Mount Saint Vincent University
Department of Applied Human Nutrition

Predictors of body image and self-esteem and changes over time among children and adolescents from low-income communities

by
Alyson Cox

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Department of Applied Human Nutrition

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Alyson Cox

Approved:

Dr. Misty Rossiter, PhD, PDt
Thesis Supervisor
Assistant Professor of Applied Human Nutrition
Mount Saint Vincent University

Dr. Ilya Blum, PhD
Chair Mathematics and Computer Science
Mount Saint Vincern University

Dr. Robert Arnold, PhD
Associate Professor of Sociology
University of Windsor

Tristaca Curley, PDt
Lecturer in Nutrition and Dietetics
Acadia University

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ABSTRACT

This study aims to investigate the factors associated with body image and self-esteem among children and adolescents from economically disadvantaged neighbourhoods and to determine if these relationships change over time. One thousand children and adolescents participating in Better Beginnings, Better Futures (BBBF), a multidisciplinary longitudinal prevention project in Ontario, completed a Youth Self Report Form which gathered information on their body image and self-esteem, and had their height and weight measured in 2000 / 2001 (grade six) and again in 2003 / 2004 (grade nine). An Eating Behaviours Survey was completed to measure diet quality and demographic information came from a Parent Survey. The Social Cognitive Theory helps to define the models identified in this research. Children who met the Canada's Food Guide (CFG) recommended intakes for fruit and vegetable consumption had an increased chance of being in the strong body image category by a factor of 2.487 (OR = 2.487, p = 0.029) as well, as average increases in their self-esteem by 0.621 points, on a twenty-point scale, (p = 0.020) in grade 6. Participation in physical activity with and without a coach when children were in grade 6 was shown to improve the child's average body image by 0.201 and 0.278 points respectively, on a five-point scale (p = 0.050, p = 0.033) and average self-esteem by 0.754 and 0.501 points respectively, on a twenty-point scale (p = 0.000, p = 0.018). Participation in physical activity in grade 6 without a coach also

improved a child's odd of being in the strong body image category by a factor of 2.345 (OR = 2.345, p = 0.003) and high self-esteem category by a factor of 1.880 (OR = 1.880, p = 0.010). Participation in physical activity in grade 6 with a coach increased a child's odds of being in the high self-esteem category by a factor of 2.030 (OR = 2.030, p = 0.001). As well, children who participated in physical activity more often (four or more times per week) demonstrated improved body image on average by 0.321 points (p = 0.005) and self-esteem on average by 1.452 points (p = 0.023), while children who participated less often (less than one time per week) demonstrated decreased body image with a coach on average by a factor of 0.254 (OR = 0.254, p = 0.003) and without a coach on average by a factor of 0.395 (OR = 0.395, p = 0.003) and self-esteem with a coach on average by a factor of 0.335 (OR = 0.335, p = 0.000), and without a coach on average by a factor of 0.499 (OR = 0.499, p = 0.011). Finally, obese children had decreased odds of being in the strong body image category in grade 6 by a factor of 0.366 (OR = 0.366, p = 0.004) and had an average decrease in body image by 0.316 points in grade 6 (p = 0.005) and by 0.414 points in grade 9 (p = 0.001). Longitudinally, sex of the child, participation in physical activity and weight status were related to a child's body image or self-esteem. Models that predict body image and self-esteem in grade 6 cannot be used to predict the same in grade 9 because the factors that impact these change as children age. In conclusion, programming aimed at increasing fruit and vegetable intake and physical activity levels in children, and promoting a healthy body weight can help to promote a positive body image and self-esteem in children and adolescents.

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Chapter 1

INTRODUCTION

"Body dissatisfaction has been considered so common among females that it is referred to as 'normative discontent' " (Rodin, Silberstein & Striegel-Moore, 1985)

1.0 Introduction

Body image dissatisfaction is seen in a large proportion of the population, and is one of the leading causes of psychiatric disorders that affect children and adolescents (1). Body image can be defined as an individual's psychological representation of their body (i.e. the way in which they see themselves in terms of their appearance) (2). Body image and the role it plays in psychological well-being affects everyone in different ways. Body image dissatisfaction is becoming increasingly prevalent in younger populations, including children and adolescents. Dohnt and Tiggemann (2006), found that 46.7% of girls in pre-school (average age six) desired to have a thinner body (3). As well, Rhodes (2002) found that weight status and body mass index (BMI) influenced a child's self-esteem; this relationship was seen in children eight years and older (4). This indicates that children are very young when they begin to develop body dissatisfaction, but it is unknown at exactly what age this dissatisfaction develops.

Body image dissatisfaction often occurs simultaneously with lower self-esteem in children and adolescents. Self-esteem can be defined as the "real" opinion someone holds of them self, including the value and respect they hold for them self as a person (5). Griffiths, Parsons, and Hill (2010), conducted a meta-analysis examining the effects of obesity in children and adolescents on their self-esteem and quality of life (6). Griffiths et al. (2010) found that children and adolescents who were obese had lower self-esteem, lower athletic and physical competence, and a lower physical appearance when compared to their normal weight peers(6). As well, obese children were found to have lower social acceptance and social functioning than their normal weight peers (6).

