|----------|------------|
| Race | | | | | | | | |
| Indigenous | 20 (2.6) | 0 (0.0) | 0 (0.0) | 20 (2.3) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) |
| White | 655 (83.9) | 14 (17.3) | 9 (81.8) | 679 (77.2) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) |
| Black | 54 (6.9) | 60 (74.1) | 0 (0.0) | 115 (13.1) | 206 (98.6) | 295 (98.3) | 6 (100) | 507 (98.3) |
| Others | 48 (6.1) | 6 (7.4) | 2 (18.2) | 56 (6.4) | 2 (1.0) | 2 (0.7) | 0 (0.0) | 4 (0.7) |
| Unknown | 4 (0.5) | 1 (1.2) | 0 (0.0) | 8 (0.9) | 1 (0.5) | 3 (1.0) | 0 (0.0) | 5 (1.0) |
| Employment | | | | | | | | |
| Student | 24 (3.1) | 11 (13.6) | 3 (27.3) | 38 (4.3) | 9 (4.3) | 12 (4.0) | 0 (0.0) | 21 (4.1) |
| Employed | 557 (71.3) | 66 (81.5) | 4 (36.4) | 629 (71.6) | 180 (86.1) | 272 (90.7) | 5 (83.3) | 458 (88.8) |
| Unemployed | 21 (2.7) | 2 (2.5) | 2 (18.2) | 25 (2.8) | 9 (4.3) | 3 (1.0) | 1 (16.7) | 13 (2.5) |
| Others | 178 (22.8) | 1 (1.2) | 2 (18.2) | 182 (20.7) | 7 (3.3) | 8 (2.7) | 0 (0.0) | 15 (2.9) |
| Unknown | 1 (0.1) | 1 (1.2) | 0 (0.0) | 4 (0.5) | 4 (1.9) | 5 (1.7) | 0 (0.0) | 9 (1.7) |
| Health Status | | | | | | | | |
| Excellent | 25 (3.2) | 16 (4.1) | 2 (18.2) | 44 (5.0) | 39 (18.7) | 61 (20.3) | -33.3 | 103 (19.8) |
| Very good | 128 (16.4) | 36 (44.4) | 2 (18.2) | 166 (18.9) | 61 (29.2) | 118 (39.3) | 2 (33.3) | 182 (35.3) |
| Good | 359 (46.0) | 21 (25.9) | 3 (27.3) | 383 (43.6) | 79 (37.8) | 98 (32.7) | 1 (16.7) | 178 (34.4) |
| Fair | 222 (28.4) | 6 (7.4) | 3 (27.3) | 231 (26.3) | 27 (12.9) | 23 (7.7) | 0 (0.0) | 50 (9.7) |
| Poor | 47 (6.0) | 2 (2.5) | 1 (9.1) | 52 (5.9) | 3 (1.4) | 0 (0.0) | 1 (16.7) | 4 (0.8) |
| Unknown | 0 (0) | 0 (0) | 0 (0) | 2 (0.2) | 0 (0) | 0 (0) | 0 (0) | 0 (0) |
| Health Status compared to others your age | | | | | | | | |
| Excellent | 32 (4.1) | 14 (17.3) | 1 (9.1) | 48 (5.5) | 44 (21.1) | 64 (21.4) | 3 (50) | 111 (21.5) |
| Very good | 120 (15.4) | 37 (45.7) | 1 (9.1) | 158 (18.0) | 64 (30.6) | 114 (38.1) | 0 (0.0) | 179 (34.7) |
| Good | 302 (38.7) | 20 (24.7) | 1 (9.1) | 323 (36.8) | 74 (35.4) | 105 (35.1) | 3 (50) | 182 (35.3) |
| Fair | 224 (28.7) | 7 (8.6) | 2 (18.2) | 233 (26.5) | 20 (9.6) | 15 (5.0) | 0 (0.0) | 35 (6.8) |
| Poor | 103 (13.2) | 3 (3.7) | 6 (54.5) | 114 (13.0) | 7 (3.3) | 1 (0.3) | 0 (0.0) | 8 (1.6) |
| Unknown | 0 (0) | 0 (0) | 0 (0) | 2 (0.2) | 0 (0) | 1 (0.3) | 0 (0) | 1 (0.2) |

a. "Other" gender includes non-binary and those preferring to self-describe gender. Seven individuals (6 from Canadian, 1 from Nigerian) had missing data on gender and were therefore not included in the table. b. BMI <18.5. c. BMI 18.5-24.9. d. BMI 25.0-29.9. e. BMI >30.0

Appendix C: Analysis of Completers and Non-completers for Canada.

Pearson chi-square values for Completers and Non-completers (Canada)

| | <i>df</i> | <i>N</i> | X^2 | <i>p</i> |
|---------------|-----------|----------|--------|----------|
| Gender | 4 | 1053 | 10.68 | .03 |
| Race | 24 | 1105 | 189.87 | <.001 |
| Environment | 1 | 1047 | .02 | .90 |
| Education | 7 | 1033 | 7.75 | .36 |
| Employment | 8 | 1033 | 28.98 | <.001 |
| Relationship | 7 | 1033 | 8.66 | .28 |
| Health Status | 4 | 1031 | 2.31 | .68 |

Multivariate Analysis of Variance results showing the difference between

Completers and Non-completers for Age and BMI (Canada).

| | Completers | | Non- completers | | F (1, 1012) | P | η^2 |
|-----|------------|-------|-----------------|-------|-------------|------|----------|
| | M | SD | M | SD | | | |
| Age | 47.55 | 12.81 | 46.26 | 11.90 | 1.63 | .202 | .002 |
| BMI | 36.38 | 11.11 | 34.96 | 11.45 | 0.18 | .668 | .000 |

Appendix D: Analysis of Completers and Non-completers for Nigeria.

Pearson chi-square values for Completers and Non-completers (Nigeria)

| | <i>df</i> | <i>N</i> | <i>X</i> ² | <i>p</i> |
|---------------|-----------|----------|-----------------------|----------|
| Gender | 3 | 711 | 5.31 | .15 |
| Race | 8 | 754 | 110.00 | <.001 |
| Environment | 1 | 698 | .81 | .37 |
| Education | 6 | 674 | 25.77 | <.001 |
| Employment | 7 | 674 | 7.90 | .34 |
| Relationship | 7 | 674 | 6.57 | .48 |
| Health Status | 4 | 671 | 8.35 | .08 |

Multivariate Analysis of Variance results showing the difference between

Completers and Non-completers for Age and BMI (Nigeria).

| | Completers | | Non-completers | | F (1,647) | p | η^2 |
|-----|------------|------|----------------|-------|-----------|------|----------|
| | M | SD | M | SD | | | |
| Age | 39.92 | 9.25 | 38.30 | 10.51 | 8.55 | .004 | .013 |
| BMI | 26.07 | 6.90 | 25.76 | 7.56 | 3.17 | .075 | .005 |

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