The Influence of Body Shape Perception on Physical Activity, Screen Time, and Eating in Black School-Aged Immigrant Children

Ashley Gunter

Interdisciplinary School of Health Sciences
Faculty of Health Sciences
University of Ottawa, Ontario

Supervisor: Isabelle Giroux, PhD, RD
Co-Supervisor: Jeffrey Jutai, PhD, CPsych

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Abstract

Background: Previous studies revealed both parents and children tend to misperceive the child's body shape. Body shape perception has been found to influence modifiable lifestyle habits; however, these relationships have been scarcely studied. **Objective**: To determine the influence of body shape perception on physical activity, screen time, and maternal feeding practices. **Methods**: A total of 259 mother-child dyads were interviewed. Data were collected during structured interviews and included questions regarding body shape perception, physical activity, screen time, and maternal feeding practices. **Results**: Roughly 50% of mothers and children misperceived the child's body shape. Children's physical activity and certain maternal feeding practices were found to be influenced by body shape perception; however, body shape perception did not significantly influence children's screen time. **Conclusion**: Body shape misperception was frequent among this group of mothers and children. As well, body shape perception seemed to have influenced certain modifiable lifestyle habits.

Keywords: Black children, Body shape perception, Physical activity, Screen time, Eating

Abrégé

Mise en contexte : Des études précédentes révèlent qu'une perception inexacte de l'image corporelle de l'enfant est fréquente chez les parents et les enfants. La perception de l'image corporelle semble influencer les habitudes de vie modifiables, mais ces relations ont été peu étudiées. **Objectif** : Déterminer l'influence de la perception de l'image corporelle sur l'activité physique, les comportements sédentaires et les pratiques d'alimentation maternelles. **Méthodes** : Un total de 259 dyades mère-enfant ont été interviewées. Les données ont été recueillies lors d'entrevues dirigées et comprenaient des questions au sujet de la perception de l'image corporelle, l'activité physique, les comportements sédentaires et les pratiques d'alimentation maternelles. **Résultats** : Environ 50% des mères et des enfants ont une perception inexacte de l'image corporelle de l'enfant. L'activité physique des enfants et certaines pratiques d'alimentation maternelles semblaient être influencées par la perception de l'image corporelle. Cependant, la perception de l'image corporelle n'a pas semblée avoir influencé significativement les comportements sédentaires des enfants. **Conclusion** : Une perception inexacte de l'image corporelle était fréquente parmi ce groupe de mères et d'enfants. De plus, la perception de l'image corporelle semblait avoir été influencée par certaines habitudes de vie modifiables.

Mots-clés : Enfants noirs, Perception de l'image corporelle, Activité physique, Comportements sédentaires, Alimentation

Statement of Contributions

The present study was conducted as part of the Master of Science in Interdisciplinary Health Sciences under the supervision of Isabelle Giroux PhD, RD, associate professor at the School of Nutrition Sciences of the University of Ottawa and the co-supervision of Jeffrey Jutai PhD, CPsych, full professor at the Faculty of Health Sciences of the University of Ottawa.

The data from the present study is part of a larger study conceived by Rosanne Blanchet PhD candidate, which examined the impact of factors such as acculturation, linguistic status, perceptions, and eating practices which influence eating habits and weight status of Black school-aged immigrant children. Miss Ashley Gunter assisted with interviews, transcription, data cleaning, and analyses.

The conception of the present study was realized by Miss Gunter under the supervision of Dr. Isabelle Giroux and Dr. Jeffrey Jutai. The work of this thesis is comprised of three articles (Chapters 2, 5, and 6) which Miss Gunter is the first author. The first article will be submitted to the *Interdisciplinary Journal of Health Sciences*, the second to the journal of *Body Image*, and the third to the *Journal of Nutrition Education and Behavior*. Results from the present study will also be disseminated at conferences including *Journées Montfort*, *Canadian Nutrition Society Annual Conference*, and *Interdisciplinary Conference in Psychology*.

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List of Abbreviations and Symbols

BMI – Body mass index

CCHS – Canadian Community Health Survey

CHMS – Canadian Health Measures Survey

CI – Confidence interval

CFQ – Child Feeding Questionnaire

M – Mean

n - Sample

NHANES – National Health and Nutrition Examination Survey

NHS – National Household Survey

OR – Odds ratio

SD – Standard deviation

WHO – World Health Organization

χ^2 – Chi-square statistic

Preface

The present thesis is article-based and is comprised of three articles. The first article presented in Chapter 2 is entitled *A Review of Factors Influencing Parents' and Children's Body Shape Perceptions*. This article will be submitted to the *Interdisciplinary Journal of Health Sciences* and is a review of the literature on parents' and children's body shape perceptions of children as well as the factors which can influence body shape perception. The second article presented in Chapter 5 is entitled *Rates and Predictors of Body Shape Misperception in Black Immigrant Children and Their Mothers* and will be submitted to the *Body Image* journal. The main objective of this article is to determine and compare the perceptions of mothers and children of the child's body shape. In addition, predictors of body shape misperception are also explored. The final article presented in Chapter 6 is entitled *The Influence of Black Immigrant Mothers' Body Shape Perception of Their Child on Maternal Feeding*. This article will be submitted to the *Journal of Nutrition Education and Behavior* and examines the influence of mothers' body shape perception of their child on maternal feeding practices.

Chapter 1 – General Introduction

The general introduction demonstrates the need for the present study in a broader context. More specifically, the physical and psychological health of immigrants in Canada is explored, especially the increased chronic health risks in Black populations. Furthermore, obesity and its impact on lifestyle in a society where its perception varies across cultures are discussed, along with the importance for parents to perceive excessive weight in their children when it is present.

1.1 Physical and Psychological Health of Immigrants in Canada

Given to a low fertility rate and an aging population, Canada heavily relies on immigration to sustain its population and workforce (Statistics Canada, 2016). According to the National Household Survey (NHS), Canada's population was composed of approximately 20.6% of immigrants in 2011, the highest among the G8 countries, for a total of 6,775,800 foreign-born individuals (Statistics Canada, 2013). Moreover, the NHS indicated that roughly 30% of Canada's youth under the age of 18 were living in immigrant households (Statistics Canada, 2013). Upon arrival to Canada, immigrants experience a lower risk of chronic diseases and therefore are relatively in better health than native-born Canadians (McDonald & Kennedy, 2004). However, the "healthy immigrant effect" quickly vanishes and with the passing of time, the health of immigrants converges to that of the general Canadian population (McDonald & Kennedy, 2004). Immigrants, except for recent arrivals (generally less than10 years residency in Canada), are even at a greater risk of experiencing worse health status in comparison to Canada's native-born (Newbold & Danforth, 2003). Even though national Canadian policies ensure that healthy immigrants are admitted to Canada, minimal efforts are implemented to ensure the safeguarding of their physical and psychological health (Beiser, 2014). Nevertheless, very little is known about the factors associated with the decline in health following immigration but combinations of political, cultural, economic, and social factors have been proposed as an explanation (Beiser, 2014; Newbold & Danforth, 2003). Furthermore, even though psychological factors including body image dissatisfaction and body shape misperception, in combination with acculturative stress of immigrants, are known to contribute to negative health outcomes (e.g. depression, problematic eating, and eating disorders), the experiences of immigrant youth in Canada have not yet been documented (Kimber, Couturier, Wahoush, &

Jack, 2014; Perez, Voelz, Pettit, & Joiner, 2002; Stice & Bearman, 2001). In addition, immigrant youth are widely known to experience increased social hardships and economic instability which may augment their risk of mental illness (Kimber, Georgiades, Jack, Couturier, & Wahoush, 2015). Moreover, the internalization of sociocultural pressures to conform to the ideal Westernized thin or muscular body shapes has been deemed a risk factor which contributes to overweight and obesity (Kimber et al., 2015; Sonneville et al., 2012). Consequently, with a striking increase in the prevalence of childhood overweight and obesity in Canada, children who immigrate to North America are at a greater risk of developing this medical condition which they may battle for the rest of their lives (Adhikari & Sanou, 2012; Tremblay & Willms, 2000).

1.2 Childhood Overweight and Obesity

According to the Canadian Health Measures Survey (CHMS; 2009-2011), nearly one third (31.5%) or roughly 1.6 million of 5 to 17 year olds in Canada were classified as overweight (19.8%) or obese (11.7%) based on the World Health Organization (WHO) classification (Roberts, Shields, de Groh, Aziz, & Gilbert, 2012). Having been identified as a multi-factorial problem and global public health crisis, overweight and obesity have been found to affect both boys and girls of all ages from different socioeconomic backgrounds (Koplan, Liverman, & Kraak, 2005). Furthermore, the percentage of Canadian children and adolescents classified as overweight or obese increased from 14% to 31% for boys and from 14% to 25% for girls between 1981 to 2009 (Tremblay et al., 2010). Substantial inflations in the prevalence of overweight and obesity have been predominantly found in Westernized countries and economically developed regions which places North American immigrants at risk (Lobstein, Baur, & Uauy, 2004). Among ethnic minority groups, Black immigrants are amid the most at risk of becoming overweight and obese (Adhikari & Sanou, 2012; Koplan et al., 2005; Lutfiyya,

Garcia, Dankwa, Young, & Lipsky, 2008; Sankofa & Johnson-Taylor, 2007; Strauss & Pollack, 2001). Therefore, this particular population may greatly benefit from education programs such as lifestyle interventions aimed at promoting healthy and active lifestyle habits in the fight against overweight and obesity (Anderson, Economos, & Must, 2008; Patrick & Nicklas, 2005). Previously uncommon in children, associated co-morbidities such as heart disease, hypertension, type 2 diabetes, and cancer could also be addressed during education programs raising awareness about chronic diseases (Edmunds, Waters, & Elliott, 2001; Koplan et al., 2005; Sankofa & Johnson-Taylor, 2007). In addition, the social stigmatization of childhood overweight and obesity which can involve teasing, rejection, and isolation from peers that can result in a lasting impact on self-esteem and body image should also be addressed (Edmunds et al., 2001).

1.3 Factors Influencing Rates of Overweight and Obesity

The increased prevalence rate of childhood overweight and obesity is widely attributable to modern lifestyle changes which foster an increased energy intake in comparison to energy expenditure (Edmunds et al., 2001). Moreover, factors which alter energy intake and/or expenditure have been found to be major contributors to the widespread of overweight and obesity and include environmental and cultural factors as well as lifestyle preferences (Hardy, Harrell, & Bell, 2004; Stang & Loth, 2011). In addition, parents are highly responsible for creating environments which will either support healthy lifestyle choices or promote excessive adipose gain in their children (Francis, Hofer, & Birch, 2001). Consequently, the shaping of a healthy and active lifestyle early on in life is of great importance since trends are indicative of the overweight and obesity epidemic persisting into adulthood and leading to devastating physical and mental health outcomes (Benton, 2004; Jansen, Mackenbach, Zwanenburg, & Brug, 2010; Lobstein et al., 2004; Roberts et al., 2012). For that reason, childhood overweight and

obesity are rather problematic. More precisely, children coming from families of obese parents have a higher risk of becoming obese adults than children coming from families of normal weight parents (Baughcum, Chamberlin, Deeks, Powers, & Whitaker, 2000; Birch & Fisher, 1998; Cutting et al., 1999; Trost, Sirard, Dowda, Pfeiffer, & Pate, 2003; Wardle, Guthrie, Sanderson, Birch, & Plomin, 2001). For instance, children of obese parents were found to be approximately twice as likely to possess a BMI greater than the 95th percentile in comparison to children of leaner parents (Acharya, Feese, Franklin, & Kabagambe, 2011; Keane, Layte, Harrington, Kearney, & Perry, 2012). Another study found that families with at least one obese parent were three to six times more prone to have overweight children in their household (Trost et al., 2003). As a result, there is a need to implement effective strategies to reduce the prevalence of excessive adipose gain and the internalization of sociocultural pressures to conform to body shape ideals early on in life since overweight and obesity have been found to persist into adulthood (Roberts et al., 2012; Kimber et al., 2015).

1.4 Overweight and Obesity in a Multicultural Society

From an anthropological perspective, the diagnosis of obesity can be rather complex in a multicultural society since perceptions of overweight and obesity vary greatly across cultures (Renzaho, 2004). For instance, Westernized societies highly value and associate positive attributes to thin and muscular body shapes while overweight and obese bodies receive a negative connotation (Klein & Shiffman, 2005; Lake, Staiger, & Glowinski, 2000). In comparison, Black communities tend to have a rather flexible view on the "ideal" body shape, prefer larger body sizes, and experience higher body satisfaction (McClure, 2012; Neumark-Sztainer et al., 2002). Moreover, the most frequently cited definition in the literature refers to obesity as an excess of adipose tissue in the body which results in the deterioration of overall

health with the passing of time (Burton & Foster, 1985). However, the previously stated definition of obesity is not as prevalent in certain developing countries such as Sub-Saharan Africa where being overweight and obese is seen as good health and not as a disease (Renzaho, 2004). Contrary to the Westernized ideology, many countries that are less socioeconomically developed value plumpness as an indication of beauty, health, fertility, and prosperity (Tiggemann, 2012). All in all, health professionals and decision makers must keep in mind that perceptions of overweight and obesity vary greatly across cultures. Nevertheless, perceived pressure to conform and internalization of the Westernized body shape ideals have been found to decreased body satisfaction (Stice & Bearman, 2001; Kimber et al., 2015). Therefore, there is a fine balance between being unaware of excessive weight and being obsessed with concerns about weight.

1.5 Recognition of Excessive Weight Gain in Children

In preventing future excessive weight gain in children, a preliminary step is to help parents recognize their child's excessive weight since parents who fail to do so may not deem an intervention worthy (Eckstein et al., 2006; Jeffery et al., 2014; Maynard, Galuska, Blanck, & Serdula, 2003; Oude Luttikhuis, Stolk, & Sauer, 2010). Accurately perceiving weight status has also been linked to greater motivation resulting in positive weight control behaviours and healthy lifestyle changes in adolescents (Edwards et al., 2010; Foti & Lowry, 2015). In addition, parents' perception of their child's overweight or obese weight status seemed to be associated with their readiness to make the necessary lifestyle changes (Rhee et al., 2005). Therefore, understanding parents and children's perceptions of the child's body shape is of importance in helping prevent excessive weight gain or in offering weight management interventions targeted toward children and their families (Lyles, 2014; Maximova et al., 2008; Remmers et al., 2014;

Yilmaz, Erkorkmaz, Ozcetin, & Karaaslan, 2013; Young-Hyman, Herman, Scott, & Schlundt, 2000). In addition, it is of importance to avoid compromising high body satisfaction which remains unaffected at higher weight statuses in Black populations (McClure, 2012; Neumark-Sztainer et al., 2002). Therefore, it is imperative for intervention programs to focus on increasing awareness about health risks associated with obesity and helping to increase levels of physical activity and healthy eating habits rather than focusing primarily on weight loss to avoid potential pitfalls such as excessive weight/shape concerns and/or unhealthy weight control behaviours (Sherwood et al., 2004). Nevertheless, it is widely known that regular physical activity is beneficial from a physical and mental health perspective regardless of an individual's weight status (Lee, Sui, & Blair, 2009). Moreover, programs should be implemented early on in life since eating and lifestyle preferences have been found to be established during childhood and persist into adulthood (Hands et al., 2011; Tremblay et al., 2012).

Chapter 2 – A Review of Factors Influencing Parents' and Children's Body Shape Perceptions

A review article which will be submitted to the *Interdisciplinary Journal of Health Sciences* is presented in this chapter. The authors are Ashley Gunter, Rosanne Blanchet, Jeffrey Jutai, and Isabelle Giroux. The mentioned article is a review of the body of literature addressing parents' and children's body shape perceptions of children. Factors which have been found to influence body shape perception are also explored.

Abstract

Body shape misperception is prevalent among parents and children with a tendency to underestimate. The highest rates of misperception have been found in overweight and obese children and their parents. Multiple factors such as child's sex, age, and weight status as well as household socioeconomic status, ethnicity, and parents' education level have been found to influence rates of body shape misperception in parents and children. Nevertheless, the influence of certain of these factors on body shape perception remains unclear. Given that achieving a healthy body weight seems difficult when body shape is misperceived, body shape perception should be included as a determinant of weight status. Moreover, accurate body shape perception has been found to influence and motivate health related behaviours; however, the literature on this topic is scarce in school-aged children. Therefore, there is a need to better study these relationships in children and more specifically in Black immigrant children who are amid the most at risk of becoming overweight and obese.

KEYWORDS: Body shape perception, Children, Parents, Weight Status

2.1 Parental Body Shape Perception of Children

Body shape misperception (i.e. underestimation or overestimation) occurs when a discrepancy is found between perceived body shape and measured weight status. The greatest misperception of weight has been found in parents of overweight and obese children (Etelson, Brand, Patrick, & Shirali, 2003; Sarafrazi, Hughes, Borrud, Burt, & Paulose-Ram, 2014). For instance, a study found that only 10.5% of parents accurately perceived their overweight child's weight status in comparison to 59.4% of parents of non-overweight children (Etelson et al., 2003). Similarly, the Quebec Longitudinal Study of Child Development (1998-2010) found that 16% of normal weight and 77% of overweight and obese children were inaccurately perceived by their parents (Mathieu, Drapeau, & Tremblay, 2010). In addition, a systematic review of parental perception of overweight children, which included a total of 23 articles, concluded that 6.2% to 73% of parents of overweight children aged 2 to 12 years old correctly identified their child's weight status (Parry, Netuveli, Parry, & Saxena, 2008). Furthermore, correct identification of children's weight status was inferior to 50% in 82% of the studies included in the systematic review (Parry et al., 2008).

The prevalence of parental misperception may be attributable to desensitisation to excessive weight as a result of overweight having become the norm of many societies (Jeffery, Voss, Metcalf, Alba, & Wilkin, 2005). Certain parents also tend to believe that their child's excessive weight is a transitory phase of childhood (Shrewsbury et al., 2012). Parents' misperception of their child's body shape and weight status might also be indicative of a lack of awareness of their child's risk for obesity and associated co-morbidities since this misperception is often an underestimation (De La O et al., 2001; Remmers et al., 2014). Overall, increasing parents' awareness of their children's excessive weight status might be a factor to further

consider in the prevention of future excessive weight gain in children since weight perception has been found to influence health-related behaviours (He & Evans, 2007; Wilma Jansen & Brug, 2006; Shrewsbury et al., 2012; Towns & D'Auria, 2009; Yao & Hillemeier, 2012; Yilmaz et al., 2013).

2.2 Factors Influencing Parental Body Shape Perception of Children

Multiple factors have been found to influence parental body shape perception of their children, such as child's age, sex, and weight status, as well as parents' ethnicity, education level, socioeconomic status, and body mass index (BMI; Remmers et al., 2014; Towns & D'Auria, 2009). However, the influences of certain factors on rates of body shape misperception remain contradictory.

2.2.1 Child's Age

Parents of younger children have been found to have poor awareness of their child's body shape with a tendency to underestimate (Genovesi et al., 2005; Rhee et al., 2005; Young-Hyman et al., 2000). For instance, 65% of parents of younger overweight children aged 3 to 12 years old underestimated their child's weight compared to 51% of parents of adolescents aged 13 to 19 years old (West et al., 2008). A longitudinal study found a similar trend with parents accurately classifying their children's weight status at 44% when their children were 7 years old and accuracy improving to 77% at 16 years old (Jeffery et al., 2014). A recent meta-analysis also revealed that parental misperception of their child's weight status was superior in children ages 2-6 in comparison to children ages 7-18 (Rietmeijer-Mentink, Paulis, van Middelkoop, Bindels, & van der Wouden, 2013). It has been hypothesized that a higher incidence of parental misperception is present in parents of younger children since many believe that a plump child will outgrow excessive body fat (Jain et al., 2001; Jeffery et al., 2014; Sherry et al., 2004).

Consequently, parents tend to believe that their overweight child is indeed healthy and that excessive adipose tissue is typical during childhood development (Sherry et al., 2004). On the contrary, other studies have found that children's age does not have a significant impact on parental rates of misperception (Baughcum et al., 2000; Boutelle, Fulkerson, Neumark-Sztainer, & Story, 2004; Carnell et al., 2005; He & Evans, 2007).

2.2.2 Child's Sex

Certain studies (Baughcum et al., 2000; West et al., 2008; Yilmaz et al., 2013; Young-Hyman et al., 2000) found no difference in parental misperception of their children's weight status when comparing boys and girls, whereas other studies found significant differences based on children's sex (Boutelle et al., 2004; Fisher, Fraser, & Alexander, 2006; He & Evans, 2007; Jeffery et al., 2005; Maynard et al., 2003; Shrewsbury et al., 2012). Moreover, certain studies have found that mothers are more likely to have an incorrect perception of their sons weight status in comparison to their daughters' (Binkin, Spinelli, Baglio, & Lamberti, 2013; Boutelle et al., 2004; Jeffery et al., 2005; Vanhala et al., 2011). However, another study reported that maternal misclassification was greater among their daughters in comparison to their sons with girls being approximately 3 times more likely to be classified as overweight by their mothers (Maynard et al., 2003). Furthermore, parents of girls have been found to have a tendency to underestimate their child's weight in comparison to parents of boys (Hussin, Mohammad, Al-Hamad, Makboul, & Elshazly, 2011). Due to conflicting results, further research is warranted to investigate the influences of sex on parents' body shape perception of their children.

2.2.3 Child's Weight Status

Prior research has revealed that parental weight perception of their overweight and obese children is often underestimated (Campbell, Williams, Hampton, & Wake, 2006; De La O et al.,

2001; Jones et al., 2012; Rietmeijer-Mentink, Paulis, van Middelkoop, Bindels, & van der Wouden, 2013; Towns & D'Auria, 2009; West et al., 2008). Indeed, West and colleagues (2008) found that 60% of parents of overweight children underestimated their child's weight. Similarly, a meta-analysis found that 62.4% of parents inaccurately identified their overweight or obese child as having a normal weight status (Rietmeijer-Mentink et al., 2013). Likewise, a Canadian study found that 63% of overweight children were classified as normal weight and 63% of obese children were classified as overweight by their parents whereas only 22% of normal weight children were misclassified (He & Evans, 2007).

2.2.4 Parental Ethnicity

Parents of ethnic minorities have been found to be at a higher risk of misperceiving their child's weight status (He & Evans, 2007; Remmers et al., 2014). More precisely, parents of ethnic minorities such as African-Americans and Hispanics were found to perceive their children to be thinner than their actual size (Killion, Hughes, Wendt, Pease, & Nicklas, 2006; Myers & Vargas, 2000). However, certain studies have found that parental perception of their child's weight status was not associated with ethnicity (Boutelle et al., 2004; Carnell et al., 2005; Maynard et al., 2003). For example, an integrative review of the literature found that five out of six studies, which reported parental ethnicity, concluded that ethnicity did not have a significant impact on the misclassification of overweight children (Towns & D'Auria, 2009).

2.2.5 Parental Education Level & Socioeconomic Status

Lower levels of parental education have been previously linked to a higher rate of misperception of children's weight status (Baughcum et al., 2000; Binkin, Spinelli, Baglio, & Lamberti, 2013; Eckstein et al., 2006; Genovesi et al., 2005; Remmers et al., 2014). A previous study identified low maternal education as a significant predictor of maternal misclassification

with 79% of mothers failing to accurately classify their overweight child (Baughcum et al., 2000). A second study found that mothers of lower education levels were more likely to underestimate their child's weight status (Manios, Kondaki, Kourlaba, Vasilopoulou, & Grammatikaki, 2009). It has been proposed as an explanation that parents of lower education levels might be more hesitant to disclose that their child is overweight or they may simply be unaware of the negative health outcomes associated with being overweight (Baughcum et al., 2000). However, other studies found no significant impact of parental education on child weight perception accuracy (Adams, Quinn, & Prince, 2005; Carnell et al., 2005; Contento, Basch, & Zybert, 2003; He & Evans, 2007; Wilma Jansen & Brug, 2006). Very few studies have investigated the relationship between body shape perception and socioeconomic status. However, a Canadian study found no association between rates of parental misperception and household income (He & Evans, 2007). On the contrary, a study found that misperception among low-income mothers was the result of a belief that genetic factors contributing to obesity were prevalent regardless of modifiable lifestyle habits (Jain et al., 2001).

2.2.6 Maternal Weight Status

Overweight and obese mothers have been found to be less likely to accurately identify their children's weight status in comparison to normal weight mothers (Boutelle et al., 2004; Doolen, Alpert, & Miller, 2009). A study found that the higher the mother's BMI, the more likely they were to underestimate their child's weight status (Manios et al., 2009). More precisely, normal weight mothers were found to be approximately half as likely to underestimate their adolescents' weight status when compared to their overweight counterparts (Boutelle et al., 2004). Other studies found that parental accuracy of their child's weight status did not significantly vary based on parents' BMI status (He & Evans, 2007; West et al., 2008).

2.3 Children's Body Shape Perception

Children start being aware of their body shape at a very young age. As young as 3 to 6 years old, children have been found to engage in social comparisons and gain awareness of social standards that "fat is bad" (Davison, Markey, & Birch, 2000; Smolak, 2012; Tiggemann, 2012). By the age of 6 years, several studies have reported that girls express body image dissatisfaction with a desire to be thinner and a worry about being or becoming "too fat" (Smolak, 2012).

Similarly to their parents, previous studies revealed that children have a tendency to misperceive their body shape (Chaimovitz, Issenman, Moffat, & Persad, 2008; Martin, Frisco, & May, 2009; Truby & Paxton, 2002). A study found that girls as young as 5 years old expressed a significant tendency to select thinner figures in comparison to their actual size (Williamson & Delin, 2001). Likewise, the majority of children tend to underestimate their size; this trend being most prevalent among overweight and obese youth (Hussin, Mohammad, Al-Hamad, Makboul, & Elshazly, 2011; Martin, Frisco, & May, 2009; Maximova et al., 2008). For instance, Truby and Paxton (2002) found a consistent bias toward underestimation using the Children's Body Image Scale to assess the accuracy of body size perception in a sample of boys and girls aged 7 to 12 years. Another study revealed that 43% of children underestimated their current weight status while also using pictorial figures of bodies (Chaimovitz et al., 2008). Certain factors such as child's sex, age, weight status, ethnicity, and socioeconomic status have been found to influence a child's tendency to misperceive their body shape (Maximova et al., 2008; Sarafrazi et al., 2014).

2.3.1 Child's Sex and Age

Trends of body shape misperception have been found to vary in comparing boys and girls but results remain conflicting. A study found that girls had a greater likelihood of overestimating

their weight status in comparison to boys (Martin et al., 2009) while another study indicated that underestimation was found to be common in girls classified as overweight and obese (Hussin et al., 2011). In contrast, the National Health and Nutrition Examination Survey 2005-2012 (NHANES) found that girls had a lower misperception rate (28%) in comparison to boys (32.3%) (Sarafrazi et al., 2014). Similarly, another study found that girls were more likely to accurately perceive their weight status (Chung, Perrin, & Skinner, 2013). Child's age has also been found to impact accuracy rates with previous studies concluding that older children were the most accurate at perceiving their weight status (Chung et al., 2013). According to the NHANES, misperception was significantly higher in younger children regardless of sex with roughly 33% of 8-11 year olds misperceiving their weight status while only 27% of 12-15 year olds misperceived (Sarafrazi et al., 2014).

2.3.2 Child's Weight Status

Overweight and obese youth have been found to be more likely to misperceive their weight status in comparison to their non-overweight counterparts (Maximova et al., 2008). The NHANES found that approximately 81% of overweight boys and 71% of overweight girls thought they were the right weight whereas 48% of obese boys and 36% of obese girls judged themselves to be the right weight (Sarafrazi et al., 2014). Likewise, weight perception was also found to vary by children's BMI status with 76.0% of overweight and 41.9% obese children indicating that they were normal weight (Sarafrazi et al., 2014). Furthermore, children with parents of greater BMI statuses, were more likely to underestimate their weight status compared to children of leaner parents (Maximova et al., 2008).

2.3.3 Child's Ethnicity & Socioeconomic Status

Differences in weight perception have also been observed based on ethnicity. For instance, according to the NHANES, a higher rate of weight misperception was found in non-Hispanic Black youth (34.4%) in comparison to non-Hispanic White youth (27.7%) (Sarafrazi et al., 2014). On the contrary a study found that African girls (9 to12 years old) were less likely to have discrepancies between their ideal and current body size in comparison to White girls (Mciza et al., 2005). Like ethnicity, socioeconomic status has yet to be widely studied but has been found to be associated with weight perception in children with the highest rate of misperception in children from lower socioeconomic backgrounds (Sarafrazi et al., 2014). In addition, among African American youth and adolescents of low socioeconomic status, the most common ideal body shape, based on 8 silhouettes, was the fourth, corresponding to normal weight; 55% of boys and 49% of girls selecting the fourth silhouette (Chen & Wang, 2012).

2.4 Conclusion

In essence, increasing parents' awareness of overweight and obesity in their children might help to prevent future excessive weight gain in children since parents who have failed to do so may not deem an intervention worthy (Eckstein et al., 2006; Jeffery et al., 2014; Maynard, Galuska, Blanck, & Serdula, 2003; Oude Luttikhuis, Stolk, & Sauer, 2010). Moreover, parents' perception of their child's overweight or obese weight status has been found to be associated with their readiness to make adequate lifestyle changes (Rhee et al., 2005). Therefore, understanding parents' and children's perceptions of the child's body shape is an important component to include in order to offer effective excessive weight gain prevention and/or management interventions targeted toward children and their families (Lyles, 2014; Maximova et al., 2008; Remmers et al., 2014; Yilmaz, Erkorkmaz, Ozcetin, & Karaaslan, 2013; Young-

Hyman, Herman, Scott, & Schlundt, 2000). In addition, although typical healthy lifestyle intervention programs include physical activity and healthy eating education, the psychological aspects of behaviour change such as perceptions, values, and attitudes are also important to consider and should be integrated into programming supporting families. Since perceptions are difficult to modify, further studies are needed to better understand factors which have been found to influence body shape perception of children, including those of ethnic minorities such as Black immigrants who have been found to be the most at risk of becoming overweight and obese.

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Chapter 3 – Literature Review on Children's Physical Activity and Screen Time, and Parental Feeding Practices

A review of children's physical activity and screen time as well as parental feeding practices is presented in this chapter. In addition, the relationships between body shape perception and modifiable lifestyle habits including children's physical activity and screen time as well as parental feeding practices are stated all while addressing the literature gap of the mentioned relationships in school-aged children and more specifically in Black immigrants.

3.1 Physical Activity in Children

In spite of the known health benefits of regular physical activity, including increased musculoskeletal and cardiovascular health as well as higher levels of self-esteem and prosocial behaviours, the prevalence rate of inactivity is increasing around the globe (Colley et al., 2011; Gillis, Kennedy, & Bar-Or, 2006; Strong et al., 2005; Tremblay et al., 2011). Adequate levels of physical activity are also widely known to be associated with the maintenance of a healthy body weight (Campbell & Hausenblas, 2009; Chaput et al., 2011; Wardle & Cooke, 2005). In addition, health benefits have been associated with being physically active for at least 60 minutes per day; however, only 40% of children aged 5-17 years old meet the Canadian recommendations at least 3 days per week (Active Healthy Kids Canada, 2014). In Canada, levels of physical activity for children and youth, regardless of sex and age, have declined significantly since 1981 (Tremblay et al., 2010). More precisely, according to the 2015 ParticipACTION Report Card on Physical Activity for Children and Youth, Canada received a grade of D- in the category of overall physical activity for the third year in a row which indicated that only between 21-40% of children met the Canadian Physical Activities Guidelines (ParticipACTION, 2015). Therefore, recommendations for the prevention of childhood obesity are in place in Canada to promote a daily increase of physical activity and decrease of sedentary pursuits (Anderson et al., 2008). More precisely, the Canadian Physical Activities Guidelines for children 5-11 and youth 12-17 years old recommend a minimum of 60 minutes of moderate- to vigorous-intensity physical activity on a daily basis to achieve positive health and fitness benefits (Canadian Society for Exercise Physiology, 2012). Above Canadian recommendations, parents play a front line role in influencing their children's health related behaviours, such as eating patterns, screen time, and levels of physical activity (Nagel et al., 2009; Rhee, 2008). A majority

of children are initially introduced to physical activity through their family (Clark, 2008). Consequently, family has an important influence in shaping children's lifestyle habits by investing the necessary time and support (Côté & Hay, 1998). Increased levels of physical activity early on in life have also been associated with lower levels of excessive adipose tissue gain later on (Moore et al., 2003).

In comparing boys and girls, boys have been frequently found to have higher levels of physical activity than girls (Colley et al., 2011; ParticipACTION, 2015; Seabra et al., 2013). In addition, girls have been found to have lower levels of physical activity than boys regardless of their weight status (Gillis et al., 2006). In comparison, boys had greater enjoyment while participating in sports than did girls, although average-weight girls enjoyed physical activity more than overweight or obese girls (Seabra et al., 2013). Furthermore, boys have been found to be more active than girls by means of accelerometers with 12,100 daily steps for boys and only 10,300 for girls (Colley et al., 2011).

Levels of physical activity also tend to decrease with age with 70% of children aged 3-4 and only 9% of 5-17 year old youth meeting the recommended guidelines for daily physical activity in Canada (ParticipACTION, 2015). A study found that children 4 to 7 years of age had similar levels of physical activity regardless of weight status; however, older children who were overweight had lower levels in comparison to non-overweight children (Gillis et al., 2006). Overall, the general trend of physical activity in children and youth is indicative that boys are more physically active than girls and that physical activity decreases drastically with increasing age (ParticipACTION, 2015).

In addition, children from families of higher socioeconomic status have been found to be more likely to express enjoyment regarding physical activity, in comparison to those of lower

socioeconomic status (Seabra et al., 2013). Consequently, children coming from lower socioeconomic status families have been found to be more vulnerable to being overweight and obese as a result of limited opportunities to be physically active (Lobstein et al., 2004; Seabra et al., 2013). Furthermore, the amount of barriers reported by low income parents (e.g. cost, lack of opportunities and transportation) was inversely related to children's participation in organised activities (Smith et al., 2010). Finally, it has been shown that children from overweight/obese families show a stronger preference for sedentary pursuits such as activities relating to computer, video games, and television (Wardle et al., 2001).

3.2 Screen Time in Children

Significant odds of increased obesity have been associated with lower levels of physical activity and higher levels of screen time (Gable, Chang, & Krull, 2007; Kenney, Wang, & Iannotti, 2014; Proctor et al., 2003). Moreover, decreased screen-based sedentary behaviours have been deemed an important factor in promoting a healthy weight status (Hills, King, & Armstrong, 2007; Lowry, Wechsler, Galuska, Fulton, & Kann, 2002; Marshall, Biddle, Gorely, Cameron, & Murdey, 2004). On the contrary, high levels of sedentary activities, including increased screen time, are known to be associated with greater health risks despite levels of physical activity (Saunders et al., 2013). In addition, television viewing, video games, and computer usage occupies a high percentage of children's leisure time and can contribute to the widely observable decrease of physical activity (Boulos, Vikre, Oppenheimer, Chang, & Kanarek, 2012; Koplan et al., 2005). In Canada, according to the 2015 ParticipACTION Report Card on Physical Activity for Children and Youth, Canada received a grade of D- for sedentary behaviours with only 21-40% of children and youth 3-17 years old meeting the Canadian Sedentary Behaviour Guidelines (ParticipACTION, 2015). The Canadian Sedentary Behaviour

Guidelines recommend that children limit their screen time (e.g. television, video games, and computer) to a maximum of 2 hours per day as well as limiting motorized transportation and extended sitting time which all reduce overall daily energy expenditure (Canadian Society for Exercise Physiology, 2012). According to data from the 2007 to 2009 CHMS, Canadians aged 6 to 19 years old spent on average 8.6 hours per day engaging in sedentary behaviours (Colley et al., 2011). The CHMS also reported that the total time spent being sedentary in children increased with age (ParticipACTION, 2015). More precisely, children 3-4 years old spent 5.8 hours daily in sedentary activities compared to 7.6 hours for children 5-11 years old and finally 9.3 hours for those aged 12-17 years old (ParticipACTION, 2015). Similarly, a national representative sample of 51,922 Canadian youth from grades 6 to 12 found that 50.9% of children spent more than 2 hours per day, which is superior to the Canadian Sedentary Behaviour Guidelines (Leatherdale & Ahmed, 2011). This study also found that the average daily screen time for this nationally representative Canadian sample of youth was 7.8 ± 2.3 hours (Leatherdale & Ahmed, 2011). Similarly, another study indicated that school-aged children spend on average 3 hours per day watching television and that this number exceeded 5 hours per day when computers and video games were included (Jordan & Robinson, 2008).

Many studies have found that boys spend on average more time in screen-based activities than girls (Anderson et al., 2008; Bassett-Gunter & Leatherdale, 2014; Fairclough, Boddy, Hackett, & Stratton, 2009; Ferrar, Olds, & Walters, 2012; Laurson et al., 2008). In a study conducted by Ferrar, Olds, and Walters (2012), television viewing time differed significantly between boys and girls; however, computer usage did not differ. The greatest difference in screen times between boys and girls was for time spent playing video games with boys spending 60 minutes per day compared to 19 minutes per day for girls (Ferrar et al., 2012). Overall,

children who have been found to be at a higher risk of lower active play and higher screen time were older age, females, and non-Hispanic Blacks (Anderson et al., 2008). In addition, findings from a recent Ontario based study, with a sample size of 2,331 children of grades 1 to 4, found that high screen-based sedentary was highest in boys, older, and overweight children (Bassett-Gunter & Leatherdale, 2014). Another study also found that children with an increased weight status tended to spend more time in sedentary based activities in comparison to leaner children (Vandewater, Shim, & Caplovitz, 2004). Strikingly, children who did not meet recommendations regarding time spent doing physical and sedentary activities were 3 to 4 times at higher risk of becoming overweight in comparison to children who conformed to the recommendations (Laurson et al., 2008). Black youth also had greater odds of being obese if they did not exercise daily or spent more than 2 hours per day in screen time (Kenney et al., 2014). Moreover, children coming from lower socioeconomic families have been found to spend more time in sedentary pursuits than being physically active (Fairclough et al., 2009). Altogether, it is recommended that parents provide opportunities and encourage their children to be physically active all while reducing their screen time (Ritchie, Welk, Styne, Gerstein, & Crawford, 2005).

3.3 Influence of Body Shape Perception on Physical Activity and Screen Time

With a substantial decrease in levels of physical activity, there has been an increase of studies looking at potential predictors of physical activity. A factor which has gained particular attention is body image. Body image is defined as an internal representation of one's body shape, weight or any other construction of physical appearance with social and cultural attitudes helping to shape one's representation (Cash, 2012; Skrzypek, Wehmeier, & Remschmidt, 2001). Accurate weight perception and positive body image have been deemed important predictors of

healthy lifestyle changes in adolescents and adults (Edwards et al., 2010; Foti & Lowry, 2015; Williams & Cash, 2001). In addition, parents' perception of their child's weight has been found to influence their willingness to make necessary changes to prevent further excessive weight gain in their child (Jeffery et al., 2014; Rhee et al., 2005). Although there is a vast array of studies, predominantly in adolescent and adult populations, which investigated the impact of body image on levels of physical activity, none to our knowledge have looked at the impact of body shape perception using silhouettes on levels of physical activity and screen time in children.

Overall, higher levels of physical activity have been frequently found to be related to higher levels of psychological well-being (Arbour & Martin Ginis, 2008; Kirkcaldy, Shephard, & Siefen, 2002). More precisely, regular physical activity has been related to a more favourable body image and higher body esteem (Goldfield et al., 2011; Kirkcaldy et al., 2002; Williams & Cash, 2001). For instance, a study found that body image (e.g. feeling comfortable in one's body, being satisfied with one's appearance), regardless of BMI, was a positive predictor of moderate-to-vigorous physical activity in adolescents 14-16 years old (Kantanista, Osiński, Borowiec, Tomczak, & Król-Zielińska, 2015). Similarly, body image has been found to be a determinant of levels of physical activity among preadolescent girls but not among boys (Jensen & Steele, 2009). However, other studies found that body image was not a significant predictor of physical activity (Bhuiyan, Gustat, Srinivasan, & Berenson, 2003; Duncan, Al-Nakeeb, Nevill, & Jones, 2006). In addition, studies have found that low body image discourages physical activity (Neumark-Sztainer, Paxton, Hannan, Haines, & Story, 2006; Yancey, Simon, McCarthy, Lightstone, & Fielding, 2006).

Body weight perception has also been deemed an important factor in weight management practices (Brener, Eaton, Lowry, & McManus, 2004). For instance, African American

adolescents with a BMI-for-age-and-sex equivalent or greater to the 85th percentile or who self-perceived themselves as being obese were more likely to produce efforts to lose weight (Wang, Liang, & Chen, 2009). Similarly, the National Health and Nutrition Examination Survey (NHANES; 2005-2010) found that perception of being overweight and actual overweight were both strongly associated with weight loss behaviours in a sample of 4,355 children and adolescents 8-15 years old (Chung et al., 2013). Consequently, self-perception of overweight or obesity was related to weight loss attempts regardless if their perception was accurate or not (Chung et al., 2013). In addition, a study found that girls who perceived their weight status to be 'about right size' or 'I don't think about it' had higher levels of physical activity (Symons et al., 2013).

Very little research has been conducted regarding the relationship between body shape perception and screen time. The general trend is that adolescents and adults perceiving themselves as overweight or obese tend to have increased time spent in sedentary pursuits (Felts, Parrillo, Chenier, & Dunn, 1996; Yancey et al., 2006). For instance, a study found that adolescents who perceived themselves as "too fat" were found to spend increased time in sedentary pursuits (Felts et al., 1996). More precisely, adolescents who perceived themselves as overweight were more likely to watch television or play video games for more than 4 hours per day in comparison to adolescents who did not view themselves as "too fat" (Felts et al., 1996). Similarly, normal weight adults who perceived themselves as overweight had higher sedentariness than those who perceived themselves as normal weight (45.3% compared to 33.0%) (Yancey et al., 2006). All in all, there is a need for further studies exploring the relationships between body shape perception, physical activity, and screen time in school-aged

children since influences have been documented in adolescent and adult populations but have yet to be widely studied in youth.

3.4 Parental Feeding Practices

Parents are widely known to be responsible for teaching their children about food preferences and eating habits (Birch & Fisher, 1998; Kröller & Warschburger, 2009). More specifically, parental feeding practices, such as monitoring, pressure to eat, and restriction, are factors which have been found to predict energy intake in children (Yilmaz et al., 2013). Parental feeding practices are defined as behavioural strategies which moderate children's dietary intake and eating behaviours leading to the development of food preferences which are associated with children's weight status (Benton, 2004; de Lauzon-Guillain, Musher-Eizenman, Leporc, Holub, & Charles, 2009). These practices have been found to vary greatly based on the child's individual characteristics such sex, age, weight status, and ethnicity (Cardel et al., 2012; Savage, Fisher, & Birch, 2007). For instance, in comparing White and African-American mothers feeding practices using the Child Feeding Questionnaire (CFQ), African-American mothers indicated higher monitoring, responsibility, pressure to eat, restriction, and concern for child's weight (Spruijt-Metz, Li, Cohen, Birch, & Goran, 2006). Certain parental characteristics such as education level and socioeconomic status also impact parental feeding practices (Kröller & Warschburger, 2008). In addition, parents' perception of their child's weight and risk of overweight are critical factors which have been found to influence parental feeding practices (Birch & Fisher, 2000; Scaglioni et al., 2008; Yilmaz et al., 2013). Therefore, parents will influence their child's weight status by means of feeding practices but children will also influence parental feeding strategies by means of their characteristics resulting in a bidirectional relationship (Webber, Hill, Cooke, Carnell, & Wardle, 2010).

Overall, a child's family has been shown to be an important contributor in shaping their eating habits and evaluation of satiety (Patrick & Nicklas, 2005). Therefore, it is recommended that parents create an environment which fosters healthy opportunities since childhood lifestyles can have lasting effects on weight outcomes in their future (Birch & Davison, 2001; Ritchie et al., 2005; Savage et al., 2007). Moreover, parental feeding practices have been found to explain significant variance in children's adipose mass (Spruijt-Metz, Lindquist, Birch, Fisher, & Goran, 2002). Consequently, a promising avenue to tackle increases in childhood obesity is to explore the influences of parental feeding practices on children (Rhee, 2008; Ritchie et al., 2005; Stang & Loth, 2011; Wardle & Carnell, 2007). The bulk of research on parental feeding practices takes a closer look at strategies utilized by parents to influence their child's food intake and the unintended effects of others on children's weight status (Savage et al., 2007; Wardle & Carnell, 2007). Certain parental feeding practices have been linked to the maintenance of a healthy weight in children such as exerting certain control over the types and quantities of food as well as frequency at which their child eats (Birch & Krahnstoever, 2001; Cross, Hallett, Ledoux, O'Connor, & Hughes, 2014; Stang & Loth, 2011; Ventura & Birch, 2008). However, other parental feeding practices have been classified as counterproductive such as excessive control, restriction, and pressure to eat (Scaglioni, Arrizza, Vecchi, & Tedeschi, 2011). Moreover, parental feeding practices may vary by the child's sex, age, BMI z-score, and ethnicity; however, results are conflicting (Stang & Loth, 2011; Wardle & Carnell, 2007) Nevertheless, since research in this area has been predominantly conducted in White samples of mid-upper socioeconomic status, future research is needed to determine if these trends are prevalent in racial minorities such as Sub-Saharan African and Caribbean youth and to increase generalisability of findings (Arredondo et al., 2006; Cross et al., 2014; Spruijt-Metz et al., 2006).

3.4.1 Perceived Parental Responsibility in Child Feeding

Perceived parental responsibility has been found to significantly predict parental feeding practices (de Lauzon-Guillain et al., 2009). For instance, perceived parental responsibility was associated with higher encouragement to consume a variety of healthy foods, greater teaching opportunities about nutrition, and lower use of controlled feeding practices on behalf of the parents (de Lauzon-Guillain et al., 2009). In comparing mothers and fathers, mothers generally reported increased perceived parental responsibility of their children's feeding (Blissett, Meyer, & Haycraft, 2006).

3.4.2 Parental Control in Child Feeding

Previous research suggests a link between parental control during child feeding and children's BMI status (Scaglioni et al., 2008a). Evidence suggests that fewer opportunities of self-control for the child can result in a preference for energy-dense foods, limited acceptance of divers foods, lower consumption of healthy foods, and an alteration in self-regulation of eating (Arredondo et al., 2006; Scaglioni et al., 2008; Tan & Holub, 2011). Lower levels of self-regulation may lead to eating in response to external cues such as availability and smell of foods (Faith, Scanlon, Birch, Francis, & Sherry, 2004). As a result, greater parental control may ultimately foster an excessive gain of adipose tissue in children (Scaglioni et al., 2008a; Wehrly, Bonilla, Perez, & Liew, 2014). Moreover, a pilot study conducted in a sample of low-income mothers of diverse ethnic/racial backgrounds found that White mothers exerted greater control to manage their child's food intake in comparison to Hispanic and non-Hispanic Black mothers (Vollmer & Mobley, 2013). On the contrary, a study conducted by Spruijt-Metz et al (2002) found that African American mothers exerted greater control than White mothers.

Two parental feeding practices which are classified as controlling include pressuring a child to eat and restricting types and/or quantities of particular foods in a child's diet (Wehrly et al., 2014). A previous study found that pressure to eat was associated with lower BMI in children whereas restriction was association with higher BMI in children (Wehrly et al., 2014). Moreover, both of these associations were the most frequent findings in a recent systematic review on feeding in children (Hurley, Cross, & Hughes, 2011). The intention of parents who utilize controlling feeding practices is generally to promote healthier eating behaviours in children but these practices have been found to have negative influences on children's food preferences and satiety cues (Carper et al., 2000; Savage et al., 2007; Wardle et al., 2002). Consequently, parental feeding practices deemed to be controlling have the potential to negatively influence children's food intake and preferences resulting in higher rates of overweight and obesity (Stang & Loth, 2011).

3.4.3 Pressure to Eat in Child Feeding

Pressure to eat has be defined as a parent's will to increase their child's overall food consumption and/or regulate foods that their child consumes (Faith et al., 2003; Keller, Pietrobelli, Johnson, & Faith, 2006; Savage et al., 2007). Increased pressure to eat has been found to be associated with decreased preference for the pressured food, notably fruits and vegetables, as well as an increased fussiness regarding foods (Fisher & Birch, 2002; Galloway, Fiorito, Lee, & Birch, 2005; Powell et al., 2011). Pressure to eat has been found to be associated with concern for underweight in children as young as 2 years old (Gregory, Paxton, & Brozovic, 2010). In addition, pressure to eat has also been associated with low child BMI as well as an overall decreased food consumption (Cardel et al., 2012; Carnell & Wardle, 2007; Galloway et al., 2006; Matheson, Robinson, Varady, & Killen, 2006; Spruijt-Metz et al., 2002; Wehrly et al.,

2014). Moreover, mothers who visually classified their child as overweight or obese used less pressure to eat in child feeding situations compared to mothers who perceived their child as leaner (Keller et al., 2006; Wardle & Carnell, 2007; Webber et al., 2010; Yilmaz et al., 2013). Similarly, another study found that mothers who perceived their daughters as thinner pressured them to consume greater quantities of food (Francis et al., 2001). It has been proposed as an explanation that children with lower body weight may be pressured to eat by their parents to increase their energy intake where as children considered overweight or obese will be pressured to consume greater amounts of low-energy dense foods (Stang & Loth, 2011). Consequently, when parents perceive their child as too thin or consuming too few calories, they will pressure their child to eat (Spruijt-Metz et al., 2002; Webber et al., 2010).

3.4.4 Restriction in Child Feeding

Restriction relates to a parent's attempt to control their child's dietary intake by limiting their overall food consumption and/or access to specific palatable foods such as unhealthy or snack foods (Faith et al., 2003; Savage et al., 2007; Spruijt-Metz et al., 2002). Restricting access to food has been found to alter a child's sensitivity to internal cues of hunger and satiety; thus reducing self-regulation of food intake which leads to eating in the absence of hunger and ultimately overeating (Faith, Scanlon, et al., 2004; Rhee, 2008). Therefore, children may focus on restricted foods and overeat when they are freely available which contribute to an obesogenic environment (Fisher & Birch, 1999; Jansen, Mulkens, & Jansen, 2007; Van Strien et al., 2009). For instance, an experimental study found that children with parents who exerted the lowest and highest use of restriction at home consumed a significantly higher total amount of kilocalories during the entire experiment in comparison to children whose parents exert moderate use of restriction at home (Jansen et al., 2007). As a result, modest use of restriction in child feeding

situations have been found to have beneficial impacts on overweight youth in the frame of a professional obesity intervention (Butryn & Wadden, 2005).

More precisely, parental restriction has been associated with higher BMI and adipose tissue in children even though the main aim of this practice is reducing energy intake and thus limiting additional excessive adipose gain in children (Birch & Fisher, 2000; Faith, Berkowitz, et al., 2004; Francis et al., 2001; Gray, Janicke, Wistedt, & Dumont-Driscoll, 2010). Therefore, parental restriction has been found to be directly associated with children's BMI status (Cardel et al., 2012; Clark, Goyder, Bissell, Blank, & Peters, 2007; Joyce & Zimmer-Gembeck, 2009; Scaglioni et al., 2011). On the contrary, other studies have rather found that restriction is not directly associated with children's BMI status (Carnell et al., 2005; Carnell & Wardle, 2007; Kröller & Warschburger, 2008). Parents who exert higher use of restriction have also been found to have a strong desire for their children to be leaner (de Lauzon-Guillain et al., 2009). Most notably, mothers who were concerned about their weight exerted greater restriction, especially with their daughters, and certain also encouraged their daughters to lose weight (Francis et al., 2001). Furthermore, mothers who viewed their daughters as overweight/obese utilized restrictive feeding practices to a greater extent than if they viewed them as underweight or normal weight (Birch et al., 2001; Brann, 2010; Johannsen et al., 2006). Consequently, restriction has been associated with parental perception of their child's body weight status (de Lauzon-Guillain et al., 2009).

3.4.5 Monitoring in Child Feeding

Parental monitoring can be described as the extent to which parents verify the types and quantities of food that their children eat such as sweets, snack foods, and high-fat foods (Birch et al., 2001). An experimental design study found that children decreased their consumption of

non-nutritious foods (high in sugar, sodium, and saturated fats) as well as the overall energy content of their meal with the threat or actual presence of parental monitoring (Klesges, Stein, Eck, Isbell, & Klesges, 1991). Moreover, mothers who want their children to be leaner have been found to exert greater monitoring (de Lauzon-Guillain et al., 2009). In comparing boys and girls, a study found that parents of girls exerted increased monitoring of sweets and snack foods versus parents of boys (Tremblay et al., 2012). In addition, non-Hispanic Black and Hispanic mothers have been found to cater to their children's food preference and offer large portions of desired foods in comparison to White mothers (Vollmer & Mobley, 2013).

3.4.6 Concern for Child's Weight Status

Even though parental feeding practices have been deemed changeable, if parents express little or no concern over their child's weight status, changes are very unlikely (Webber et al., 2010). Parents who lack recognition of their child's weight status have been shown to express the least amount of concern regarding their child's weight (Lampard, Byrne, Zubrick, & Davis, 2008). More precisely, parents of overweight and obese children typically express little or no concern especially if they underestimate their child's weight status (Etelson et al., 2003; May et al., 2007; Tschamler, Conn, Cook, & Halterman, 2010). In addition, a Canadian study found that parents who accurately perceived their overweight child's weight status were more likely to express concern in comparison to parents who inaccurately perceived their overweight child's weight status (Tremblay et al., 2012). Other studies have found higher rates of concern among parents of heavier children (Keller et al., 2006; Lampard et al., 2008; Mulder, Kain, Uauy, & Seidell, 2009). For instance, a study found that only 50% of mothers having classified their children as overweight/obese expressed concern regarding their child's current or future weight status (Webber et al., 2010); whereas another study indicated that 66.2% of mothers expressed

concerns regarding their children becoming overweight in the future (Carnell et al., 2005). Parents of overweight children have been found to express little parental concern in comparison to parents of obese children; 82% in comparison to 18% respectively. Similarly, a second study found that 81% of parents of overweight children and 42% of parents of obese children expressed no concern for their child's weight (Wake, Salmon, Waters, Wright, & Hesketh, 2002). Parents are less likely to express concern regarding their sons weight status in comparison to their daughters; especially for younger children (Baughcum et al., 2000; Campbell et al., 2006; Carnell et al., 2005; Maynard et al., 2003). A longitudinal study with a sample of White and African American children-mother dyads found that parental concern effected total fat mass change overtime in White children but was an insignificant predictor in African American children (Spruijt-Metz et al., 2006).

3.5 Summary

The influence of body shape perception on modifiable lifestyle habits has been scarcely studied; even fewer studies have been conducted in ethnic minority samples. Nevertheless, body shape misperceptions could impair children's and parents' ability to prevent further excessive weight gain in children (Jeffery et al., 2014; Rhee et al., 2005). On the contrary, an accurate body shape perception has been found to be related to positive lifestyle changes to maintain or reach a healthy weight status by means of increased levels of motivation (Edwards et al., 2010; Foti & Lowry, 2015; Williams & Cash, 2001). Therefore, there is evidence that supports further exploration of the influences of body shape perception on modifiable lifestyle habits. The present study will aim to address the possible associations between body shape perception and modifiable lifestyle habits including physical activity, screen time, and maternal feeding practices to better understand the influences in a sample of Black immigrants and Canadian-born

mothers and school-aged children. Altogether, correct body shape perception in children and adolescents has been associated with appropriate lifestyles changes (Sarafrazi et al., 2014; Talamayan, Springer, Kelder, Gorospe, & Joye, 2006). In addition, physical inactivity (Colley et al., 2011; Gillis, Kennedy, & Bar-Or, 2006; Strong et al., 2005), prolonged screen time (Cheng, 2005; He, Harris, Piché, & Beynon, 2009; Laurson et al., 2008), and parental feeding practices (Birch & Fisher, 1998; Joyce & Zimmer-Gembeck, 2009; Scaglioni, Salvioni, & Galimberti, 2008) are among the modifiable lifestyle habits which have been proven to reduce the risk of childhood overweight and obesity.

3.6 Overview of the Present Study

The present study is based on the social-ecological model which considers the totality of spheres of an individual's life and the dynamic interrelations among various factors to better understand development (Bronfenbrenner, 1994). A conceptual model has been constructed to reveal the theoretical relationships between the main outcomes of the present study which include children's body weight status, body shape perception, and modifiable lifestyle habits. The conceptual model was inspired by a model constructed by Wang and colleagues (2009) which aimed to assess the associations between actual BMI, body weight perception as well as dissatisfactions and weight control in a sample of African American adolescents. More precisely, the conceptual model for the present study aims to demonstrate the influence of children's body weight status on mothers' and children's body shape perception of the child as well as the relationship between body shape perception and modifiable lifestyle habits including physical activity, screen time, and eating (**Figure 3.1**).

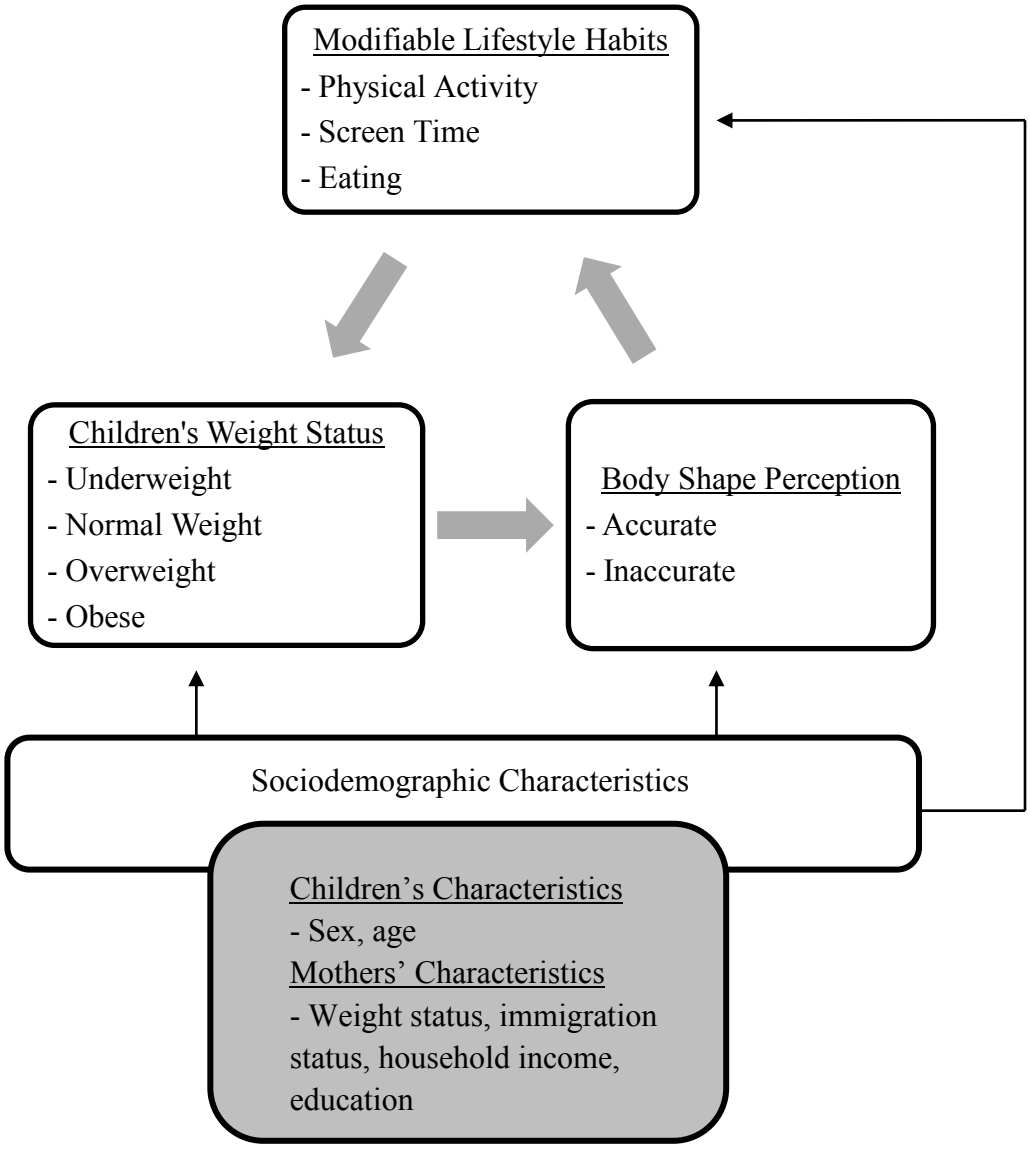

Figure 3.1 Conceptual model: Children's body weight status, body shape perception, and modifiable lifestyle habits

A common measure of children's weight status is BMI-for-age-and-sex z-scores and percentiles which can be subdivided into 1) underweight, 2) normal weight, 3) overweight, and 4) obese. Firstly, children's weight status has been found to influence mothers' and children's body shape perceptions of the child (Rietmeijer-Mentink et al., 2013; Towns & D'Auria, 2009;

West et al., 2008). Body shape perception can be further classified as either 1) accurate perception or 2) inaccurate perception (or misperception). Secondly, body shape perception has been found to influence certain modifiable lifestyle habits including physical activity, screen time, and parental feeding practices (Remmers et al., 2014; Sarafrazi et al., 2014; Stockton et al., 2009). In return, modifiable lifestyle habits have been found to influence body weight status (Colley et al., 2011; He & Evans, 2007; Scaglioni et al., 2008); however, this relationship is beyond the scope of the present study. The relationships between body shape perception and modifiable lifestyle habits have been scarcely studied in children and even less in Black immigrant children. Nevertheless, it is widely known the Black communities have differences in perceptions of beauty and body shape compared to Westernized societies (Renzaho, 2004; Tiggemann, 2012). Therefore, the present study will aim to better understand the influences of mothers' and children's body shape perceptions of the child on physical activity, screen time, and maternal feeding practices in Black school-aged immigrant children in Ottawa.

3.7 Objectives and Hypotheses

- **Objective 1**: To determine and compare the perceptions of mothers and children of the child's body shape.
  - **Hypothesis 1a**: Mothers of overweight and obese children will underestimate their child's body shape.
  - **Hypothesis 1b**: Overweight and obese children will underestimate their body shape.
- **Objective 2**: To determine the relationships between body shape perception and physical activity in children.

  - **Hypothesis 2**: Body shape perception will be significantly associated with physical activity in children.

- **Objective 3**: To determine the relationships between body shape perception and screen time in children.
  - **Hypothesis 3**: Body shape perception will be significantly associated with screen time in children.
- **Objective 4**: To determine the influences of body shape perception of children on parental feeding practices.
  - **Hypothesis 4**: Mothers who perceive their child's body shape as underweight will demonstrate decreased restriction, monitoring, and concern for child weight, and an increase in pressure to eat in comparison to mothers who perceive their child's body shape as overweight or obese.

Chapter 4 – Methodology

The methodology of the present study which includes participant characteristics, recruitment strategies, inclusion criteria, data collection procedure, measures, and a detailed analytic plan is presented in this chapter.

4.1 Participants and Recruitment

A total of 259 parent/guardian-child dyads were recruited as part of a larger study (only one child per household was eligible to participate). The larger study examined the determinants of eating habits and weight status of Black school-aged immigrant children in Ottawa. Respondents were predominantly biological mothers (96.9%), with a smaller percentage of female guardians (1.9%; three grandmothers, one aunt and one adoptive mother) and fathers (1.2%; two biological fathers and one step-father). Data from the father-child dyads were excluded since males and females were found to have different bodily perceptions (Shrewsbury et al., 2012). In addition, one mother-child dyad did not meet the inclusion criteria since the child was adopted and was subsequently removed for analyses. Therefore, the sample which met the inclusion criteria for the present study was 255 mother-child dyads. More precisely, the sample of children included 136 girls (53.3%) and 119 boys (46.7%). The children were school-aged ranging in age from 6 to 12 years (M = 9.2 years, SD = 1.9 years), living in Ottawa, Ontario. The majority of children were from immigrant families with the mothers originating from Sub-Saharan Africa (n=126; 49.4%) and the Caribbean (n=62; 24.3%); 73.7% of the total sample was composed of immigrants (n=188). For comparison purposes, children from families with mothers of diverse ethnic backgrounds born in Canada (n=67; 26.3%) were also recruited; roughly 60% were Caucasians. A total of 68.2% of mothers reported living in a two-parent household while 31.8% reported being single mothers.

Participant recruitment started in January 2014 and concluded in April 2015. Since very few studies have examined the physical and psychological health of Black immigrants in Canada, an availability sample was used for this study which was comparable to other studies (Killion et al., 2006). Therefore, recruitment was based on a convenience sampling method.

Participants were recruited mostly by team members during community events, religious gatherings, etc., and through various outlets such as word of mouth, community organisations, and ethno-cultural associations. The study was approved by the University of Ottawa Research and Ethics Board (reference code: H08-13-17); ethics was obtained until November 3rd, 2016. Prior to data collection, all participants, including mothers and children, provided written informed consent and assent, respectively.

4.2 Inclusion Criteria

Inclusion criteria included being a Black woman born in Sub-Saharan Africa or the Caribbean or being a woman born in Canada and having a child aged 6 to 12 years old (regardless of child's place of birth). The mother-child dyad had to also be living in the Ottawa area (limited to the Ontario side), and have sufficient understanding of French or English to hold a conversation. Children with a medical condition which could significantly impact their dietary intake and/or level of physical activity as well as children with a food allergy which could markedly affect their dietary intake were excluded from the present study.

Mothers were chosen as family representatives for the interviews because they have been found to be most often responsible for food choices and food preparation for children in these particular cultural groups (Francis et al., 2001; Marquis & Shatenstein, 2005; Scaglioni, Salvioni, & Galimberti, 2008b; Vollmer & Mobley, 2013). In addition, children 6 to 12 years old were selected for this study since they are more influenced by their parents, whereas teens have additional factors which influence their lifestyles and self-perceptions, including peers and their degree of sexual maturation (Ward & Bélanger, 2011).

4.3 Procedure

Data were collected during face-to-face structured interviews and were conducted either in English or in French by a dietitian and a research assistant (when possible) with the mother-child dyad. Each standardized nutritional interview had an approximate duration of 90 minutes and took place at the University of Ottawa campus or another location at the discretion of the mother-child pair. The mother was interviewed using a standardized approach by the dietitian and answered questions which included but were not limited to general sociodemographic details, parental feeding practices and habits, eating habits before and after immigration, meal preparation skills, and body shape perception of their child. During this time, the child was interviewed by a trained research assistant or graduate student regarding their levels of physical activity, screen time, and body shape perception. Following completion of the structured interview, mother-child dyads were given a $25 grocery gift card as compensation for their time and costs associated with participation in the study. At a subsequent date, a personalized dietary assessment summary for the child was provided to the mother.

4.4 Measures

Sociodemographic data were collected from each mother-child pair and included details such as sex, age, marital status, level of education, household income, and immigration status. Measures which were retained for the present study included: body shape perception (Stevens et al., 1999), portions of a validated questionnaire derived from the Canadian Community Health Survey (CCHS; Health Canada, 2004): children's physical activities and sedentary activities, and subscales of the Child Feeding Questionnaire (CFQ; Birch et al., 2001).

4.4.1 Weight and Height Measurements

Before measurements were taken, mothers and children were asked to remove their shoes and any heavy clothing. Weight measurements of the participants were collected by the dietitian or research assistant using a calibrated, standardized digital scale and recorded in pounds to the nearest 0.01lbs. Height measurements were taken using a portable stadiometer and were recorded in centimeters to the nearest 0.1cm. All anthropometric measurements were collected in duplicates to increase measurement reliability.

For adults, body mass index (BMI; kg/m^2) is a widely used tool to grossly estimate body composition and overall health status (Health Canada, 2011). BMI was calculated for the mothers by dividing their weight in kilograms (kg) by their respective height in meters squared (m^2). A BMI cut-off approach according to Health Canada (2011) was used to identify underweight (BMI < 18.5), normal weight (BMIs 18.5 to 24.9), overweight (BMIs 25.0 to 29.9), and obese (BMI ≥ 30.0). For the children, the World Health Organization (WHO) Growth Charts for Canada, adapted through a collaboration led by the Dietitians of Canada and included the Canadian Paediatric Society, the College of Family Physicians of Canada, Community Health Nurses of Canada, and the Canadian Pediatric Endocrine Group, were used to assess overall healthy growth patterns (Dietitians of Canada, 2015). More precisely, age-/sex-specific classification for children and adolescents aged 5 to 19 years old were created to provide an appropriate reference for this age group where percentiles and z-scores are utilized to compare a child's measurements (weight and height) to averages of other children who are of the same age and sex. Children's height and weight measurements were transformed into age- and sex-specific BMI z-scores using WHO AnthroPlus (2009). A BMI-for-age-and-sex z-score approach according to the WHO Growth Charts for Canada (2015) utilized age- and sex-specific cut-offs

to identify underweight (z-scores < -2, equivalent to below the 3rd percentile), normal weight (z-scores from -2 to +1, equivalent to the 3rd percentile to below the 85th percentile), overweight (z-scores from +1 to +2, equivalent to the 85th to 97th percentile), and obese (z-scores > +2 or equivalent to above the 97th percentile). During certain analyses, BMI z-scores were used as a continuous variable.

4.4.2 Body Shape Perception

The sex-specific figure rating scale with a total of eight silhouettes showing a range of body sizes from underweight to obese was used to assess body shape perception (Stevens et al., 1999). Line drawings have been found to be appealing in assessing body shape perception in children since they require less verbal fluency and are easier to understand compared to questionnaires (McCabe, 2012; Truby & Paxton, 2002). The drawings are similar to the widely used Stunkard's Figure Rating Scale (Stunkard, Sorensen, & Schulsinger, 1983) but were adapted to be age appropriate for children (Stevens et al., 1999). The children were instructed to choose a silhouette to best represent their perception of their current body shape on a sex-specific scale. The mothers were also instructed to choose a silhouette to best represent their perception of their child's current body shape.

To further analyse body shape perception, the eight silhouettes were collapsed to create 4 categories, namely underweight (silhouettes #1 to #2), normal weight (silhouettes #3 to #4), overweight (silhouettes #5 to #6), and obese (silhouettes #7 to #8). Similar classification was used in a study which assessed the impact of parental perception of their child's weight status on their feeding practices (Yilmaz et al., 2013). In addition, the classification used was identical to an American study which used very similar silhouettes (Sherwood et al., 2003). Body shape perception accuracy was assessed by comparing body shape perception using the silhouettes (#1

to #8) and measured weight status. More precisely, underestimation was when the perceived body shape was inferior to the measured BMI status whereas overestimation was when the perceived body shape was superior to the measured BMI status; both are equivalent to an inaccurate body shape perception. An accurate perception was when both the perceived body shape and measured BMI status were in the same category (see **Figure 4.1**).

Figure 4.1 Classification of body shape perception accuracy[1]

Weight categories	**Body shape perception** Silhouette number							
	1	2	3	4	5	6	7	8
Underweight (z-scores < -2)								
Normal weight (z-scores from -2 to +1)								
Overweight (z-scores from +1 to +3)								
Obese (z-scores > +3)								

[1] The grey tiles are equivalent to an accurate body shape perception while the tiles above (overestimation) and below (underestimation) are equivalent to an inaccurate body shape perception.

4.4.3 Levels of Physical Activity and Screen Time

Portions of a validated questionnaire from the CCHS (Health Canada, 2004; see **Appendix A** for questionnaire) were used to measure levels of physical activity and screen time. Prior to questions on physical activity, the following introductory statement was read to the children, "*Physical activity is any activity that increases your heart rate and makes you get out of breath some of the time. It can be done in sports, school activities, playing with friends, or walking to school. Some examples of physical activity are running, brisk walking, rollerblading, biking, dancing, skateboarding, swimming, playing soccer, basketball, and football.*" This introductory statement assured that the entity of physical activities and intensities were

considered by the children. To assess levels of physical activity, children in our study were asked about the number of days a week they were physically active in the previous seven days for at least 60 minutes per day. Answer options for this question included: 1) None (zero days), 2) 1 day, 3) 2 to 3 days, 4) 4 days or more, and 5) Don't know/refuse to answer. The children were then asked to identify the average number of hours per day that they spent watching television/videos or playing video games as well as the average number of hours per day spent on a computer. Answer options for the two previous questions included: 1) None, 2) Less than 1 hour a day, 3) 1 to 2 hours a day, 4) 3 to 4 hours a day, 5) 5 to 6 hours a day, 6) 7 or more hours a day, and 7) Don't know/refuse to answer.

4.4.4 Parental Feeding Practices and Behaviours

The Child Feeding Questionnaire (CFQ; Birch et al., 2001; see **Appendix B** for questionnaire) is a self-report questionnaire containing 31-items which assessed parental beliefs, attitudes, and practices pertaining to child feeding. The CFQ has been widely used in previous studies to assess parental feeding practices (Birch & Fisher, 2000; Carnell & Wardle, 2007; Hughes, Power, Orlet Fisher, Mueller, & Nicklas, 2005; Jansen et al., 2007; Montgomery et al., 2006; Spruijt-Metz et al., 2002; Ventura & Birch, 2008). More precisely, the CFQ was designed to be used with parents having children aged from 2-11 years old (Birch et al., 2001). A series of studies have established the CFQ as a valid and reliable tool to measure aspects of parental feeding during childhood (Birch & Fisher, 2000; Birch, 1998; Carper et al., 2000). For this study, a modified version of the CFQ was used (Birch et al., 2001). Moreover, a French version of the CFQ was created for the present study. Subscale scores were created by taking the mean of all items for each subscale and higher scores represented increased use of a particular parental

feeding practice or greater concern for the child's weight. More precisely, subscales derived from the CFQ for the present study included:

1. ***Perceived Responsibility*** was a 3-item subscale which assessed parents' perception of their responsibility for feeding their child. An example of an item was, "When your child is at home, how often are you responsible for feeding him/her?" Answers were recorded on a 5-point Likert scale ranging from 1 (never) to 5 (always) with higher scores being indicative of greater parental perceived responsibility toward child feeding. The reliability (Cronbach's α) in the present sample for this subscale was 0.55. This subscale was omitted from analyses due to low reliability and very little variability in participants' answers.
2. ***Restriction*** was an 8-item subscale which assessed the extent to which parents limit their child's access to palatable foods; includes both types and amounts of food. An example of an item was, "I have to ensure that my child does not eat too many sweets (candy, ice cream, cake or pastries)?" Answers were recorded on a 5-point Likert scale ranging from 1 (disagree) to 5 (agree) with higher scores being indicative of greater parental feeding restriction. The reliability (Cronbach's α) in the present sample for this subscale was 0.66. Two items (#47 and #48, see **Appendix B** for questions) from the restriction subscale were removed to increase reliability (Cronbach's $\alpha = 0.68$) and due to the nature of the questions (#47 and #48) regarding "food as a reward" instead of "restriction".
3. ***Pressure to Eat*** was a 4-item subscale which assessed the extent to which parents force their child to eat certain quantities and types of foods. An example of an item was, "My child should always eat all of the food on their plate." Answers

were recorded on a 5-point Likert scale ranging from 1 (disagree) to 5 (agree) with higher scores being indicative of greater parental pressure to eat. The reliability (Cronbach's α) in the present sample for this subscale was 0.69. One item (#51, see **Appendix B** for question) was removed to increase reliability (Cronbach's α = 0.74).

4. ***Monitoring*** was a 3-item subscale which assessed the extent to which parents watch over their child's consumption of sweets, snack foods, and high-fat foods. An example of an item is, "How much do you keep track of snack food (potato chips, Doritos, cheese puffs) that your child eats?" Answers were recorded on a 5-point Likert scale ranging from 1 (never) to 5 (always) with higher scores being indicative of greater levels of parental monitoring. The reliability (Cronbach's α) in the present sample for this subscale was 0.85.
5. ***Concern about Child Weight*** was a 7-item subscale which assessed how concerned parents are about their child's weight and eating habits. An example of an item is, "How concerned are you about your child becoming overweight?" Answers were recorded on a 5-point Likert scale ranging from 1 (unconcerned) to 5 (very concerned) with higher scores being indicative of greater levels of parental concern. The reliability (Cronbach's α) in the present sample for this subscale was 0.92.

Cronbach coefficients obtained, with the exception of "Perceived Responsibility" (0.55), are comparable to those from the initial confirmatory factory analysis which were all above 0.70 (Birch et al., 2001). In addition, Cronbach coefficients obtained were similar to a Canadian

study conducted in Sudbury, Ontario which studied the relationships between parental perception of their child's weight status accuracy and feeding strategies (Tremblay et al., 2012).

4.5 Analytic Plan

All statistical analyses were performed using the SPSS Statistics for Windows Software, Version 23.0 with an alpha level of $p < 0.05$ considered significant for all analyses. Means and standard deviations as well as prevalence rates and percentages were computed to describe the general characteristics of the sample for both mothers and children as well as separately for inaccurate and accurate body shape perceptions (**Table 5.1** and **Table 5.2**). Univariate analyses were conducted to determine if differences existed between these subgroups (i.e. inaccurate and accurate perceptions) for mothers and children with chi-square tests for categorical variables and independent samples *t*-tests for continuous variables.

4.5.1 To determine and compare the perceptions of mothers and children of the child's body shape (*Objective 1*).

Figure 5.1 presents the frequencies of selected silhouettes for both mothers and children while **Figure 5.2** and **Figure 5.3** compare children's measured BMI categories to the mothers' and children's perceived body shape of the child, respectively. The children's measured BMI categories were cross-tabulated with 1) mothers body shape perception of their child (**Table 5.3**) and 2) children's body shape perception of themselves (**Table 5.4**). Intraclass correlation was used to assess the agreement between children's measured BMI categories and 1) mothers body shape perception of their child and 2) children's body shape perception of themselves. Binomial logistic regression analyses were used to identify predictors of 1) maternal accuracy of children's body shape and 2) children's accuracy of their body shape. Univariate logistic regressions were performed to explore relationships between the dependant variable (i.e. inaccurate and accurate

perceptions) and all independent variables of interest including children's (sex, age, and BMI z-score) and mothers' (age, BMI, immigration status, household income, and highest education level) characteristics. Next, binary logistic regressions models were adjusted for significant univariate predictors at $p < 0.10$ which lead to odds ratio (OR) and 95% confidence intervals predicting the likelihood of mothers (**Table 5.5**) and children (**Table 5.6**) misperceiving the child's body shape.

4.5.2 To determine the relationships between body shape perception and physical activity in children (*Objective 2*).

Frequencies and percentages of days spent being physically active (≥60min/day) per week by children are presented in **Table 7.1** for the total sample as well as by the child's sex, immigration status, household income, body shape perception, and body shape perception accuracy. Means and standard deviations of the child's age and BMI z-score are presented in **Table 7.2** for subgroups of days spent being physically active (≥60min/day) per week. Chi-square tests (categorical variables) and independent-samples *t*-test (continuous variables) were conducted to assess whether differences existed for days spent being physically active (≥60min/day) in a week. Binomial logistic regression analyses were used to identify predictors of children completing more than 60 minutes of physical activity per day for at least 4 days per week. Next, binomial logistic regression models were adjusted for significant univariate predictors at $p < 0.10$ which lead to odds ratio and 95% confidence intervals predicting the likelihood of children completing more than 60 minutes of physical activity per day for at least 4 days per week. Since both "body shape perception" and "body shape perception accuracy" were significant predictors, 2 models are presented (**Table 7.3**).

4.5.3 To determine the relationships between body shape perception and screen time in children (*Objective 3*).

Frequencies and percentages of hours per day spent 1) watching television/videos or playing video games by children (**Table 7.4**) and 2) being on a computer (**Table 7.6**) are presented for the total sample as well as by child's sex, immigration status, household income, body shape perception, and body shape perception accuracy. Means and standard deviations of child's age and BMI z-score are presented for subgroups of hours per day spent watching television/videos or playing video games (**Table 7.5**) and being on a computer (**Table 7.7**). Chi-square tests (categorical variables) and one-way ANOVAs (continuous variables) were conducted to assess whether differences existed for hours per day spent watching television/videos or playing video games and being on a computer. Univariate regressions were performed to explore relationships between the dependant variables (i.e. none or < 1hr/day, 1-2hr/day, and > 3hr/day for both time spent watching television/videos or playing video games and being on a computer) and all independent variables of interest including child's sex, child's age, child's BMI z-score, immigration status, household income, body shape perception, and body shape perception accuracy. Next, ordinal logistic regression models were adjusted for significant univariate predictors at $p < 0.15$ which lead to odds ratio and 95% confidence intervals predicting children's hours per day spent 1) watching television/videos or playing video games and 2) being on a computer (**Table 7.8**).

4.5.4 To determine the influence of body shape perception of children on parental feeding practices (*Objective 4*).

Medians and interquartile ranges for subscales of the Child Feeding Questionnaire are presented in **Table 6.2**. Mann-Whitney U tests were run to determine if there were significant differences in the use of maternal feeding practices between different subgroups including child's sex, immigrations status, body shape perception, and body shape perception accuracy.

Kruskal-Wallis H tests were run to determine if there were significant differences in levels of maternal feeding practices between body shape perception categories. Subsequently, when significant differences were found with Kruskal-Wallis H tests, pairwise comparisons were used to determine where the differences occurred between the groups.

Chapter 5 – Rates and Predictors of Body Shape Misperception in Black Immigrant Children and Their Mothers

The following article will be submitted to the *Body Image* journal is included in the present chapter. The authors are Ashley Gunter, Rosanne Blanchet, Jeffrey Jutai, Dia Sanou, Malek Batal, and Isabelle Giroux. This article will aim to determine and compare the perceptions of mothers and children of the child's body shape (*Objective 1*). In addition, predictors of rates of body shape misperception are explored.

Abstract

The main objectives of this study were to compare mothers and children's perceptions of the child's body shape and to determine the predictors of body shape misperception. A structured interview was completed with 259 mother-school aged children dyads. Mothers were Canadian-born or immigrants from Sub-Saharan Africa or the Caribbean. A total of 46.3% of mothers and 50.0% of children misperceived the child's body shape with a tendency to underestimate. The highest rates of misperception were found in overweight and obese children and their mothers with 76.9% of children and 78.8% of mothers misperceiving the child's body shape. Factors such as children's age, mothers' BMI, and immigrant status were found to influence rates of misperception in children. All in all, misperception of the child's body shape was frequent among mothers and children which could be indicative of a lack of awareness of childhood overweight and obesity.

Keywords: Body shape perception, Black immigrants, Children, Mothers

5.1 Introduction

Obesity has been identified as a multifactorial problem and global public health crisis (Roberts et al., 2012). It has been estimated that nearly one third (31.5%) or roughly 1.6 million of 5 to 17 year olds in Canada are overweight (19.8%) or obese (11.7%) (Roberts et al., 2012). Excessive weight gain can lead to negative health outcomes which were previously uncommon in children, such as heart disease, type 2 diabetes, hypertension, and cancer, (Edmunds et al., 2001). The social stigmatization also associated with childhood overweight and obesity can lead to teasing, rejection, and isolation from peers which can result in a lasting negative impact on the self-esteem and body image of children (Koplan, Liverman, & Kraak, 2005). Increases in the prevalence of overweight and obesity are more prevalent in Westernized and economically developed countries which places North American immigrants at greater risk of excessive weight gain (Hurley et al., 2011; Lobstein et al., 2004). Among ethnic minority groups, Black immigrants are amid the most at risk of becoming overweight and obese (Adhikari & Sanou, 2012; Lutfiyya et al., 2008; Sankofa & Johnson-Taylor, 2007).

An important step in preventing future excessive weight gain in children is to help families accurately perceive their children's weight since parents who do not recognize a problematic weight may not feel an intervention to be worthy (Jeffery et al., 2014; Maynard et al., 2003; Oude Luttikhuis et al., 2010). Moreover, accurate perception has been linked to positive weight control behaviours and healthy lifestyle changes as a result of increased motivation (Edwards et al., 2010; Foti & Lowry, 2015; Rhee et al., 2005). However, misperception is prevalent with the greatest misperception of weight found in parents of overweight and obese children with a tendency to underestimate (Etelson et al., 2003; Sarafrazi et al., 2014; Tremblay, Rinaldi, Lovsin, et al., 2012). A recent meta-analysis found that 62.4%

of parents inaccurately identified their overweight or obese child as having a normal weight status (Rietmeijer-Mentink et al., 2013). Comparable trends were found in a Canadian study which concluded that 77% of overweight and obese children were inaccurately perceived by their parents with only a 16% misperception rate among parents of normal weight children (Mathieu et al., 2010). Similarly to their parents, previous studies have shown that children have a lack of body shape awareness with the majority of children tending to underestimate their size (Chaimovitz et al., 2008; Hussin et al., 2011; Truby & Paxton, 2002). Underestimation was also found to be most prevalent among overweight and obese children (Maximova et al., 2008). For instance, a study found that 76.0% of overweight and 41.9% of obese children believed they were normal weight (Sarafrazi et al., 2014). In addition, differences in rates of misperception have been observed based on parents and children's ethnicity (He & Evans, 2007; Remmers et al., 2014). Studies have found that parents of ethnic minorities have a tendency to perceive their children to be slimmer than their actual size (Killion et al., 2006; Myers & Vargas, 2000). Contradictory to the Westernized ideology on overweight and obesity, cultural values of many ethnic minorities value plumpness as a sign of beauty, health, and prosperity (Tiggemann, 2012).

The prevalence of misperception may be attributable to desensitisation to excessive weight as a result of a large portion of individuals in Westernized societies considered overweight (Jeffery et al., 2005). Certain parents also believe that excessive weight is a common transition phase during childhood (Jeffery, Voss, Metcalf, Alba, & Wilkin, 2005; Shrewsbury et al., 2012). Since parents play a front line role in creating environments which are obesogenic or supporting of healthy lifestyle choices (Francis, Hofer, & Birch, 2001), a promising approach to prevent future excessive weight gain in children is for parents to achieve accurate perception of their children's weight status (Shrewsbury et al., 2012; Towns & D'Auria, 2009; Yilmaz et al.,

2013). Therefore, understanding parents' perceptions of their children's body shape is of great importance seeing as parents who do not recognize their child's problematic weight may not feel an intervention to be worthy (Carnell, Edwards, Croker, Boniface, & Wardle, 2005; Jeffery et al., 2014; Oude Luttikhuis et al., 2010).

This study aimed to compare mothers and children's perceptions of children's body shape. More specifically, it was hypothesized that overweight and obese children would underestimate the child's body shape. Furthermore, in line with the literature, predictors of body shape misperception for mothers and children were further investigated.

5.2 Methodology

5.2.1 Participants

This study was part of a larger study which examined the determinants of eating habits and weight status of Black school-aged immigrant children in Ottawa. Participants were recruited from January 2014 to April 2015 and recruitment was based on a convenience sampling method. Participants were recruited mostly by team members during community events, religious gatherings, etc., and through various outlets such as word of mouth, community organisations, and ethnocultural associations. A total of 259 mother-child dyads were recruited (only one child per household was eligible to participate). A total of 242 mother-child dyads were included in the present study; one dyad was excluded since the child was adopted, three dyads were excluded because they were father-child dyads, and thirteen mother-child dyads were excluded due to missing data. Similar to Shrewsbury and colleagues (2012), data from the father-child dyads were removed for analyses which assessed parental body shape perception of the child since males and females were found to have different bodily perceptions. The overall sample of children included 133 girls (55.0%) and 109 boys (45.0%). The children were school-

aged ranging in age from 6 to 12 years (*M* = 9.1 years, *SD* = 1.9 years), living in Ottawa, Canada. The majority of children were from immigrant families with the mothers originating from Sub-Saharan Africa and the Caribbean (n=177; 73.1%). For comparison purposes, children from families with mothers originating from Canada (n=65; 26.9%) were also recruited. A total of 162 mothers (66.9%) reported living in a two-parent household while 80 (33.1%) reported being a single mother.

5.2.2 Procedure

Data were collected during face-to-face nutritional interviews with the mother-child dyad and were conducted either in English or in French by a dietitian and with the help of a research assistant, when possible. The mother was interviewed using a standardized approach by the dietitian and answered questions which included general demographic details and body shape perception of their child. The child was asked about his or her body shape perception. Following completion of the survey, mother-child dyads received a $25 grocery gift card as compensation for their time and costs associated with participation in the study. This study was reviewed and approved by the University of Ottawa Research and Ethics Board. All participants, including mothers and children, provided written informed consent and assent, respectively, prior to data collection.

5.2.3 Measures

5.2.3.1 Weight & Height Measurements

Before measurements were taken, mothers and children were asked to remove their shoes and any heavy clothing. Weight measurements of the participants were collected by the dietitian and research assistant using a calibrated, standardized digital scale and recorded in pounds to the nearest 0.01 lb. Height measurements were taken using a portable stadiometer and were

recorded in centimeters to the nearest 0.1 cm. All anthropometric measurements were done in duplicates to increase measurement reliability. For adults, body mass index (BMI; kg/m^2) is a widely used tool to grossly estimate body composition and overall health status (Health Canada, 2011). BMI was calculated for the mothers by dividing their weight in kilograms (kg) by their respective height in meters squared (m^2). For the children, the World Health Organization (WHO) Growth Charts for Canada, adapted through a collaboration led by the Dietitians of Canada were used (Dietitians of Canada, 2015). Children's height and weight measurements were transformed into BMI-for-age-and-sex z-scores using WHO AnthroPlus (WHO, 2009). The age- and sex-specific cut-offs according to the WHO Growth Charts for Canada (2015) were used.

5.2.3.2 Body Shape Perception

Sex specific figure rating scales with a total of eight silhouettes ranging from underweight to obese were used to determine body shape perception (Stevens et al., 1999). The drawings were similar to the widely used Stunkard's Figure Rating Scale (Stunkard et al., 1983) but were adapted to be age appropriate for this particular population (Stevens et al., 1999). The children were instructed to choose a silhouette to best represent their perception of their current body shape on a sex-specific scale. The mothers were also instructed to choose a silhouette to best represent their perception of their child's current body shape. These measures were used to assess the mother's and child's perception of the child's body shape as well as their accuracy in comparison to the child's BMI z-score weight category.

To further analyse body shape perception, the eight silhouettes were collapsed to create 4 weight categories, namely underweight (silhouettes #1 and #2), normal weight (silhouettes #3 and #4), overweight (silhouettes #5 and #6), and obese (silhouettes #7 and #8). The silhouette

classification we used is identical to an American study which further modified the silhouettes to resemble African American children (Sherwood et al., 2003). In addition, this classification is similar to that of two previous studies which used Stunkard Figure Rating Scale to assess body shape perception (Bhuiyan et al., 2003; Lynch et al., 2009). Body shape perception accuracy was assessed by comparing body shape perception using the silhouettes and BMI z-scores grouped into BMI classification categories. Misperception or inaccurate perception was indicative that the perceived body shape was in a different weight category than the measured BMI category. An accurate perception was when both the perceived body shape and measured BMI fell into the same body weight category.

5.2.3.3 Predictors of Body Shape Misperception

Evidence exists that certain factors have been found to increase the likelihood of mothers and children misperceiving the child's body shape. Based on results from prior studies, multiple factors have been shown to influence rates of body shape perception accuracy, such as child's age (Carnell et al., 2005; He & Evans, 2007; Rhee et al., 2005), sex (Martin et al., 2009; Sarafrazi et al., 2014; Shrewsbury et al., 2012; Yilmaz et al., 2013), and weight status (He & Evans, 2007; Maximova et al., 2008; Rietmeijer-Mentink et al., 2013), as well as ethnicity (Martin et al., 2009; Remmers et al., 2014; Towns & D'Auria, 2009), parental education level (Adams, Quinn, & Prince, 2005; Binkin, Spinelli, Baglio, & Lamberti, 2013; Jansen & Brug, 2006), household socioeconomic status (Chen & Wang, 2012; He & Evans, 2007; Jain et al., 2001), and maternal weight status (Boutelle et al., 2004; Doolen et al., 2009; Dowd, Kirwan, Hannigan, Purtill, & O'Gorman, 2015). Due to conflicting results, further research is warranted to investigate the influences of the factors influencing the risk of body shape misperception.

5.2.4 Analytic Plan

All statistical analyses were performed using the SPSS Statistics for Windows Software, Version 23.0 with an alpha level of $p < 0.05$ considered significant for all analyses. Means and standard deviations as well as prevalence rates and percentages were computed to describe the general characteristics of the sample for both mothers and children as well as separately for inaccurate and accurate body shape perceptions (**Table 5.1** and **Table 5.2**). Univariate analyses were conducted to determine if differences existed between these subgroups (i.e. inaccurate and accurate perceptions) for both mothers and children with chi-square tests for categorical variables and independent samples *t*-tests for continuous variables. Children's weight categories were then cross-tabulated with 1) mothers' body shape perception of their child (**Table 5.3**) and 2) children's body shape perception of themselves (**Table 5.4**). Finally, binary logistic regressions models were adjusted for significant univariate predictors which lead to odds ratio (OR) and 95% confidence intervals predicting the likelihood of mothers (**Table 5.5**) and children (**Table 5.6**) misperceiving the child's body shape.

5.3 Results

5.3.1 Mothers' and Children's Characteristics

Descriptive characteristics of the study population are presented for the mothers in **Table 5.1** and for the children in **Table 5.2**. Descriptive characteristics are presented overall for the study population and by body shape perception accuracy (i.e. inaccurate and accurate perceptions) for both mothers and children.

Table 5.1 General characteristics of mothers

	Total sample (n=242)		**Inaccurate body shape perception**[1] (n=112)		**Accurate body shape perception**[2] (n=130)	
Characteristics	Mean	SD	Mean	SD	Mean	SD
Age (years)	39.06	6.02	38.73	6.13	39.35	5.94
BMI (kg/m^2)[3]	29.49	6.24	30.52*	6.36	28.61*	6.01
Immigrant status	Frequency	%	Frequency	%	Frequency	%
Immigrant	177	73.1	91**	81.3	86**	66.2
Non-immigrant	65	26.9	21**	18.7	44**	33.8
Household income	Frequency	%	Frequency	%	Frequency	%
< $30,000	84	34.7	39	34.8	45	34.6
$30,000-$60,000	49	20.2	25	22.3	24	18.5
$60,000-$100,000	43	17.8	16	14.3	27	20.8
> $100,000	43	17.8	22	19.6	21	16.2
Missing Data	23	9.5	10	8.9	13	10.0
Education level[4]	Frequency	%	Frequency	%	Frequency	%
Low	32	13.2	18	16.1	14	10.8
Mid-low	97	40.1	46	41.1	51	39.2
Mid-high	79	32.6	30	26.8	49	37.7
High	34	14.0	18	16.1	16	12.3

[1] Inaccurate body shape perception: mothers' perceived body shape of their child ≠ child's measured BMI weight category.

[2] Accurate body shape perception: mother's perceived body shape of their child = child's measured BMI weight category.

[3] n=234 due to missing data.

[4] **Low** = high school diploma, equivalency certificate or less; **mid-low** = trade certificate/diploma, college, Cegep or other non-university certificate/diploma; **mid-high** = university certificate/diploma below the bachelor's level or bachelor's degree; **high** = university certificate/degree above the bachelor's level. Highest level of education obtained regardless of country and whether participant is presently completing the mentioned degree.

Significant difference between subgroups of inaccurate and accurate perceptions at *$p < 0.05$ and **$p < 0.01$ using independent-samples *t*-tests for continuous variables and chi-square tests for categorical variables.

Independent-samples *t*-tests were conducted to determine if differences existed between body shape perception accuracy and maternal characteristics (continuous variables). Mothers who inaccurately perceived their child's body shape had a higher BMI ($M = 30.52$ kg/m^2, SD =

6.36) than mothers who accurately perceived their child's body shape (M = 28.61 kg/m^2, SD = 6.01), a significant difference (M = -1.91, 95% CI [-3.51, -0.32], t (232) = -2.36, p < 0.05). Mother's age was not significantly different based on their body shape perception accuracy of their child (M = 0.61, 95% CI [-0.92, 2.14], t (240) = 0.79, p = 0.432). Chi-square tests for association were conducted between maternal body shape perception accuracy and maternal characteristics (categorical variables). There was a significant association between maternal body shape perception accuracy and immigrant status (χ^2 (1) = 7.00, p < 0.01). Household income (χ^2 (4) = 2.35, p = 0.671) and mothers' education level (χ^2 (3) = 4.13, p = 0.248) were not significantly associated with mothers' body shape perception accuracy of their child.

Table 5.2 General characteristics of children

	Total sample (n=242)		**Inaccurate body shape perception**[1] (n=121)		**Accurate body shape perception**[2] (n=121)	
Characteristic	Mean	SD	Mean	SD	Mean	SD
Age (years)	9.11	1.95	8.78*	1.82	9.44*	2.02
BMI z-score	0.82	1.21	1.38**	1.23	0.26**	0.89
Characteristics	Frequency	%	Frequency	%	Frequency	%
Sex						
Girl	133	55.0	65	53.7	68	56.2
Boy	109	45.0	56	46.3	53	43.8
Immigrant Status[3]						
Immigrant	177	73.1	100**	82.6	77**	63.6
Non-immigrant	65	26.9	21**	17.4	44**	36.4

[1] Inaccurate body shape perception: children's perceived body shape ≠ child's measured BMI weight category.

[2] Accurate body shape perception: child's perceived body shape = child's measured BMI weight category.

[3] Immigrant status is derived from whether the child's mother immigrated to Canada or was born in Canada.

Significant difference between subgroups of inaccurate and accurate perceptions at *p < 0.01 and **p < 0.001 using independent-samples *t*-tests for continuous variables and chi-square tests for categorical variables.

Independent-samples *t*-tests were conducted to determine if differences existed between body shape perception accuracy and children's characteristics (continuous variables). Children who inaccurately perceived their body shape were younger (M = 8.78 years, SD = 1.82) than children who accurately perceived their body shape (M = 9.44 years, SD = 2.02), a significant difference (M = 0.66, 95% CI [0.17, 1.15], t (240) = 2.67, p < 0.01). Children who inaccurately perceived their body shape had a higher BMI z-score (M = 1.38, SD = 1.23) than children who accurately perceived their body shape (M = 0.26 years, SD = 0.89), a significant difference (M = -1.11, 95% CI [-1.38, -0.84], t (240) = -8.01, p < 0.001). Chi-square tests for association were conducted between children's body shape perception accuracy and children's characteristics (categorical variables). There was a significant association between children's body shape perception accuracy and immigrant status (χ^2 (1) = 11.13, p < 0.001) while child's sex was not significantly associated with children's body shape perception accuracy (χ^2 (1) = 0.15, p = 0.698).

5.3.2 Mothers' and Children's Body Shape Perception of the Child

Figure 5.1 shows the distribution of the frequencies of silhouettes selected by both mothers and children. When mothers were asked about how they perceived their child's body shape based on the sex-specific figure rating scale (Stevens et al., 1999), the most frequently selected silhouette was #4 for a total of 34.3% of mothers. Overall, silhouettes #3, #4, and #5 were the most frequently selected and accounted for 81.8% of responses. The silhouettes on both extremes accounted for the least amount of responses; 10.3% for silhouettes #1 and #2 and 0.8% for silhouettes #7 and #8. Very similar trends were found for children's perception of their

body shape. The most frequently selected silhouette for children was also #4 for a total of 42.1% of children with silhouettes #3, #4, and #5 accounting for 83.0% of responses from children. For both extremes, silhouettes #1 and #2 totalled 7.8% of responses and silhouettes #7 and #8 only 0.4%.

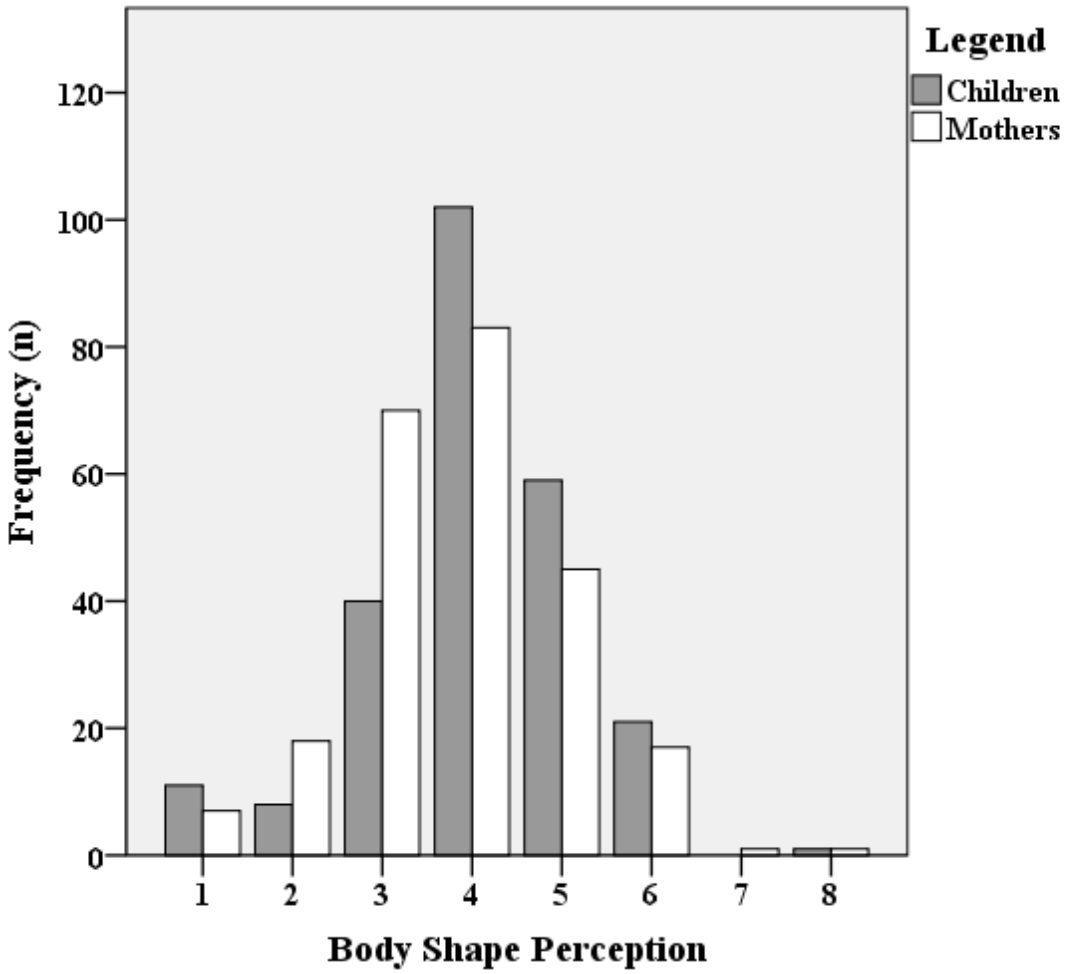

Figure 5.1 Distribution of the frequencies of silhouettes selected by mothers and their child to represent the child's body shape (n=242)

5.3.3 Mothers' and Children's Perceptions and Children's Measured BMI

Figure 5.2 compares children's measured BMI categories to the mothers' perceived body shape of their child. The children's measured weight categories (i.e. 0.4% underweight, 56.6% normal weight, 24.0% overweight, and 19.0% obese) were different than the mothers' perception of their child's body shape (i.e. 10.3% underweight, 63.2% normal weight, 25.6% overweight, and 0.8% obese).

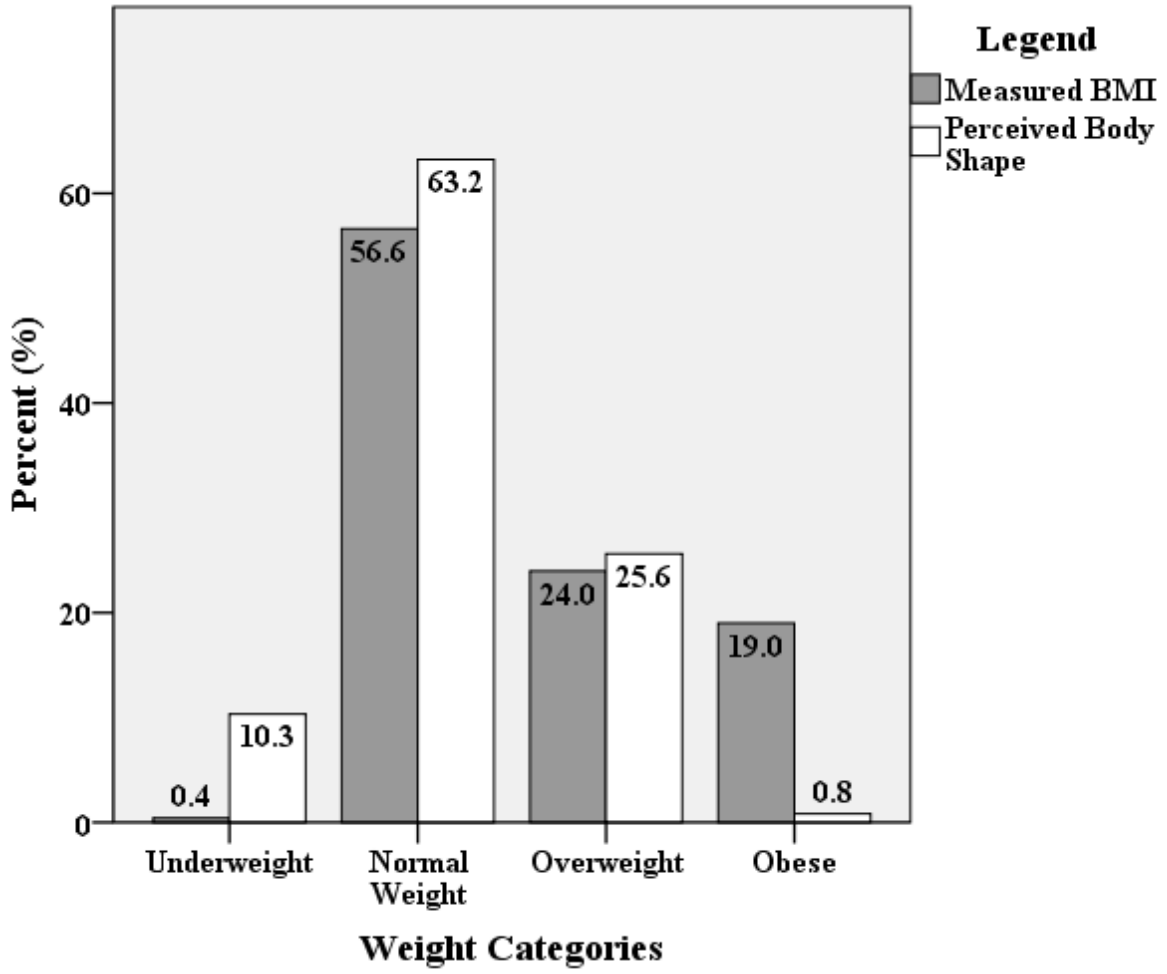

Figure 5.2 Children's weight categories by measured BMI and mothers' body shape perception of their child (n=242)

Figure 5.3 compares children's measured BMI categories to their perceived body shape. The children's measured weight categories (i.e. 0.4% underweight, 56.6% normal weight, 24.0% overweight, and 19.0% obese) were different than the children's perception of their body shape (i.e. 7.9% underweight, 58.7% normal weight, 33.1% overweight, and 0.4% obese).

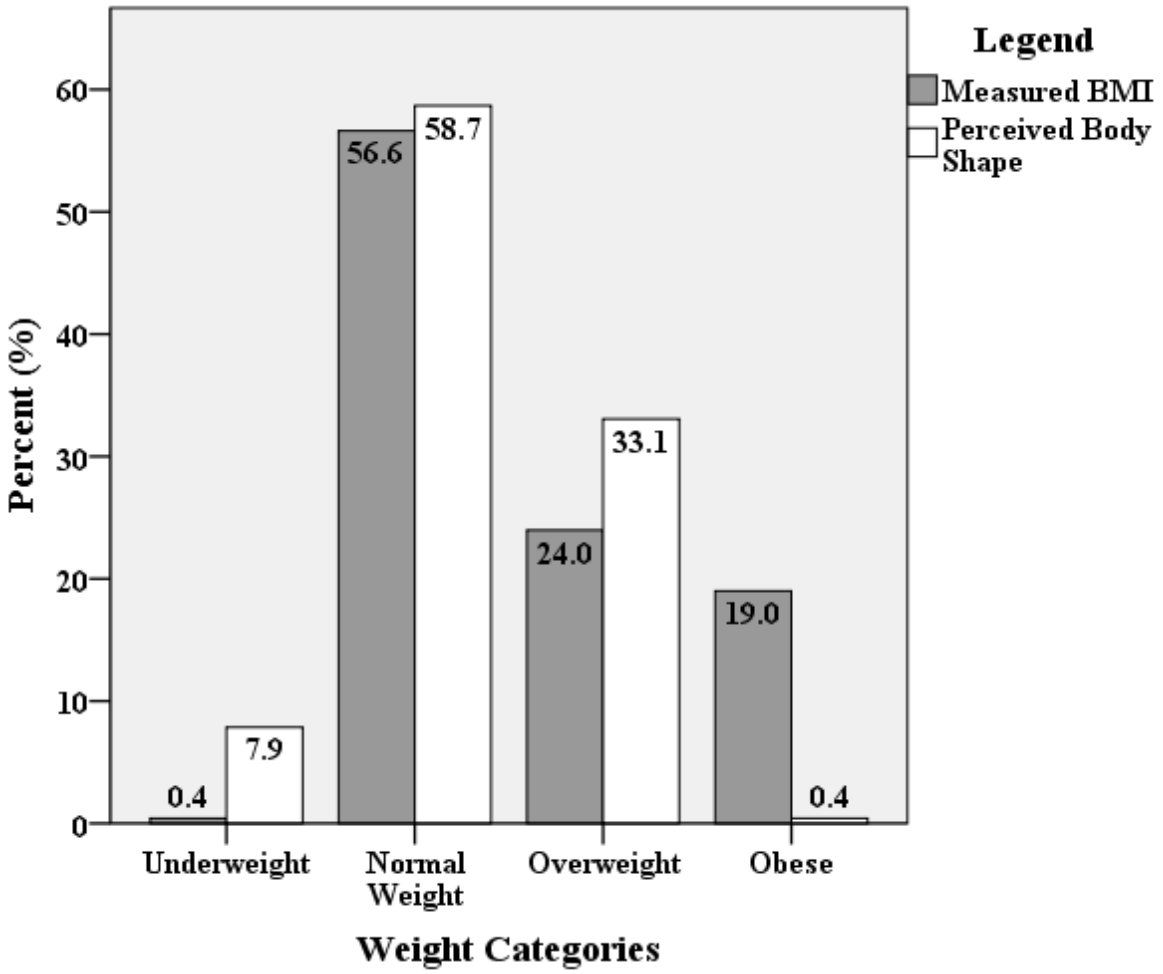

Figure 5.3 Children's weight categories by measured BMI and children's body shape perception of themselves (n=242)

Table 5.3 Summary of maternal perception of children's body shape compared with children's measured weight status (n=242)

	Maternal Body Shape Perception				
Immigrant	Underweight	Normal Weight	Overweight	Obese	**Total**
Measured Weight Categories[1]					
Underweight	1	0	0	0	1
Normal Weight	18	67	6	0	91
Overweight	1	25	16	0	42
Obese	0	9	32	2	43
Total (n)	20	101	54	2	177
Non-Immigrant	Underweight	Normal Weight	Overweight	Obese	**Total**
Measured Weight Categories[1]					
Underweight	0	0	0	0	0
Normal Weight	5	40	1	0	46
Overweight	0	12	4	0	16
Obese	0	0	3	0	3
Total (n)	5	52	8	0	65

[1]Children's measured weight categories are based on BMI z-score cut-offs of the WHO growth charts, adapted for Canada (Dietitians of Canada, 2015).

[2] Numbers in grey boxes indicate that the body shape perception matched the measured weight categories for those participants. Numbers over the grey boxes indicate an over-estimation of child's weight category, whereas the numbers under the grey boxes indicate an underestimation.

Table 5.3 presents the cross-tabulation of mothers' body shape perception of their child in comparison to the child's measured BMI category. Intraclass-correlations were used to determine the degree of agreement between the mothers' body shape perception of their child and the children's measured weight category. There was good agreement for immigrants (ICC = 0.62, 95% CI [0.49, 0.72], $p < 0.001$) and moderate agreement for non-immigrants (ICC = 0.60, 95% CI [0.34, 0.75], $p < 0.001$). In total, 51.4% of immigrant

mothers and 32.3% of non-immigrant mothers misperceived their child's body shape. For overweight and obese children, 78.8% of immigrant mothers and 78.9% of non-immigrant mothers of overweight and obese children underestimated their child's body shape. A chi-square test revealed significant differences in rates of accuracy of body shape perception between immigrant and non-immigrant mothers' (χ^2 (1) = 7.00, $p < 0.01$) with immigrant mothers having a higher rate of body shape misperception.

Table 5.4 Summary of children's perception of their body shape compared with their measured weight status (n=242)

			Children Body Shape Perception		
Immigrant	Underweight	Normal Weight	Overweight	Obese	**Total**
Measured Weight Categories[1]					
Underweight	0	1	0	0	1
Normal Weight	12	59	20	0	91
Overweight	2	23	17	0	42
Obese	0	11	31	1	43
Total (n)	14	99	69	1	177
Non-Immigrant	Underweight	Normal Weight	Overweight	Obese	**Total**
Measured Weight Categories[1]					
Underweight	0	0	0	0	0
Normal Weight	5	38	3	0	46
Overweight	0	10	6	0	16
Obese	0	0	3	0	3
Total (n)	5	48	12	0	65

[1] Children's measured weight categories are based on BMI z-score cut-offs of the WHO growth charts, adapted for Canada (Dietitians of Canada, 2015).

[2] Numbers in grey boxes indicate that the body shape perception matched the measured weight categories for those participants. Numbers over the grey boxes indicate an over-estimation of child's weight category, whereas the numbers under the grey boxes indicate an underestimation.

Table 5.4 presents the cross-tabulation of children's body shape perception of themselves in comparison to the children's measured weight category. Intraclass-correlations were used to determine the degree of agreement between the children's body shape perception of themselves and the children's measured weight category. There was moderate agreement for immigrants (ICC = 0.50, 95% CI [0.32, 0.63], $p < 0.001$) and good agreement for non-immigrants (ICC = 0.63, 95% CI [0.40, 0.78], $p < 0.001$). In total, 56.5% of immigrant children and 32.3% of non-immigrant children misperceived their body shape. For overweight and obese children, 78.8% of immigrant children and 68.4% of non-immigrant children underestimated their body shape. A chi-square test revealed significant differences in rates of accuracy of body shape perception between immigrant and non-immigrant children (χ^2 (1) = 11.13, $p < 0.001$) with immigrant children having a higher rate of body shape misperception.

5.3.4 Predictors of Maternal Body Shape Misperception

Univariate analyses were performed to explore relationships between body shape perception accuracy and all factors of interest including children's (sex, age, and BMI z-score) and mothers' (age, BMI, immigration status, household income, and highest education level) characteristics; significant predictors at $p < 0.1$ were included in the model. A binomial logistic regression was conducted to predict the likelihood of mothers misperceiving their child's body shape using significant predictors of the univariate analyses which included child's BMI z-score, mother's BMI, and immigration status (**Table 5.5**).

Table 5.5 Odds ratio (95% CI) in the logistic regression predicting the likelihood of maternal misperception of their child's body shape (n=234)[1]

	OR[2]	95% CI	p
Child's BMI z-score	2.37	1.76-3.19	< 0.001
Mother's BMI	0.97	0.95-1.05	0.965
Immigration status			
Immigrant	1.61	0.84-3.10	0.153
Non-immigrant	1.00		

[1] A total of 8 mothers' had missing data for their BMI status.

[2] OR: Odds ratio adjusted for all other variables in the model. CI: Confidence intervals. BMI: Body mass index.

The binomial logistic regression model was significant (χ^2 (3) = 52.50, $p < 0.001$) and explained 26.9% (Nagelkerke R^2) of the variance in maternal misperception of their child's body shape. The model without predictors accurately predicted body shape misperception 53.8% of times while the model with predictors increased accuracy to 73.9%. Of the 3 predictors included in the final model, only 1 was significant: child's BMI z-score. Mothers with children of a higher BMI z-score had a greater likelihood of misperceiving their child's body shape (OR = 2.37, 95% CI [1.76-3.19], $p < 0.001$).

5.3.5 Predictors of Children's Body Shape Misperception

Univariate analyses were performed to explore relationships between body shape perception accuracy and all factors of interest including children's (sex, age, and BMI z-score) and mothers' (age, BMI, immigration status, household income, and highest education level) characteristics; significant predictors at $p < 0.1$ were included in the model. A binomial logistic regression was conducted to predict the likelihood of children misperceiving their body shape using significant predictors of the univariate analyses which included child's age, child's BMI z-score, mother's BMI, and immigration status (**Table 5.6**).

Table 5.6 Odds ratio (95% CI) in the logistic regression predicting the likelihood of children's body shape misperception (n=234)[1]

	OR[2]	95% CI	p
Child's Age	0.80	0.68-0.94	< 0.01
Child's BMI z-score	2.40	1.75-3.29	< 0.001
Mother's BMI	1.05	1.00-1.11	< 0.05
Immigration Status			
Immigrant	2.32	1.16-4.65	<0.01
Non-immigrant	1.00		

[1] A total of 8 mothers' had missing data for their BMI status.

[2] OR: Odds ratio adjusted for all other variables in the model. CI: Confidence intervals. BMI: Body mass index.

The binomial logistic regression model was significant (χ^2 (4) = 72.88, $p < 0.001$) and explained 35.7% (Nagelkerke R^2) of the variance in children's body shape misperception of themselves. The model without predictors accurately predicted body shape misperception 50.4% of times while the model with predictors increased accuracy to 74.4%. All 4 predictors included in the final model were significant. Older children had a lesser likelihood of misperceiving their body shape (OR = 0.80, 95% CI [0.68-0.94], $p < 0.01$) while children with a higher BMI z-score had a higher likelihood of misperceiving their body shape (OR = 2.40, 95% CI [1.75-3.29], p <

0.001). Children of mothers with a higher BMI had a greater likelihood of misperceiving their body shape (OR = 1.05, 95% CI [1.00-1.11], $p < 0.05$). Finally, immigrant children had a higher likelihood of misperceiving their body shape (OR = 2.32, 95% CI [1.16-4.65], $p < 0.01$).

5.4 Discussion

The present study aimed to compare mothers' and children's body shape perceptions to children's measured weight status to determine rates of accurate and inaccurate perceptions. Predictors of body shape misperception for mothers and children were also investigated. Findings from this study are important since no study to our knowledge explored body shape perception in a sample of predominantly Black immigrant mother-child dyads in Canada. Nevertheless, our findings showed that body shape misperception seemed to be more prevalent in Black immigrants in comparison to Canadian born. In addition, the highest rates of misperception were found in overweight and obese children and their mothers; which confirms our hypothesis.

Body shape misperception was found for both mothers and children with a total of 46.3% of mothers (n=112) and 50.0% of children (n=121) misperceiving. More precisely, for mothers and children who inaccurately perceived, underestimation accounted for 93.8% (n=105) and 80.2% (n=97), respectively. Likewise, this trend was reported by other studies which looked at the direction of parents' and children's rates of misperception and determined a predominance toward underestimation (Chaimovitz et al., 2008; Etelson et al., 2003; Hussin et al., 2011; Sarafrazi et al., 2014; Tremblay et al., 2012). Underestimation was predominant in overweight and obese children in our study with the majority of these children and their mothers misperceiving. More precisely, for overweight and obese children, 76.9% of children (n=80) and 78.8% (n=82) of their mothers underestimated the child's body shape. Therefore only 23.1%

(n=24) of overweight and obese children and 21.2% of their mothers (n=22) accurately identified the child's body shape. Maternal rates of misperception for overweight and obese children were higher than those of a recent meta-analysis which found that 62.4% of parents inaccurately identified their overweight or obese children as having a normal weight status (Rietmeijer-Mentink et al., 2013). A higher rate of maternal misperception could have been found in our study since our sample was predominantly composed of Sub-Saharan African and Caribbean immigrants (73.1% or n=177) and parents of ethnic minorities have been found to have a higher tendency to misperceive body shape (He & Evans, 2007; Killion et al., 2006; Remmers et al., 2014). Moreover, children and adolescents of ethnic minorities have also been found to perceive themselves thinner than their actual weight based on Western standards (Daniels, 2005; Martin et al., 2009; Sarafrazi et al., 2014).

In further comparing immigrants and non-immigrants, higher rates of misperception were found for immigrant mothers and children. A total of 51.4% of immigrant mothers misperceived their child's body shape with only 32.3% for non-immigrant mothers. Similarly for children, 56.5% of immigrant children and 32.3% of non-immigrant children misperceived their body shape. In line with findings from our study, Killion et al. (2006) found that parents of ethnic minorities believed that their child was thinner than their actual size and roughly two-thirds of mothers with children $\geq 85^{th}$ percentile were satisfied with their child's size or even wanted their child to be heavier. Killion et al. (2006) proposed that this was an indication that a cultural norm for a larger body size was desirable for low-income African-Americans and Hispanics. It has also been found that in certain developing countries such as Sub-Saharan Africa, being overweight and obese is seen as good health and not as a disease (Renzaho, 2004). More precisely, many countries that are less socioeconomically developed value plumpness as an

indication of beauty, health, fertility, and prosperity which is contradictory to the current Westernized ideology on overweight and obesity (Tiggemann, 2012). A Canadian study also found that children living in environments with overweight and/or obese parents and classmates have a higher risk of underestimating their own weight status (Maximova et al., 2008). Similarly, our study found that children of mothers with a higher BMI were more likely to misperceive their body shape compared to children of leaner mothers. Furthermore, in comparing rates of overweight and obesity in our sample, 77.92% of immigrant mothers (n=138) and only 55.4% of non-immigrant mothers (n=36) were classified as overweight or obese. The greater rate of overweight and obesity in our immigrant sample might have contributed to the desensitization to excessive weight which could help to explain the higher rate of misperception found among immigrant mothers and children. Therefore, the prevalence of underestimation in our Black immigrant sample might be attributable to cultural differences in acceptance of larger body sizes and/or possibly to a lack of awareness as a result of higher rates of overweight and obesity in individuals of this particular group.

In evaluating predictors of mothers' likelihood of misperceiving their child's body shape, our study showed that mother's BMI and immigrant status were independently associated with maternal body shape perception. Mothers who inaccurately perceived their child's body shape had a higher BMI status than mothers who accurately perceived their child's body shape. These findings regarding mother's BMI status and body shape perception were in line with studies by Boutelle et al. (2004) and Doolen et al. (2009). Similarly to previous studies, our study also found that immigrant mothers were more likely to misperceive their child's body shape (He & Evans, 2007; Killion et al., 2006; Remmers et al., 2014). Maternal misperception was not associated with mother's highest education level and annual household income. Previous studies

investigating education and socioeconomic status differences have yielded conflicting results in this regard. Certain studies found that lower levels of parental education were associated with higher rates of parental body shape misperception (Binkin et al., 2013; Eckstein et al., 2006; Remmers et al., 2014), while others reported no significant associations (Carnell et al., 2005; He & Evans, 2007; Wilma Jansen & Brug, 2006). Socioeconomic status as it relates to body shape perception has not be widely studied but a Canadian study found no association between parental misperception and household income (He & Evans, 2007).

Child's age was not significantly associated with rates of maternal misperception of their child's body shape ($p=0.3$, data not presented). Certain studies have found children's age to not significantly impact parental rates of misperception (Baughcum, Chamberlin, Deeks, Powers, & Whitaker, 2000; Boutelle et al., 2004; He & Evans, 2007), while other studies have found that parents of younger children have poor awareness of their child's body shape (Baughcum et al., 2000; Oude Luttikhuis et al., 2010). We hypothesized that child's age was not associated with rates of maternal perception in our study since most studies which reported child's age as a significant predictor had samples with children younger than the present sample which had a mean age of 9.1 years. For instance, a recent meta-analysis compared children aged 2-6 years with older children and found that misperception was higher in parents of children aged 2-6 years (Rietmeijer-Mentink et al., 2013). The misperception of children's body shape by parents according to sex is controversial. Certain studies have found no differences when comparing rates of misperception of parents of boys and girls (West et al., 2008; Yilmaz et al., 2013; Young-Hyman et al., 2000) whereas other studies have found differences (Boutelle et al., 2004; He & Evans, 2007; Shrewsbury et al., 2012). In the present study, no significant differences were found between boys and girls for mothers' rate of misperception ($p=0.4$; data not

presented). After controlling for all significant covariates, maternal rate of misperception seemed to only be influenced by the child's BMI z-score. Our study revealed that mothers were 2.37 times more likely to misperceive their child's weight status with every increment of 1 unit of child's BMI z-score ($p < 0.001$).

Regarding children's likelihood of misperceiving their body shape, our study revealed that child's age, BMI z-score, and immigration status were independently associated with body shape perception accuracy. Older children were more accurate in perceiving their body shape in comparison to younger children. These findings are similar to previous studies which concluded that older children were the most accurate at perceiving their weight status (Chung et al., 2013; Sarafrazi et al., 2014). Our study also found that children who inaccurately perceived their body shape had a higher BMI z-score than children who accurately perceived their body shape. In line with previous studies, overweight and obese children were more likely to misperceive their weight status in comparison to their non-overweight counterparts (Martin et al., 2009; Maximova et al., 2008; Sarafrazi et al., 2014). Like overweight and obese children, immigrant children were more likely to misperceive their body shape than non-immigrant children. Higher rates of misperception in children and adolescents of ethnic minorities have been found in some studies (Daniels, 2005; Sarafrazi et al., 2014). In our study, children's sex was not significantly associated with body shape perception accuracy. However, other studies have found differences when comparing body shape perception accuracy in boys and girls (Chung et al., 2013; Sarafrazi et al., 2014). After controlling for all significant covariates, children's rate of misperception seemed to be influenced by the child's age, BMI z-score, mothers' BMI, and immigration status. Our study revealed that children were 0.80 times less likely to misperceive their body shape with every increment of 1 unit of child's age. For children's BMI z-score, children were 2.40 times

more likely to misperceive their body shape with every 1 unit increment in BMI z-score. In addition, children were 1.05 times more likely to misperceive their body shape with every 1 unit increment of their mothers' BMI. Finally, immigrant children were more likely to misperceive their body shape by 2.79 times in comparison to non-immigrant children.

5.5 Strengths and Limitations

The current study has strengths, such as the recruitment of a relatively large sample of Sub-Saharan African and Caribbean immigrants; little is known about the health and body shape perception of Sub-Saharan African and Caribbean school-aged children living in Ottawa, Ontario. Since body shape perception has been found to influence and motivate modifiable lifestyle habits, this study will offer a better understanding of body shape perception and predictors of body shape misperception in this particular population. Secondly, the use of measured height and weight for mothers and children allowed increasing accuracy of weight classifications. There are potential limitations to this study which warrant mention. Firstly, recruitment was conducted through a convenience sampling method which could limit the generalisability of the results since our sample may not be representative of all Black Sub-Saharan African and Caribbean children of Ottawa, Ontario. Secondly, social desirability is an important factor to consider. Social desirability is a participant's tendency to answer in a favourable manner to project a positive image of them and avoid a negative evaluation. Consequently, social desirability could have created a bias in the obtained results. Finally, ideally a larger sample of Canadian-born mothers would have been recruited to have relatively similar sample sizes for both immigrants and non-immigrants. Groups similar in size would have allowed for better comparisons.

5.6 Conclusions

This study showed that mothers and children had a tendency to underestimate child's body shape with the highest rates of misperception found in overweight and obese children and their mothers. Black immigrant children also had a greater likelihood of misperceiving their body shape while older children had a lower rate of misperception. Exploration of methods aimed at increasing body shape awareness could be beneficial component to integrate as part of programs aimed at managing excessive weight gain since misperception might have implications for associated co-morbidities and health related behaviours. Since Black immigrants have been found to be at a higher risk of overweight and obesity (Adhikari & Sanou, 2012), it is of importance to better understand their body shape perception which could impact health-related behaviours. Future research should aim to better understand mothers' and children's body shape perception which has been found to influence health-related behaviours such as physical activity, screen time, and eating habits.

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DISCLOSURE

The authors declare no conflict of interest.

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Chapter 6 – The Influence of Black Immigrant Mothers' Body Shape Perception of Their Child on Maternal Feeding Practices

An article which will be submitted to the *Journal of Nutrition Education and Behavior* is presented in this chapter. The authors are Ashley Gunter, Rosanne Blanchet, Jeffrey Jutai, Dia Sanou, Malek Batal, and Isabelle Giroux. The article will explore the influence of mothers' body shape perception of their child on maternal feeding practices including restriction, pressure to eat, monitoring, and concern for child weight (*Objective 4*).

ABSTRACT

Objective: To determine the influence of mothers' body shape perception of their child on maternal feeding practices.

Design: Structured interviews were conducted by a dietitian.

Setting: Communities in Ottawa, Ontario, Canada.

Participants: 259 mothers of Sub-Saharan African and Caribbean descent or Canadian-born with school-aged children.

Main Outcome Measures: Maternal feeding practices and body shape perception.

Analysis: Mann-Whitney U tests and Kruskal-Wallis H tests with post hoc multiple pairwise comparisons; statistical significance $P<.05$.

Results: Mothers who perceived their child as underweight or normal weight exerted higher pressure to eat compared to mothers who perceived their child as overweight/obese ($P<.05$). Mothers who perceived their child as underweight or normal weight expressed less concern for their child's weight in comparison to mothers who perceived their child as overweight/obese ($P<.001$). Black immigrant mothers had higher restriction ($P<.001$), pressure to eat ($P<.001$), monitoring ($P<.05$), and concern for their child's weight ($P<.001$) compared to Canadian-born mothers.

Conclusions and Implications: Maternal feeding practices seemed to vary based on the mother's perception of their child's body shape and immigration status. Achieving correct body shape perception of children might aid parents in implementing adequate parental feeding practices to help their child attain a healthy weight status.

Keywords: Child, Feeding behavior, Body image, Emigrants and immigrants, Childhood obesity

6.1 INTRODUCTION

According to the Canadian Health Measures Survey (CHMS; 2009-2011), nearly one third or roughly 1.6 million of 5 to 17 year olds in Canada were classified as overweight (19.8%) or obese (11.7%) based on the World Health Organization (WHO) classification.[1] Among ethnic minority groups, Black immigrants are amid the most at risk of becoming overweight and obese.[2] Moreover, the diagnosis of obesity can be rather complex in a multicultural society since perceptions of overweight and obesity vary greatly across cultures.[3] For instance, Westernized societies highly value and associate positive attributes to thin and muscular body shapes while overweight and obese bodies receive a negative connotation.[4,5] In comparison, Black communities tend to adopt a more flexible view on the "ideal" body shape, prefer larger body sizes, and experience higher body satisfaction.[6,7] Therefore, perceptions of overweight and obesity have been found to vary greatly across cultures.[6]

Indeed, with familial context being widely deemed a major contributor to the widespread of childhood overweight and obesity, parents need to create environments which will promote healthy lifestyle choices for their children.[8] Additionally, the shaping of a healthy and active lifestyle during childhood is of great importance since trends are indicative of the overweight and obesity epidemic persisting into adulthood.[9] However, if parents are unable to recognize their child's excessive weight they may not deem lifestyle changes necessary.[10] Accurate perception of weight status has been previously linked to positive weight control behaviours and lifestyle changes by means of increased motivation.[11] Consequently, achieving accurate parental perception of their child's body shape and weight status might be a stepping stone in preventing future excessive weight gain in children.[12,13]

Furthermore, parental feeding practices including restriction, pressure to eat, and monitoring as well as parents' concern for their child's weight have been found to be influenced by parents' perception of their child's weight status.[13] Parental feeding practices have also been consistently associated with differences in children's adipose tissue.[14] Therefore, a promising avenue to tackle increases in childhood overweight and obesity is to explore the influence of parental perception of their child's weight status on parental feeding practices.[15] Previous studies have found that mothers who perceived their children as leaner exerted more pressure to eat in feeding situations compared to mothers who perceived their children as overweight or obese.[13] Moreover, it has been proposed that children perceived as leaner may be pressured to eat to increase their energy intake and weight.[16] On the contrary, parents' desire for their children to be leaner has been found to be associated with higher use of restriction in child feeding.[17] More precisely, studies have found that mothers who perceived their daughters as overweight or obese utilized more restriction compared to those who viewed their daughters as underweight or normal weight.[18,19] Parental concern for their child's weight has also been found to vary based on parents' weight perception of their children. For instance, parents who underestimated their child's weight status expressed the least amount of concern for their child's weight.[20] Another study found that parents' of overweight children who accurately perceived their child's weight status expressed more concern for their child's weight in comparison to those who inaccurately perceived.[21]

All in all, previous studies which have investigated the impact of children's characteristics on parental feeding practices found conflicting results pertaining to the influence of child's sex, age, weight status, and ethnicity on parental feeding practices.[16,22] However, factors influencing parental feeding practices have yet to be more widely studied across different

minority groups such as Black immigrants. Prior studies in this area have been predominantly or exclusively conducted with non-Hispanic White samples limiting the generalisability of these results. Therefore, there is a need to determine whether trends in parental feeding practices are prevalent in ethnic minorities vulnerable to overweight and obesity. The current study aims to further examine the influence of mothers' body shape perception of their child on maternal feeding practices in immigrant mothers from Sub-Saharan Africa and the Caribbean and Canadian-born mothers living in Ottawa, Ontario, Canada. It was hypothesized that mothers who perceived their child's body shape as overweight/obese would demonstrate higher use of restrictive feeding practices, monitoring food intake, and concern for their child's weight, and less use of pressure to eat in comparison to mothers who perceived their child as underweight or normal weight. This study also aims to establish whether maternal feeding practices differ based on mothers' immigration status and child's sex since findings are contradictory regarding the influence of these factors on feeding practices.[23,24]

6.2 METHODS

6.2.1 RESEARCH DESIGN

Data were collected during face-to-face structured interviews as part of a larger study which examined the determinants of eating habits and weight status of Black school-aged immigrant children. The mothers were interviewed using a standardized approach by a dietitian and answered questions which included sociodemographic details, maternal feeding practices, and body shape perception of their child. Mother-child dyads were given a $25 grocery gift card as compensation for their time and costs associated with participation in the study.

6.2.2 RECRUITMENT STRATEGIES

This study was reviewed and approved by the University of Ottawa Research and Ethics Board. Prior to participation, all mothers and children provided written informed consent and assent, respectively. Recruitment was based on a convenience sampling method. Participants were recruited mostly by team members during community events, religious gatherings, etc., and through various outlets such as word of mouth, community organisations, and ethnocultural associations.

6.2.3 PARTICIPANTS

A total of 259 mother-child dyads residing in Ottawa, Canada were recruited but only 248 provided data on body shape perception and maternal feeding practices. Of the children, 53.6% were girls (n=133) and 46.4% were boys (n=115) with an average age of 9.1 years (*SD*=1.9). The majority of children were from immigrant families with the mothers originating from Sub-Saharan Africa (n=121; 48.8%) and the Caribbean (n=62; 25.0%); 73.8% of the total sample was composed of immigrants (n=183). Children from families of mothers originating from Canada (n=65; 26.2%) were also recruited. Mothers had an average age of 39.0 years (*SD*=6.0) and BMI of 29.6 (*SD*=6.2).

6.2.4 MEASURES

6.2.4.1 Weight and height measurements. Height and weight measurements of mothers and children were collected by the dietitian and research assistant, when possible; duplicates were collected to increase measurement reliability. For mothers, body mass index (BMI; kg/m^2), a widely used tool to grossly estimate body composition in adults, was calculated by dividing their weight in kilograms (kg) by their respective height in meters squared (m^2). A BMI cut-off

approach according to Health Canada was used to identify the mother's weight status.[25] For children, age-/sex-specific classification for children and adolescents 5 to 19 years old according to the World Health Organization (WHO) growth charts, adapted for Canada, was used.[26]

6.2.4.2 Body shape perception. The figure rating scale used to assess mothers' body shape perception of their child is similar to the widely used Stunkard's Figure Rating Scale[27] but was adapted by Stevens et al. to be age appropriate for school-aged children[28] The silhouettes of boys and girls showed a range of eight body shapes from underweight to obese. The mothers were instructed to select a silhouette to best represent their perception of their child's current body shape. For analyses, the eight silhouettes were collapsed to create four weight categories including underweight (#1 and #2), normal weight (#3 and #4), overweight (#5 and #6), and obese (#7 and #8). The mentioned classification is identical to an American study which further modified the silhouettes to resemble African American children.[29] Similar classification was also used in a study which aimed to assess the impact of parental perception of their child's weight status on parental feeding practices.[13]

6.2.4.3 Parental feeding practices. A modified version of the Child Feeding Questionnaire (CFQ) was used to assess parental beliefs, attitudes, and practices pertaining to child feeding.[30] The CFQ was designed to be used with parents of children aged from 2-11 years old.[30] The following subscales were used: restriction, pressure to eat, monitoring, and concern for child weight. Answers for items were recorded on a 5-point Likert and subscale scores were calculated using the mean of all items in the subscale; higher scores represent higher use of a particular parental feeding practice or greater concern for the child's weight. The reliability of the subscales in the present study was tested using Cronbach's α analysis and the results are as follows: restriction (0.68; two items deleted), pressure to eat (0.74; one item deleted), monitoring

(0.85), and concern for child weight (0.92). Cronbach coefficients obtained were similar to a Canadian study which examined the relationships between parental perception of their child's weight status and feeding strategies.[21] They were also similar to those of two previous studies conducted in predominantly low-income African-American samples.[31,32]

6.2.5 STATISTICAL ANALYSES

All statistical analyses were performed using the SPSS Statistics for Windows Software, Version 23.0, with an alpha level of $P<.05$ considered significant for all analyses. Preliminary analysis of the CFQ subscales using Kolmogorov–Smirnov tests revealed that the data were not normally distributed. Similarly to other studies which used the CFQ and found that the distributions of data were not normal, we opted for non-parametric tests.[18,33,34] Medians and interquartile ranges were computed for each subscale of the CFQ for the total sample and for subgroups of interest. Mann-Whitney U and Kruskal-Wallis H tests were conducted to determine if there were significant differences for maternal feeding practices between subgroups. Subsequently, when significant differences were found with the Kruskal-Wallis H tests, post hoc multiple pairwise comparisons were performed.

6.3 RESULTS

6.3.1 Influence of Mothers' Body Shape Perception on Maternal Feeding Practices

Table 6.1 presents the medians and interquartile ranges for subscales of the CFQ for the total sample as well as separately for the main variables of interest including child's sex, immigrant status, body shape perception, and body shape perception accuracy.

Table 6.1 Medians and interquartile ranges for subscales of the Child Feeding Questionnaire[1]

	Restriction (n=248)	Pressure to Eat (n=248)	Monitoring (n=248)	Concern for Child Weight (n=242)
Total Sample	4.17 [3.50-4.83]	3.67 [2.33-5.00]	4.00 [3.00-5.00]	1.50 [1.00-2.71]
Child Sex				
Girl	4.17 [3.33-4.71]	3.33 [1.92-4.67]	4.00 [3.00-5.00]	1.57 [1.00-2.75]
Boy	4.33 [3.50-5.00]	3.67 [2.33-5.00]	4.00 [3.33-5.00]	1.43 [1.00-2.57]
Immigrant Status				
Immigrant	4.33 [3.67-5.00]**	3.67 [2.33-5.00]**	4.00 [3.33-5.00]*	1.64 [1.00-3.04]**
Non-immigrant	3.67 [2.92-4.42]**	2.33 [1.33-3.83]**	4.00 [2.67-4.67]*	1.14 [1.00-1.71]**
Body Shape Perception				
Underweight	4.00 [2.96-4.75]	4.17 [2.33-5.00]$_{b}$	4.17 [3.67-4.75]	1.14 [1.00-1.57]$_{d}$
Normal weight	4.17 [3.29-4.67]$_{a}$	3.67 [2.33-5.00]$_{c}$	4.00 [3.00-5.00]	1.29 [1.00-2.14]$_{e}$
Overweight/obese	4.50 [3.67-5.00]$_{a}$	2.33 [1.67-3.92]$_{b,c}$	4.00 [3.00-5.00]	2.57 [1.57-4.00]$_{d,e}$
Body Shape Perception Accuracy[2]				
Accurate	4.08 [3.33-4.67]*	3.67 [2.33-5.00]	4.00 [3.00-5.00]	1.29 [1.00-2.71]
Inaccurate	4.33 [3.50-5.00]*	3.33 [2.00-5.00]	4.33 [3.33-5.00]	1.57 [1.00-2.71]

Child Feeding Questionnaire (CFQ)[30]; Body shape perception scale.[28]

[1] Subscale scores for the CFQ, with a possible range of 1 to 5, were calculated using the mean of all items in the subscale; higher scores represent higher use of a particular parental feeding practice or greater concern for the child's weight.

[2] In total, 46.0% of mothers misperceived their child's body shape; there was fair agreement between these variables (κ = 0.192, P<.0001).

Significant differences using Mann-Whitney U tests (**P<.001 & *P<.05) and Kruskal-Wallis H tests followed by post hoc multiple pairwise comparisons: $_{a}$ Normal weight < Overweight/obese (P<.05) $_{b}$ Underweight > Overweight/obese (P<.05); $_{c}$ Normal weight > Overweight/obese (P<.05); $_{d}$ Underweight < Overweight/obese (P<.001); $_{e}$ Normal weight < Overweight/obese (P<.001).

Mann-Whitney U tests were conducted to determine if there were significant differences in the use of maternal feeding practices between different subgroups. In comparing immigrant and non-immigrant mothers' use of maternal feeding practices, immigrant mothers had significantly higher use of restriction (U = 3840.00, z = -4.27, P<.001), pressure to eat (U = 3837.00, z = -4.30, P<.001), and monitoring (U = 4931.00, z = -2.07, P<.05) as well as higher concern for their child's weight (U = 3788.00, z = -4.04, P<.001). For mothers' body shape perception accuracy of their child, mothers who inaccurately perceived their child's body shape had higher restriction in child feeding compared to mothers who accurately perceived their child's body shape (U = 8781.00, z = 2.04, P<.05). No significant differences were found in comparing mothers of boys and girls.

Kruskal-Wallis H tests were conducted to determine if there were differences in the use of maternal feeding practices based on mothers' body shape perception of their child. Since only two mothers selected obese silhouettes to describe their perception of their child's body shape, body shape perceptions classified as overweight and obese were collapsed for analyses. Based on mothers' perceived body shape of their child, use of restriction (χ^2 (2) = 6.38, P<.05) and pressure to eat (χ^2 (2) = 10.52, P<.01) as well as concern for child weight (χ^2 (2) = 35.60, P<.001) were significantly different. Subsequently, multiple post hoc pairwise comparisons revealed that restriction was significantly lower for children perceived as normal weight compared to children perceived as overweight/obese (P<.05). Mothers' use of pressure to eat was significantly higher for children perceived as underweight and normal weight compared to children perceived as overweight/obese (P<.05). Pairwise comparisons also revealed that mothers expressed lower concern for their child's weight if they perceived their child as underweight or normal weight compared to mothers who perceived their child as overweight/obese (P<.001).

6.4 DISCUSSION

High rates of misperception were found with a total of 46.0% of mothers misperceiving their child's body shape. In assessing differences in the use of maternal feeding practices and the accuracy of mothers' body shape perception of their child, the only significant difference found was for the use of restriction in child feeding. More precisely, mothers who misperceived their child's body shape used more restriction in feeding situations compared to mothers who accurately perceived their child's body shape ($P<.05$). Nevertheless, our study found that the use of restriction ($P<.05$) and pressure to eat ($P<.01$) as well as concern for child weight ($P<.001$) were significantly different based on mothers' perceived body shape of their child. Therefore, body shape perception accuracy might be a less critical construct determining maternal feeding practices compared to mothers' perception of their child's body shape. Similar to previous studies[13,22,37], mothers who perceived their child as underweight and normal weight utilized higher pressure to eat compared to mothers who perceived their child as overweight/obese ($P<.05$); which confirms our hypothesis. Previous studies have proposed as an explanation that parents who perceive their children as too thin will pressure them to eat to increase energy intake and weight status.[14,38] In comparison, parents who exert greater restriction in child feeding have been found to have a stronger desire for their children to be slimmer.[17] Our study found that mothers who perceived their child as normal weight utilized less restriction compared to those who perceived their child as overweight/obese ($P<.05$); which confirms our hypothesis. This finding is consistent with results of previous studies.[8,18,19] Moreover, studies have found that parents of heavier children expressed more concern regarding their child's weight status.[20,37] We observed that mothers who perceived their child as underweight and normal weight expressed

less concern for their child's weight status compared to mothers who perceived their child as overweight/obese ($P<.001$); which confirms our hypothesis. However, monitoring of food intake did not significantly differ based on mothers' body shape perception of their child; which rejects our hypothesis. A previous study found that mothers who wanted their children to be leaner exerted higher monitoring.[17] Our study might not have found differences in monitoring since this particular feeding practice might be better explained by a different construct relating to the mother's ideal body shape of their child.

Moreover, feeding practices and foods offered to children have been found to vary across racial and ethnic groups.[24,39] Significant differences were found between Black immigrant and Canadian-born mothers' use of maternal feeding practices which included restriction, pressure to eat, monitoring of food intake, and concern for child weight. More precisely, Black immigrant mothers expressed higher use of all maternal feeding practices compared to Canadian-born mothers. This interesting finding is similar to a study which found that African American mothers reported higher scores on all subscales of the CFQ in comparison to White mothers.[39] All while another study found no significant impact of ethnicity on the use of parents' restrictive feeding practices.[40] Contrary to restriction which aims to reduce the types and quantities of foods consumed by a child, the main aim of pressure in child feeding has been found to increase a child's energy intake resulting in weight gain.[16] Seeing as plumpness has been deemed acceptable and even valued in many cultures of developing countries this preference could explain the higher use of pressure to eat in immigrant mothers.[3] For instance, a pilot study conducted in a sample of low-income mothers found that White mothers exerted greater control to manage their child's food intake in comparison to Hispanic and non-Hispanic Black

mothers.[41] On the contrary, a study found that African American mothers exerted greater control than White mothers.[14]

Maternal feeding practices were not found to differ significantly when comparing boys and girls. However, differences based on the child's sex have been previously documented. [24] For instance, compared to parents of boys, studies revealed that parents of girls utilized higher monitoring of sweets and snack foods and expressed more concern regarding their daughters' weight status.[10,21] Nevertheless, most studies were predominantly or exclusively conducted in White samples which could explain why our study revealed that mothers of daughters and sons did not differ on the use of feeding practices. Indeed, culture has been found to shape parents' perceptions of a healthy weight status, with certain cultures viewing heavier children as adequate parenting.[24] It is widely known that Black cultures are more accepting of a wider range of body sizes in comparison to the Westernized culture.[3] Since our sample was predominantly composed of Black immigrants, the absence of differences between boys and girls could simply indicate that a child's sex might not be predictor of feeding practices in Black cultures.

6.5 STRENGTHS AND LIMITATIONS

The current study has certain strengths which include the recruitment of a relatively large sample of Sub-Saharan African and Caribbean immigrants. Previous studies investigating the relationships between parents' body shape perception of their child and parental feeding practices have been predominantly conducted in White samples. Therefore, this study allowed a better understanding of the use of maternal feeding practices of Black immigrant mothers which has yet to be widely studied. Potential limitations of this study include recruitment through a convenience sampling method which could impact the generalisability of the results. In addition,

a larger sample of Canadian-born mothers would have been ideal to allow for better comparisons with the Black immigrant sample.

6.6 IMPLICATIONS FOR RESEARCH AND PRACTICE

Maternal feeding practices seemed to be related to mothers' body shape perception of their child. Effective parental feeding practices aimed at adequate dietary intake in children could be a stepping stone in helping children achieve or maintain a healthy weight status since parental feeding practices have been found to explain significant differences in children's adipose mass.[14] However, if parents express little or no concern over their child's weight status or if they inaccurately perceive their child's body shape, a successful intervention is unlikely.[38] Since mothers' body shape perception of their child was found to be associated with maternal feeding practices, achieving accurate body shape perception of children might assist parents in implementing adequate feeding practices to help their child reach a normal weight status. Differences in maternal feeding practices were also found in comparing immigrants to non-immigrants. Studies investigating the impact of mothers' body shape perception of their child on maternal feeding practices are scarce, with even fewer studies conducted in multi-ethnic samples. However, our findings suggest that maternal feeding practices may differ between Black immigrant and Canadian-born mothers. Therefore, further research is needed to better understand the use of maternal feeding practices across different racial and ethnic groups.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

SUBMISSION DECLARATION

The authors certify that the work described in the article has not been published previously and that it is not under consideration for publication elsewhere.

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Chapter 7 – Complementary Results & Discussion

Complementary results which address the influences of children's body shape perception of themselves on their levels of physical activity (*objective 2*) and screen time (*objective 3*) are presented. A discussion follows the complementary results.

7.1 Complimentary Results

7.1.1 Influence of Body Shape Perception on Levels of Physical Activity in Children

Table 7.1 presents the frequencies of days spent being physically active (≥60min/day) in the week prior to data collection for children. Frequencies are presented for the total sample as well as separately for main variables of interest including child's sex, immigration status, household income, perceived body shape, and body shape perception accuracy.

Table 7.1 Frequency of days[1] spent being physically active per week by children (n=245)

	0-3 days/week n (%)	≥ 4 days/week n (%)	p
Total sample	92 (37.6%)	153 (62.4%)	-
Child sex			
Boy	45 (39.8%)	68 (60.2%)	0.292
Girl	47 (35.6%)	85 (64.4%)	
Immigration status			
Immigrant	79 (44.6%)	98 (55.4%)	< 0.001
Non-immigrant	13 (19.1%)	55 (80.9%)	
Household income[2]			
< $30,000	39 (47.0%)	44 (53.0%)	
$30,000-$60,000	18 (35.3%)	33 (64.7%)	< 0.01
>$60,000	21 (23.1%)	70 (76.9%)	
Body shape perception			
Underweight	6 (35.3%)	11 (64.7%)	
Normal weight	46 (31.1%)	102 (68.9%)	< 0.05
Overweight/obese	40 (50.0%)	40 (50.0%)	
Body shape perception accuracy			
Accurate	38 (31.4%)	83 (68.6%)	< 0.05
Inaccurate	54 (43.5%)	70 (56.5%)	

[1] (≥60min/day)
[2] n=225 due to missing data.

Chi-square tests were conducted between days spent being physically active (≥60min/day) in a week and main variables of interest presented above. Of the 5 variables, 4 revealed significant associations with the number of days spent being physically active in a

week. The significant variables were immigration status (χ^2 (1) = 13.64, p < 0.001), household income (χ^2 (2) = 11.00, p < 0.01), body shape perception (χ^2 (2) = 8.00, p < 0.05), and body shape perception accuracy (χ^2 (1) = 3.85, p < 0.05). Child's sex was not significantly associated with days spent being physically active (≥60min/day) in a week (χ^2 (1) = 0.46, p = 0.292).

Table 7.2 presents the means and standard deviations for the child's age and BMI z-score by days spent being physically active in a week.

Table 7.2 Characteristics of children by number of days[1] spent being physically active per week (n=245)

	0-3 days/week		≥ 4 days/week		p
	Mean	SD	Mean	SD	
Child age (years)	9.43	1.89	8.95	1.96	0.081
Child BMI z-score	0.98	1.32	0.79	1.11	0.170

[1] (≥60min/day)

Independent-samples *t*-tests were conducted to determine if there were differences in child's age and BMI z-score between children who were physically active for "0-3 days/week (≥60min/day)" and those who were physically active for "≥ 4 days/week (≥60min/day)". No significant differences were found between "0-3 days/week" and "≥4 days/week" but child's age was trending (*M* = 0.48, 95% CI [-0.02, 0.98], *t* (243) = 1.88, p = 0.081).

Binomial logistic regressions were performed to evaluate the impact of significant variables on the likelihood of children completing at least 4 days doing physical activity (≥60min/day) per week. Univariate logistic regressions were performed to explore relationships between the dependant variable (i.e. time spent being physically active) and all independent variables of interest including child's sex, age, and BMI z-score as well as immigration status, household income, body shape perception, and body shape perception accuracy; models were adjusted for significant univariate predictors at $p < 0.10$. Since both "body shape perception" and "body shape perception accuracy" were significant predictors, 2 models were constructed (**Table 7.3**).

Table 7.3 Odds ratio (95% CI) in the logistic regressions predicting the likelihood of children being physically active[1] for at least 4 days per week (n=225)

	Model 1			Model 2		
	OR[2]	95% CI	p	OR[2]	95% CI	p
Child age	0.86	0.74-1.01	0.070	0.88	0.76-1.02	0.098
Immigration status						
Immigrant	0.56	0.25-1.26	0.162	0.51	0.23-1.13	0.096
Non-immigrant	1.00			1.00		
Household income						
< $30,000	0.43	0.20-0.89	< 0.05	0.45	0.22-0.92	< 0.05
$30,000-$60,000	0.73	0.32-1.68	0.460	0.75	0.33-1.69	0.489
>$60,000	1.00			1.00		
Body shape perception						
Underweight	1.30	0.41-4.16	0.661			
Normal weight	2.38	1.26-4.48	< 0.01			
Overweight/obese	1.00					
Body shape accuracy						
Accurate				1.51	0.83-2.76	0.177
Inaccurate				1.00		

[1] (≥60min/day); n=225 due to missing data for household income.
[2] OR: Odds ratio adjusted for all other variables in the model. CI: Confidence intervals.

Model 1 included child's age, immigration status, household income, and body shape perception. The binomial logistic regression model was significant, χ^2 (6) = 25.26, p < 0.001 and explained 14.6% (Nagelkerke R^2) of the variance in hours of physical activity. Of the four predictors, two were significant: household income and body shape perception. Children from households with an income inferior to $30,000 were less likely (0.43 times) to report more than four days during which they did physical activity for at least 60min/day each week compared to children from families earning more than $60,000 (p < 0.05). Children who perceived themselves as normal weight had a greater likelihood (2.38 times) of reporting more than four days during which they did physical activity for at least 60min/day each week compared to children who perceived themselves as overweight/obese (p < 0.01).

Model 2 included child's age, immigration status, household income, and body shape perception accuracy. The binomial logistic regression model was significant (χ^2 (5) = 19.69, p < 0.001) and explained 11.6% (Nagelkerke R^2) of the variance in hours of physical activity. Of the four predictors, one was significant: household income. Children coming from households with an income inferior to $30,000 were less likely (0.45 times) to report more than four days during which they did physical activity for at least 60min/day each week compared to children from families earning more than $60,000 (p < 0.05).

7.1.2 Influence of Body Shape Perception on Screen Time in Children

Table 7.4 presents the frequencies of hours per day spent watching television/videos or playing video games for children. Frequencies are presented for the total sample as well as separately for main variables of interest including child's sex, immigration status, household income, body shape perception, and body shape perception accuracy.

Table 7.4 Hours per day spent watching television/videos or playing video games by children (n=245)

	None or <1hr/day n (%)	1-2hr/day n (%)	>3hr/day n (%)	p
Total sample	72 (29.4%)	119 (48.6%)	54 (22.0%)	-
Child sex				
Boy	29 (25.7%)	58 (51.3%)	26 (23.0%)	0.495
Girl	43 (32.6%)	61 (46.2%)	28 (21.2%)	
Immigrant status				
Immigrant	45 (25.4%)	85 (48.0%)	47 (26.6%)	< 0.01
Non-immigrant	27 (39.7%)	34 (50.0%)	7 (10.3%)	
Household income[1]				
< $30,000	18 (21.7%)	40 (48.2%)	25 (30.1%)	
$30,000-$60,000	12 (23.5%)	28 (54.9%)	11 (21.6%)	< 0.05
>$60,000	37 (40.7%)	39 (42.9%)	15 (16.5%)	
Body shape perception				
Underweight	3 (17.6%)	11 (64.7%)	3 (17.6%)	
Normal weight	46 (31.1%)	77 (52.0%)	25 (16.9%)	< 0.05
Overweight/obese	23 (28.7%)	31 (38.8%)	26 (32.5%)	
Body shape perception accuracy				
Accurate	38 (31.4%)	57 (47.1%)	26 (21.5%)	0.791
Inaccurate	34 (27.4%)	62 (50.0%)	28 (22.6%)	

[1] n=225 due to missing data.

Chi-square tests were performed between hours per day spent watching television/videos or playing video games and main variables of interest presented above. Of the five variables, three revealed significant associations with hours per day spent watching television/videos or playing video games: immigrant status, household income, and body shape perception. Immigration status (χ^2 (2) = 9.34, p < 0.01) and household income (χ^2 (4) = 10.72, p < 0.05) were significant variables. Children's body shape perception was also significant but this finding should be interpreted with caution since a total of two cells had an expected frequency below five (χ^2 (4) = 9.72, p < 0.05). No significant associations were found for child's sex (χ^2 (2) = 1.41, p = 0.495) and children's body shape perception accuracy (χ^2 (2) = 0.47, p = 0.791).

Table 7.5 presents the means and standard deviations for the child's age and BMI z-score by hours per day spent watching television/videos or playing video games.

Table 7.5 Characteristics of children by hours per day spent watching television/videos or playing video games (n=245)

	None or <1hr/day		1-2hr/day		>3hr/day		p
	Mean	SD	Mean	SD	Mean	SD	
Child age (years)	8.74	1.76	9.23	2.01	9.42	1.98	0.103
Child BMI z-score	0.89	1.05	0.71	1.15	1.18	1.40	0.054

One-way ANOVAs were conducted to determine if there were differences in child's age and BMI z-score between children who watched television/videos or played video games for "none or < 1hr/day", "1-2hr/day", and ">3hr/day". No significant differences were found between groups for child's age (F (2, 242) = 2.29, p = 0.103). There was difference between groups for child's BMI z-score which was a trend (F (2, 242) = 2.95, p = 0.054). Tukey's post-hoc tests revealed that children in the "1-2hr/day" group had on average a lower BMI z-score than those in the "> 3hr/day" group (p < 0.05).

Table 7.6 presents the frequencies of hours per day spent on a computer for children. Frequencies are presented for the total sample as well as separately for main variables of interest including child's sex, immigration status, household income, perceived body shape, and body shape perception accuracy.

Table 7.6 Hours per day spent on a computer[1] by children (n=245)

	None or <1hr/day n (%)	1-2hr/day n (%)	>3hr/day n (%)	p
Total sample	150 (61.2%)	67 (27.3%)	28 (11.4%)	-
Child sex				
Boy	63 (55.8%)	36 (31.9%)	14 (12.4%)	0.252
Girl	87 (65.9%)	31 (23.5%)	14 (10.6%)	
Immigrant status				
Immigrant	99 (55.9%)	53 (29.9%)	25 (14.1%)	< 0.05
Non-immigrant	51 (75.0%)	14 (20.6%)	3 (4.4%)	
Household income[2]				
< $30,000	41 (49.4%)	27 (32.5%)	15 (18.1%)	
$30,000-$60,000	29 (56.9%)	18 (35.3%)	4 (7.8%)	< 0.05
>$60,000	66 (72.5%)	18 (19.8%)	7 (7.7%)	
Body shape perception				
Underweight	9 (52.9%)	6 (35.3%)	2 (11.8%)	
Normal weight	87 (58.8%)	43 (29.1%)	18 (12.2%)	0.681
Overweight/obese	54 (67.5%)	18 (22.5%)	8 (10.0%)	
Body shape perception accuracy				
Accurate	75 (62.0%)	30 (24.8%)	16 (13.2%)	0.531
Inaccurate	75 (60.5%)	37 (29.8%)	12 (9.7%)	

[1] Computer activities such as playing games, chatting, and surfing the Internet.
[2] n=225 due to missing data.

Chi-square tests were performed between hours per day spent on a computer and main variables of interest presented above. Of the five variables, two revealed significant associations with hours per day spent on a computer. The significant variables were immigration status (χ^2 (2) = 8.55, $p < 0.05$) and household income (χ^2 (4) = 12.59, $p < 0.05$). No significant

associations were found for child's sex (χ^2 (2) = 2.76, p = 0.252), body shape perception (χ^2 (4) = 2.30, p = 0.681), and body shape perception accuracy (χ^2 (2) = 1.27, p = 0.531).

Table 7.7 presents the means and standard deviations for the child's age and BMI z-score by hours per day spent on a computer.

Table 7.7 Characteristics of children by number of hours per day spent on a computer (n=245)[1]

	None or <1hr/day		1-2hr/day		>3hr/day		p
	Mean	SD	Mean	SD	Mean	SD	
Child age (years)	8.72	1.82	9.71	1.96	9.93	2.01	< 0.001
Child BMI z-score	0.87	1.25	0.96	1.09	0.58	1.06	0.360

[1] Computer activities such as playing games, chatting, and surfing the Internet.

One-way ANOVAs were conducted to determine if there were differences in child's age and BMI z-score between children who spent "none or < 1hr/day", "1-2hr/day", and ">3hr/day" on a computer. There was a significant difference between groups for child's age (F (2, 242) = 9.31, p = < 0.001). Tukey's post-hoc tests revealed that children in the "none or < 1hr/day" group were significantly younger than those in the "1-2hr/day" group (p < 0.01) and "> 3hr/day" group (p < 0.01). No significant differences were found between groups for child's BMI z-score (F (2, 242) = 1.03, p = 0.360).

Ordinal logistic regressions were performed to evaluate the impact of significant variables predicting children's hours per day spent 1) watching television/videos or playing video games and 2) being on a computer (**Table 7.8**). Univariate regressions were performed to explore relationships between the dependant variables (i.e. time spent watching television/videos or playing video games and time spent on a computer) and all independent variables of interest including child's sex, age, and BMI z-score as well as immigration status, household income, perceived body shape, and body shape perception accuracy; models were adjusted for significant univariate predictors at $p < 0.15$.

Table 7.8 Ordinal logistic regressions predicting children's hours per day spent 1) watching television/videos or playing video games and 2) being on a computer (n=225)[1]

	1) Television/videos or video games			2) Computer		
	OR[2]	95% CI	p	OR[1]	95% CI	p
Child age	1.15	1.00-1.31	< 0.05	1.32	1.14-1.52	< 0.001
Child BMI z-score	1.07	0.84-1.37	0.563			
Immigration status						
Immigrant	1.45	0.76-2.77	0.263	1.74	0.84-3.62	0.136
Non-immigrant	1.00			1.00		
Household income						
< $30,000	1.96	1.04-3.72	< 0.05	2.28	1.14-4.53	< 0.05
$30,000-$60,000	1.49	0.74-3.01	0.261	1.41	0.65-3.06	0.387
>$60,000	1.00			1.00		
Body shape perception						
Underweight	1.43	0.47-4.35	0.529			
Normal weight	0.78	0.42-1.42	0.411			
Overweight/obese	1.00					

[1] n=225 owing to missing data for household income.

[2] OR: Odds ratio adjusted for all other variables in the model. CI: Confidence intervals.

An ordinal logistic regression was conducted to determine the effect of child's age, child's BMI z-score, immigration status, household income, and body shape perception on hours per day spent watching television/videos or playing video games. The final model significantly predicted the dependent variable above the intercept-only model (χ^2 (7) = 17.42, $p < 0.05$). Of the five predictors, two were significant: child's age and household income. An increase in child's age (expressed in years) was associated with an increase in the odds of children spending a greater amount of time daily watching television/videos or playing video games (OR = 1.15, 95% CI [1.00, 1.31], $p < 0.05$). Children coming from a family with a household income below $30,000 had higher odds of spending more time daily watching television/videos or playing video games than children coming from a family with a household income above $60,000 (OR = 1.96, 95% CI [1.04-3.72], $p < 0.05$).

A second ordinal logistic regression was conducted to determine the effect of child's age, immigration status, and household income on hours per day spent on a computer. The final model significantly predicted the dependent variable above the intercept-only model (χ^2 (4) = 29.62, $p < 0.001$). Of the three predictors, two were significant: child's age and household income. An increase in child's age (expressed in years) was associated with an increase in the odds of children spending a greater amount of time daily on a computer (OR = 1.32, 95% CI [1.14, 1.52], $p < 0.001$). Children coming from a family with a household income below $30,000 had higher odds of spending more time daily on a computer than children coming from a family with a household income above $60,000 (OR = 2.28, 95% CI [1.14-4.53], $p < 0.05$).

7.2 Complementary Discussion

With a substantial decrease in levels of physical activity, there has been an increase of studies looking at potential predictors of active lifestyles in children (Colley et al., 2011; Gillis, Kennedy, & Bar-Or, 2006; Strong et al., 2005; Tremblay et al., 2011). The general trend of physical activity in children and youth is indicative that boys are more physically active than girls and that physical activity decreases drastically as children become older (ParticipACTION, 2015). Our study found a similar trend with regards to children's age. More precisely, children who were physically active for 0-3 days per week (≥60min/day) were slightly older on average (9.4yrs) in comparison to those who were physically active for more than 4 days per week (≥60min/day; 9.0yrs); this was a trend at $p = 0.08$. However, in comparing boys and girls, our study found no significant differences. This finding is contrary to multiple studies which have found that boys have frequently higher levels of physical activity than girls (Colley et al., 2011; ParticipACTION, 2015; Seabra et al., 2013).

A predictor which has gained particular attention over the past years in adolescent and adult populations is body image. Studies in these populations have found that low body image discouraged physical activity (Neumark-Sztainer et al., 2006; Yancey et al., 2006). Therefore, our study aimed to assess the influences of body shape perception, which is a specified construct of body image, on levels of physical activity in children. A study found that self-perception of overweight or obesity was related to weight loss attempts including dieting and exercise behaviours in children and adolescents regardless if their perception was accurate or not (Chung et al., 2013). Moreover, our study found that body shape perception accuracy had a significant impact on children's level of physical activity ($p < 0.05$); however, this association was no longer significant after controlling for child's age, immigration status, and household income.

Nevertheless, children's body shape perception still had a significant impact on children's level of physical activity even after controlling for child's age, immigration status, and household income. More precisely, children who perceived themselves as normal weight were more likely (2.38 times) of completing more than four days of physical activity (≥60min/day) per week compared to children who perceived themselves as overweight/obese ($p < 0.01$). Likewise, a study found that adolescents who perceived themselves as "too fat" had lower levels of physical activity in and out of school (Felts et al., 1996). Another study found that poor body image was associated with low levels of physical activity whereas girls who perceived their weight status to be 'about right size' or 'I don't think about it' had higher levels of physical activity (Symons et al., 2013). These findings as well as those of the present study are parallel to the ideology that "feeling fat" can prevent an individual from engaging in physical activity as a result of concern surrounding body acceptance in physical activity environments (Grogan, 2008). Moreover, the National Health and Nutrition Examination Survey found perception of being overweight and actual overweight were both strongly associated with weight loss behaviours in a sample of 4355 children and adolescents 8-15 years old (Chung et al., 2013). However, our study found that children's BMI z-score was not significantly associated with levels of physical activity in the children. On the contrary, body shape perception was significantly associated with levels of physical activity in children. This finding is indicative that how a child perceives their body shape can have a significant impact on their levels of physical activity, more so than their measured weight status. Nevertheless, since the relationship between body shape perception and physical activity has been scarcely studied, insufficient evidence is presently available to establish the direction of causality between these two factors. Therefore, future research should aim to better understand the direction of this relationship.

With regards to socioeconomic status, children coming from households with an income below $30,000 were found to be less likely to complete at least 60min/day of physical activity for a total of four days per week compared to children from families earning more than $60,000 ($p < 0.05$). This finding is similar to studies which found that children of lower socioeconomic status families had limited opportunities to be physically active (Lobstein et al., 2004; Seabra et al., 2013). Moreover, children coming from lower socioeconomic families have been found to spend more time in sedentary pursuits than physical activities (Fairclough et al., 2009). Similarly, our study found that children coming from a family with a household income below $30,000 spent a greater amount of time watching television/videos or playing video games and being on a computer per day than children coming from a family with a household income above $60,000. Overall, our findings are in line with previous studies which have found that if screen time related activities occupy a great percentage of children's leisure time, this can contribute to the widely observable decrease of physical activity (Boulos et al., 2012; Koplan et al., 2005). Furthermore, in comparing Black immigrant and non-immigrant children, Black immigrant children were found to have lower levels of physical activity and higher levels of screen time. However, this difference was no longer significant once we controlled for other variables of interest including child's age, household income, body shape perception, and body shape perception accuracy in the various regression models.

Furthermore, our study found no significant differences in comparing boys and girls for time spent watching television/videos or playing video games. On the contrary, multiple previous studies have found that boys spend on average more time in screen-based activities than girls (Anderson et al., 2008; Bassett-Gunter & Leatherdale, 2014; Fairclough et al., 2009). A recent study also found no significant differences between boys and girls in time spent watching

television; however, differences were found for time spent playing video games with boys spending a total of 60 minutes per day compared to 19 minutes for girls (Ferrar et al., 2012). Unfortunately, our study might not have been able to capture this difference due to available data on screen time with television/videos and video game times being combined. With regards to hours per day spent on a computer, our study found that computer usage did not significantly differ between boys and girls. This finding is in line with a previous study which found that computer usage did not differ based on children's sex (Ferrar et al., 2012). For children's age, our study found that older children were more likely to spend more hours per day in sedentary pursuits including television/video viewing, playing video games or on a computer in comparison to younger children. Likewise, previous studies have found that older children commonly spend more time in sedentary pursuit than younger children (Leatherdale & Ahmed, 2011; ParticipACTION, 2015). More precisely, our study found that an increase in child's age (expressed in years) was associated with an increase in the odds (1.15 times) of children spending greater amount of time watching television/videos or playing video games and an increase in the odds (1.32 times) of children spending greater amount on a computer.

Unlike the influences between body shape perception and physical activity found in our study, children's screen time was not significantly associated with perceived body shape or body shape perception accuracy. Contradictory to findings from two previous studies which found that adolescents and adults who perceived themselves as overweight or obese tended to have greater time spent in sedentary pursuits (Felts et al., 1996; Yancey et al., 2006). We hypothesize that body shape perception might not be significantly associated with screen time since, unlike physical activity where individuals might feel that they do not have a certain type of body shape to participate (Grogan, 2008), there is lesser risk of being judge by others regarding weight status

in screen based activities. In addition, unlike physical activities, screen based activities do not necessarily require that individuals feel competent to participate. Altogether, screen time is a very common activity of children and therefore body shape perception might just simply not be a very important predictor in the children we studied. Nevertheless, there exists only a paucity of research examining the influence of body shape perception on screen time and therefore this relationship should be better studied to conclude whether in fact influences are not present in children.

Chapter 8 – Overall Discussion and Conclusion

An overall discussion of the present study is presented in this chapter. Furthermore, the hypotheses are addressed in comparison to the obtained results. Limitations and strengths of the study are mentioned as well as future directions and concluding statements on the present study and findings.

8.1 Overview of the Need for the Present Study

The prevalence to misperceive body shape have been found in mothers, especially among mothers of overweight and obese children with a tendency to underestimate their child's body shape (He & Evans, 2007; Mathieu et al., 2010; Rietmeijer-Mentink et al., 2013). Studies have also found similar trends in children with the highest rates of body shape misperception among overweight and obese children (Hussin et al., 2011; Maximova et al., 2008; Truby & Paxton, 2002). Moreover, certain studies have found that ethnic minorities are at a higher risk of body shape misperception (He & Evans, 2007; Remmers et al., 2014; Sarafrazi et al., 2014). On the other hand, individuals who accurately perceived their weight have been found to have increased motivation resulting in positive and healthy lifestyle changes to reach or maintain a healthy weight status (Foti & Lowry, 2015; Rhee et al., 2005). Therefore, inaccuracies in body shape perception may impair children's and parents ability to make the necessary lifestyle changes to prevent the onset of overweight and obesity (Remmers et al., 2014; Stockton et al., 2009). Aside from modifiable lifestyle habits including physical activity, screen time, and eating having been proven to reduce rates of overweight and obesity (Colley et al., 2011; He et al., 2009; Scaglioni et al., 2008), research evaluating the impact of body shape perception on these lifestyle habits in children is rather scarce, and even more so in ethnic minority groups.

Certain ethnic minorities such as Black immigrants are at a higher risk of becoming overweight and obese resulting in higher rates of associated co-morbidities such as type 2 diabetes, cancer, cardiovascular diseases, and social stigmatization (Adhikari & Sanou, 2012). Nevertheless, little is known about the health situation and well-being of Sub-Saharan African and Caribbean immigrants in Ottawa, Ontario. Therefore, the present study aimed to determine and compare the body shape perceptions of mothers' and children as well as the predictors of

body shape misperception in Black immigrants. To attain this objective, we aimed to verify that overweight and obese children and their mothers would have higher rates of body shape misperception and more specifically, would tend to underestimate the child's body shape (*Hypotheses 1a-1b*). In addition, this study aimed to examine the relationships between body shape perception and modifiable lifestyle habits including physical activity, screen time, and maternal feeding practices in children; these relationships have been scarcely studied in Black immigrant populations. More precisely, to attain the mentioned objectives, we aimed to verify that body shape perception would be significantly associated with levels of physical activity (*Hypothesis 2*) and screen time (*Hypothesis 3*). For maternal feeding practices, we aimed to verify that mothers who perceived their child's body shape as underweight would demonstrate less restriction, monitoring, and concern for child weight, and higher pressure to eat in comparison to mothers who perceived their child's body shape as overweight or obese (*Hypothesis 4*).

8.2 Summary of Results

The main results of the present study are resumed on the following page in **Figure 8.1**.

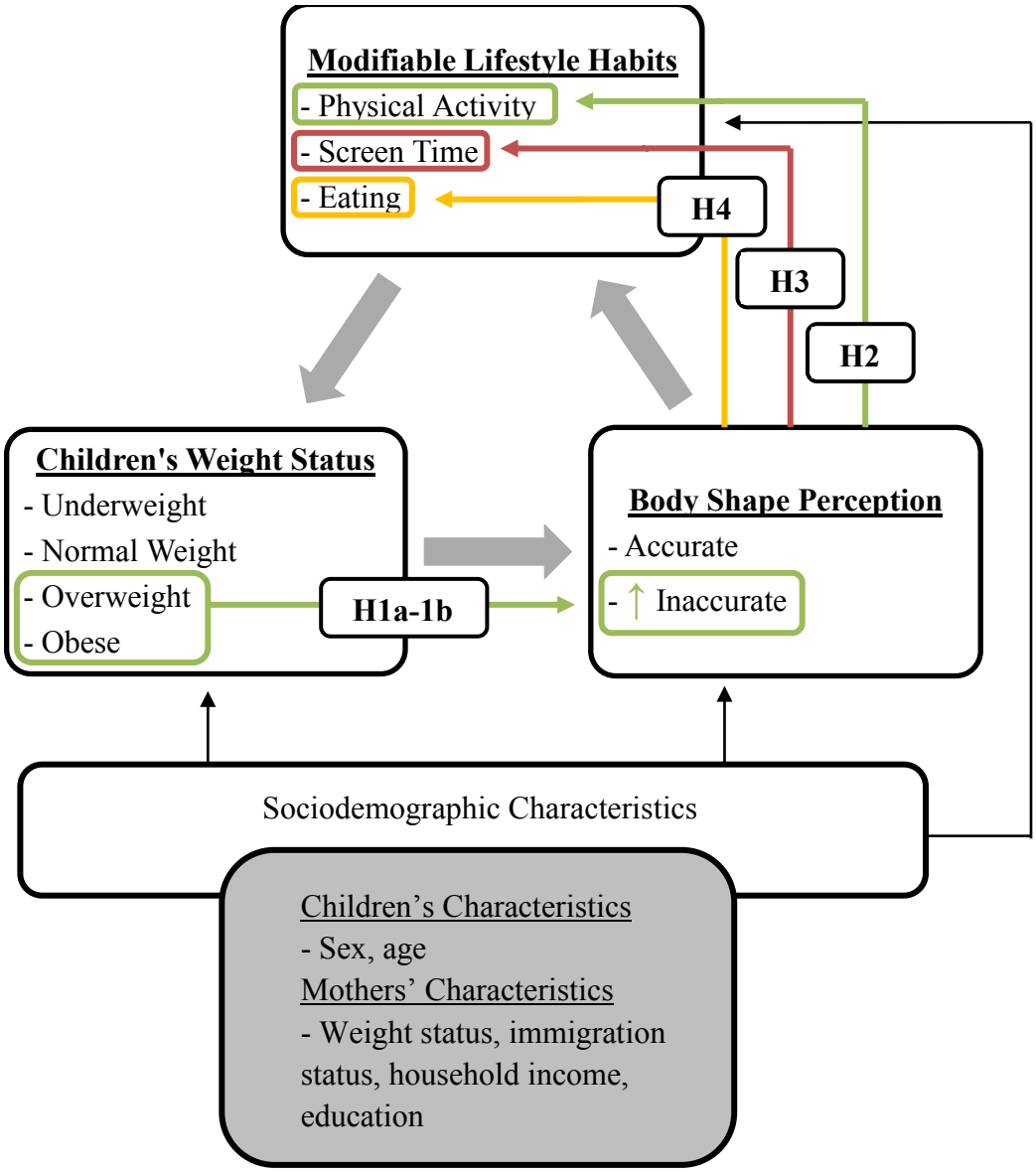

Figure 8.1 Conceptual model resuming main findings of the present study.

H: Hypothesis.
Legend: Green = hypothesis confirmed; Yellow = hypothesis partially confirmed; Red = hypothesis rejected.

8.2.1 Body Shape Perception of Children

In total, 46.3% of mothers misperceived their child's body shape. More precisely, for mothers of overweight and obese children, 78.8% of mothers underestimated their child's body

shape. In total, 50.0% of children misperceived their body shape while 76.9% of overweight and obese children underestimated their body shape. In addition, the likelihood of mothers and children misperceiving the child's body shape was roughly 2.5 times higher for children of a higher BMI z-score and their mothers. Therefore, the present study found a prevalence of body shape misperception, especially among overweight and obese children and their mothers; *this confirms our first hypothesis*. This finding is similar to previous studies which also found that overweight and obese children and their mothers had the highest rates of misperception (He & Evans, 2007; Rietmeijer-Mentink et al., 2013; Sarafrazi et al., 2014). In addition, children of mothers with higher BMI status were more likely to misperceive their body shape. Finally, older children were found to be less likely to misperceive their body shape while Black immigrant children were found to be more likely to misperceive their body shape.

8.2.2 Influence of Body Shape Perception on Physical Activity & Screen Time

Our study found that children who perceived themselves as normal weight were more likely to complete more than four days of physical activity for at least 60min/day per week compared to children who perceived themselves as overweight/obese even after controlling for covariates which included child's age, child's BMI z-score, and household income. Therefore, children's body shape perception of themselves was found to influence levels of physical activity; *this confirms our second hypothesis*. Similarly, a study found that adolescents who perceived themselves as "too fat" had lower levels of physical activity in and out of school (Felts et al., 1996). Another study found that girls who perceived their weight status to be 'about right size' or 'I don't think about it' had higher levels of physical activity (Symons et al., 2013).

On the contrary, our study found that body shape perception did not significantly impact screen time in children; *this fails to confirm our third hypothesis*. This finding is contradictory to

two previous studies which found that adolescents and adults who perceived themselves as overweight or obese tended to have greater time spent in sedentary pursuits (Felts et al., 1996; Yancey et al., 2006). Nevertheless, no studies to our knowledge have studied the impact of body shape perception on screen time in children and therefore this relationship still deserves to be further studied.

8.2.3 Influence of Body Shape Perception on Maternal Feeding Practices

Maternal feeding practices were found to differ significantly according to the mothers' body shape perception of their child. More precisely, mothers who perceived their child as underweight or normal weight used higher pressure to eat in child feeding and expressed less concern for their child's weight in comparison to mothers who perceived their child as overweight/obese; *this partially confirms our fourth hypothesis*. These findings are similar to previous studies which found higher pressure to eat in child feeding for children perceived as underweight and normal weight while concern for child's weight was found to be higher in children perceived as overweight and obese (Keller et al., 2006; Webber et al., 2010; Yilmaz et al., 2013). In addition, our study found that mothers' who perceived their child as normal weight utilized less restriction in child feeding compared to mothers who perceived their child as overweight/obese; *this partially confirms our fourth hypothesis*. This finding is consistent with prior studies (Brann, 2010; Johannsen et al., 2006). However, no significant differences were found in comparing mothers' body shape perception of their child on their use of monitoring in child feeding*; this partially fails to confirm our fourth hypothesis*. Nevertheless, Black immigrant mothers had higher use of restriction, pressure to eat, monitoring, and concern for child weight compared to Canadian-born mothers. This finding is similar to a study conducted by Spruijt-Metz and colleagues (2006).

8.3 Limitations and Strengths

There are potential limitations to this study which warrant mention. Firstly, since most of the data collected were self-report questionnaires (e.g. maternal feeding practices, physical activity and screen time), the data relies on the accuracy and honesty of the participant and was therefore not a direct observation of behaviour. Moreover, objective monitoring of physical activity and sedentary pursuits, such as the use of accelerometers, could have allowed for greater precision regarding children's time spent being physically active and sedentary since we utilized a self-report measure. However, accelerometry was beyond the scope of our study as a result of a large sample and time constraints. Secondly, social desirability is an important factor to consider. Social desirability is a participant's tendency to answer in a favourable manner to project a positive image and avoid a negative evaluation. Consequently, social desirability can create a bias in the results obtained. Furthermore, it would have been of interest to have information concerning the mothers' physical activity and screen time habits to allow for comparisons between mother-child pairs. Finally, this study had a larger sample of immigrants compared to Canadian-born which could limit the generalisability of the results to Canadian-born people in Ottawa, Ontario.

Limitations of the present study are balanced with several strengths including a relatively large sample of Sub-Saharan African and Caribbean mother-child pairs. Little is known about the health and well-being of Sub-Saharan African and Caribbean school-aged children living in Ottawa, Ontario; therefore, this study allowed to better understand their health situation. In addition, very few studies have looked at the impact of body shape perception on modifiable lifestyle habits in children and even less in ethnic minority groups. For that reason, the present study offers a novel contribution to the body of literature. Also, the use of objective measures of

height and weight for mothers and children increased the accuracy of this particular outcome. Finally, since the present study was part of a larger study, multiple previously studied covariates, often with inconclusive findings and scarcely studied in Black immigrant populations, were included in the statistical analyses to aid in better predicting the main outcomes.

8.4 Conclusions and Future Directions

Significant findings from the present study included a prevalence of body shape misperception, especially among overweight and obese children and their mothers. Moreover, body shape perception was found to influence levels of physical activity in children as well as maternal feeding practices; however, body shape perception did not significantly impact screen time in children. Overall, children's and mothers' perception of the child's body shape seem to influence certain health-related behaviours which have been found to contribute to excessive weight gain. With the presence of higher rates of childhood overweight and obesity, body shape perception could be a construct worth further studying to increase awareness surrounding the presence and risks associated with excessive weight gain. Future research should aim to better understand the causality behind body shape misperception for mothers and children. Moreover, there is a need to better identify and evaluate the predictors of body shape misperception since body shape perception was found to influence certain modifiable lifestyle habits. Furthermore, previous studies have found that accurately perceiving one's weight status resulted in greater motivation to make healthy lifestyle changes and as a result, contributed to positive weight control behaviours (Baranowski et al., 2003; Edwards et al., 2010; Foti & Lowry, 2015). Therefore, increasing awareness surrounding body shape perception might aid in increasing parents and children's willingness and readiness to make the necessary lifestyle changes to avoid negative health outcomes which could contribute to a lasting impact on the physical and mental

health of children. In addition, since our study found that rates of body shape misperception and of overweight and obesity were higher in immigrants, it would be important to better understand the cultural undertones of such phenomenon which has yet to be widely studied in immigrant youth in Canada. Nevertheless, it would be imperative to reduce the rate of overweight and obesity without compromising body satisfaction which has been widely found to be higher in Black populations (McClure, 2012; Neumark-Sztainer et al., 2002). Therefore, it is imperative to find a balance between unawareness of excessive weight and obsession with weight which could lead to unhealthy weight control practices and negative body image. Further exploration of the impact of various constructs of body shape perception such as ideal body shape and body shape satisfaction would be of interest since they might have different influences on modifiable lifestyle habits. In addition, it would be of interest to determine mothers' and children's perceptions of which silhouettes they consider to be underweight, normal weight, overweight, and obese. In assessing body shape perception, it would also be of interest to present the silhouettes in a randomized order instead of having them ordered from underweight to obese to see if this change influences rates of misperception. All in all, methods aimed at achieving accurate body shape perception could be beneficial in the fight against childhood overweight and obesity since misperception might have implications for associated co-morbidities and further excessive weight gain in children. Overall, future research should aim to better understand the impact of mothers' and children's body shape perceptions of the child on health outcomes and willingness to make positive lifestyle changes since body shape perception has been found to influence certain health related behaviours.

Previous studies have shown that lifestyle habits and preferences are formed during childhood and persist into adulthood as a result, programs and interventions need to be

implemented early on in life (Hands et al., 2011; Tremblay, Rinaldi, Cimon-lambert, & Lariviere, 2012). Moreover, parents are highly responsible for creating environments which will either foster healthy lifestyle choices or promote excessive weight gain in their children (Francis et al., 2001). Therefore, seeing as parents are highly influential on children, parents should be targeted in excessive weight gain prevention efforts aimed at reducing rates of childhood overweight and obesity (Rhee, 2008). Moreover, seeing as Black populations commonly have higher levels of body satisfaction and more accepting of larger body sizes (McClure, 2012; Neumark-Sztainer et al., 2002), it is of important to decrease the rates of overweight and obesity without jeopardizing higher body satisfaction. Consequently, interventions and programs aimed at decreasing rates of overweight and obesity should focus on implementing healthy lifestyle habits and avoid focusing on weight loss which could lead to excessive weight/shape concern and/or unhealthy weight control behaviours in children (Sherwood et al., 2004). Overall, parents should become role models for their children to support and encourage healthy lifestyle habits and choices. To develop and support a healthy lifestyle, parents should provide their children with opportunities to be physically active, reduce sedentary pursuits, and encourage healthy eating habits such as drinking water, minimizing processed foods, eating balanced meals, and consuming a variety of foods. In addition, parents can aid their children in having an accurate perception of themselves by trying to have an accurate body shape perception of their child as they grow.

In essence, the present study found a prevalence of body shape misperception, especially in overweight and obese children and their mothers with a tendency to underestimate. Modifiable lifestyle habits including levels of physical activity and certain maternal feeding practices were found to be influenced by body shape perception. Future research that builds on

the present study's novel findings is needed to better understand the impact of predictors which have been found to increase body shape misperception as well as modifiable lifestyle habits which have also been found to be influenced by body shape perception. Indeed, these relationships should be studied in varied racial and ethnic groups to understand if differences exist. Thus, these findings could help ensure that the needs of specific racial and ethnic groups are addressed in the development of active and healthy living interventions for children and their families. Overall, better understanding the relationships between body shape perception and modifiable lifestyle habits could be a small stepping stone in helping increase awareness of the presence of excessive weight as well as the associated health risks.

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Appendix A – Children's Physical Activity & Screen Time

Physical activity is any activity that increases your heart rate and makes you get out of breath some of the time. It can be done in sports, school activities, playing with friends, or walking to school. Some examples of physical activity are running, brisk walking, rollerblading, biking, dancing, skateboarding, swimming, playing soccer, basketball, and football.

For these next two questions, add up all the time you spend in physical activity each day.

1. Over the past 7 days, on how many days were you physically active for a total of at least 60 minutes per day?
   1. None (zero days)
   2. 1 day
   3. 2 to 3 days
   4. 4 days or more
   5. Don't know/refuse to answer

2. Over a typical or usual week, on how many days were you physically active for a total of at least 60minutes per day?
   1. None (zero days)
   2. 1 day
   3. 2 to 3 days
   4. 4 days or more
   5. Don't know/refuse to answer

3. About how many hours a week do you usually take part in physical activity (that makes you out of breath or warmer than usual):

	1- Never	2- <1h/w	3- 2 to 3 h/w	4- 4 to 6 h/w	5-7 or + h/w	Don't know/ refuse to answer
4. in your free time at school (for example, lunch)?						
5. in your class time at school?						
6. outside of school while participating in lessons or league or team sports						
7. outside of school while participating in unorganized activities, either on your own or with friends?						

8. On average, about how many hours a day do you watch TV or videos or play video games?
   1. I don't watch TV or videos or play video games
   2. Less than 1 hour a day
   3. 1 to 2 hours a day
   4. 3 to 4 hours a day
   5. 5 to 6 hours a day
   6. 7 or more hours a day
   7. Don't know/refuse to answer

9. On average, about how many hours a day do you spend on a computer, playing games, e-mailing, chatting, surfing the Internet, etc.?
   1. I don't use a computer play video games
   2. Less than 1 hour a day
   3. 1 to 2 hours a day
   4. 3 to 4 hours a day
   5. 5 to 6 hours a day
   6. 7 or more hours a day
   7. Don't know/refuse to answer

Appendix B – Child Feeding Questionnaire

Variable	Questions	Response Option				
Concern for Child Weight		1- Unconcerned	2- A little concerned	3- Concerned	4- Fairly Concerned	5- Very concerned
P1	How concerned are you about your child eating too much when you are not around her/him?					
P2	How concerned are you about your child having to diet to maintain a desirable weight?					
P3	How concerned are you about your child becoming overweight?					
P4	How concerned are you about your child being overweight in the future?					
P5	How concerned are you that your child's weight will cause health problems like diabetes or other health problems when they grow up?					
P6	How concerned are you about your child being teased or intimidated by other children because of their weight?					
P7	How concerned are you that your child's weight will affect their quality of life?					
Perceived Responsibility		1-Never	2-Rarely	3-Half of the time	4-Most of the time	5-Always
36	When your child is at home, how often are you responsible for feeding him/her?					
37	How often are you responsible for deciding what you child's portion sizes are?					
38	How often are you responsible for deciding if your child has eaten the right kind of foods?					
Perceived Parent Weight How would you classify your weight?		1-Markedly underweight	2- Underweight	3-Normal	4- Overweight	5-Markedly overweight
39	At present					
Perceived Child Weight How would your classify your child's weight at these stages?		1-Markedly underweight	2- Underweight	3-Normal	4- Overweight	5-Markedly overweight
40	Your child during the first year of life					
41	Your child as a toddler (*2-3 years*)					

Variable	Questions	Response Option				
42	Your child during kindergarten as a preschooler (*4-5 years*)					
Restriction		1-Disagree	2-Slightly disagree	3-Neutral	4-Slightly agree	5-Agree
43	I have to be sure that my child does not eat too many sweets (candy, ice cream, cake or pastries).					
44	I have to be sure that my child does not eat too many high-fat foods.					
45	I have to be sure that my child does not eat too much of his/her favourite foods.					
46	I intentionally keep some foods out of my child's reach.					
47	I offer sweets (candy, ice cream, cake, pastries) to my child as a reward for good behaviour.					
48	I offer my child her favourite foods in exchange for good behaviour.					
49	If I did not guide or regulate my child's eating, he/she would eat too many junk foods (pizza, fries, poutine, hotdog).					
50	If I did not guide or regulate my child's eating, he/she would eat too much of her favourite foods.					
Pressure to Eat		1-Disagree	2-Slightly disagree	3-Neutral	4-Slightly agree	5-Agree
51	My child should always eat all of the food on his/her plate.					
52	I have to be especially careful to make sure my child eats enough.					
53	If my child says "I'm not hungry", I try to get him/her to eat anyway.					
54	If I did not guide or regulate my child's eating, he/she would eat much less than he/she should.					
Monitoring		1-Never	2-Rarely	3-Sometimes	4-Mostly	5-Always
55	How much do you keep track of the sweets (candy, ice cream, cake, pies, pastries) that your child eats?					
56	How much do you keep track of the snack food (potato chips,					

Variable	Questions	Response Option				
	Doritos, cheese puffs) that your child eats?					
57	How much do you keep track of the high-fat food that your child eats?					

Appendix C – Research Ethics Board Approval

Numéro de dossier: H08-13-17 **Date (mm/jj/aaaa):** 11/09/2015

Université d'Ottawa University of Ottawa
Bureau d'éthique et d'intégrité de la recherche Office of Research Ethics and Integrity

Certificat d'approbation déontologique

CÉR Sciences et science de la santé

Chercheur principal / Superviseur / Co-chercheur(s) / Étudiant(s)

Prénom	Nom de famille	Affiliation	Rôle
Isabelle	Giroux	Sciences de la santé / Autres	Chercheur principal
Malek	Batal	Sciences de la santé / Autres	Co-chercheur
Rosanne	Blanchet	Sciences de la santé / Autres	Co-chercheur
Ashley	Gunter	Sciences de la santé / Autres	Co-chercheur
Constance	Nana	Autres / Autres	Co-chercheur
Dia	Sanou	Sciences de la santé / Autres	Co-chercheur
Diana	Tarraf	Sciences de la santé / Autres	Co-chercheur
Violeta	Ramirez Banos		Étudiant-chercheur
Teresita	de Jesus Socedo		Autre collaborateur
Daniel	Pisani		Assistant de recherche

Numéro du dossier: H08-13-17

Type du projet: Professeur

Titre: Acculturation, statut linguistique et santé nutritionnelle des enfants immigrants noirs d'âge scolaire

Date de renouvellement (mm/jj/aaaa)	Date d'expiration (mm/jj/aaaa)	Approbation
11/04/2015	11/03/2016	Ia

(Ia: Approbation complète, Ib: Autorisation préliminaire de libération de fonds de recherche)

550, rue Cumberland, pièce 154 550 Cumberland Street, room 154
Ottawa (Ontario) K1N 6N5 Canada Ottawa, Ontario K1N 6N5 Canada
(613) 562-5387 • Téléc./Fax (613) 562-5338
www.recherche.uottawa.ca/deontologie/ www.research.uottawa.ca/ethics/

Numéro de dossier: H08-13-17 **Date (mm/jj/aaaa):** 11/09/2015

Université d'Ottawa University of Ottawa
Bureau d'éthique et d'intégrité de la recherche Office of Research Ethics and Integrity

This is to confirm that the University of Ottawa Research Ethics Board identified above, which operates in accordance with the Tri-Council Policy Statement (2010) and other applicable laws and regulations in Ontario, has examined and approved the ethics application for the above named research project. Ethics approval is valid for the period indicated above and subject to the conditions listed in the section entitled "Special Conditions / Comments".

During the course of the project, the protocol may not be modified without prior written approval from the REB except when necessary to remove participants from immediate endangerment or when the modification(s) pertain to only administrative or logistical components of the project (e.g., change of telephone number). Investigators must also promptly alert the REB of any changes which increase the risk to participant(s), any changes which considerably affect the conduct of the project, all unanticipated and harmful events that occur, and new information that may negatively affect the conduct of the project and safety of the participant(s). Modifications to the project, including consent and recruitment documentation, should be submitted to the Ethics Office for approval using the "Modification to research project" form available at: http://research.uottawa.ca/ethics/submissions-and-reviews.

Please submit an annual report to the Ethics Office four weeks before the above-referenced expiry date to request a renewal of this ethics approval. To close the file, a final report must be submitted. These documents can be found at: http://research.uottawa.ca/ethics/submissions-and-reviews.

If you have any questions, please do not hesitate to contact the Ethics Office at extension 5387 or by e-mail at: ethics@uOttawa.ca.

Signature:

Jasmine Sarazin
Ethics Coordinator
For Catherine Paquet, Director of the Office of Research Ethics and Integrity

550, rue Cumberland, pièce 154 550 Cumberland Street, room 154
Ottawa (Ontario) K1N 6N5 Canada Ottawa, Ontario K1N 6N5 Canada
(613) 562-5387 • Téléc./Fax (613) 562-5338
www.recherche.uottawa.ca/deontologie/ www.research.uottawa.ca/ethics/