The National Longitudinal Survey of Children and Youth (NLSCY) (2008), found that children who were overweight and obese had significantly lower self- esteem than their normal weight peers ($p<0.05$) (7, 8). Children with lower self-esteem and a poor body image, who were also overweight or obese, were found to be less likely to participate in, and get satisfaction from physical activity (8). As well, children who participated in physical activity five to seven times per week were less likely than those who participated two or less times per week to have a low self-esteem (8, 9). Thus, this study found that regular physical activity positively contributes to a child's body image and self-esteem.

The specific factors that influence body image and self-esteem in children and adolescents have been difficult to pin point in previous research. As well, younger children are more difficult to assess in terms of what negatively influences their body image and self-esteem. Davison, Markey, and Birch (2000), examined the etiology of body dissatisfaction among five year old girls and found that girls with a higher body mass index (BMI) showed significantly greater body dissatisfaction ($p<0.05$) than those with a lower BMI; this greater body dissatisfaction was also associated with increased weight concerns ($p<0.05$) (10). Packard and Krogstrand (2002), found that body dissatisfaction was significantly higher among children aged 11-14 and 15-17 than it was in children aged 8-10 ($p=0.001$) (11). This relationship indicates that as children age they may become more aware of what their body looks like and the "flaws" it contains. This may become more internalized as children age, causing them to have greater negative feelings towards their bodies later in life.

The child poverty rate in Canada in the early 2000's was 15.1%, making Canada the fifth highest country in the world for child poverty, behind only the United States, Ireland, Germany and Italy (12). This means that more than one in seven Canadian children are living in poverty (12). There is very little research that examines body image and self-esteem among children and adolescents from low-income families, and even less examining this relationship within Canada. The alarming fact that children of all ages are showing signs of a negative body image and self-esteem highlights the need to identify the contributing factors to this issue. As well, there is a need to investigate the contributing factors to body image and self-esteem in children and adolescents from low-income populations and to determine if there are any changes in these relationships over time and if a model can be developed to promote a positive body image and self-esteem in these children.

Chapter 2

LITERATURE REVIEW

2.0 Literature Review

2.1 Introduction

This literature review is broken down into three sections. The first section provides an overview of weight status of children and adolescents in North America and how this relates to body image and self-esteem. The second section discusses physical activity levels in children and adolescents as it is related to body image and self-esteem. In the last section a review of the quality of diets of children and adolescents in North America is provided, and connections to body image and self-esteem are reviewed.

2.2 Weight Status

Increasing weight status among children and its contributing factors are an increasing area of interest for researchers. It is well known that there is a growing population of children who are overweight and obese, and that those children are presenting with these health issues at a much younger age than ever before. In 2004, an alarming 26% of Canadian children and adolescents were overweight or obese, with 8% of them falling into the obese category (13). The issues associated with childhood overweight and obesity are vast and long lasting. It is known that children who are overweight or obese are at increased risk for many disease states, some of which include hypertension, dyslipidemia, cardiovascular disease, atherosclerosis, and type II diabetes, along with increased risk of being overweight and/or obese as adults (14). These health concerns were not seen in children in the past and are becoming increasingly prevalent in children and adolescents (14). The physiological effects of overweight and obesity in children alone are enough to raise major concern, but there are many psychological issues associated with overweight and obesity as well.

Issues around weight status are also increasingly prevalent among children and adolescents living in low socio-economic environments (15-18). Fisher, Lang, Young-Cureton, and Canham (2005), examined children aged 8 to 10 from low socio-economic statuses to determine if there was a relationship between perceived and ideal body size and BMI (16). Of the children studied, 40% were in the normal range for BMI, while 30% each were in the at-risk-of overweight, and overweight categories (16). When asked to choose their ideal body size (on a scale of seven images, ranging from severely underweight to obese), 23% of the children chose underweight images as their ideal size, surprisingly, 75% choose normal weight images, and 2% chose overweight body size (16). In comparison, Balentine, Stitt, Bonner, and Clark (1991), examined self-reported eating disorders in adolescents from low-income families through the Alabama school system (15). In this study, high school children had a greater tendency to throw-up to lose weight, and to show tendencies towards worrying about losing weight, and being afraid of gaining weight (15). The adolescents who had the highest number of perceived eating disorders were more likely to weigh more than the 50^{th} percentile of weight for height than their peers (15). Another study, conducted by Park (2011) examined the tendency of children to over or underestimate their weight status and whether this varied across socioeconomic groups (18). In this study, approximately 75% of the children had a healthy body weight, 22% were overweight or obese, and 2% were underweight; of those who were at a healthy weight 13.2% thought they were overweight, and 9.8% thought they were underweight (18). In the overweight students, 39.3% felt they were the right weight, and 1.4% felt they were underweight (18). Students from low-income households were more likely than their medium to high-income counterparts to have a discordant

weight status ($p<0.001$), with students from low-income families more likely to underestimate their weight status ($p<0.001$) (18). Finally, Grant, Lyons, Landis, Cho, Scudiero, Reynolds, et al. (1999) examined the relationships between gender, body image, and depression in adolescents from low-income families (17). Grant et al (1999) studied 165, sixth to eighth graders from low-income families, and found that girls were more likely to have a desire to lose weight than their male peers (48% of the girls sampled indicated they wanted to lose weight, while only 37% of the males indicated this) (17). These results highlight that children from low-income families may show similar inclinations, as their more affluent peers, towards having a desire to weigh less.

2.2.1 Body Image and Weight Status

Weight status in children plays a role in the way that they view their bodies (19). Due to the psychological issues associated with obesity, the relationship between body image and weight status is an area that requires further research. Pallan, Hiam, Duda, and Adab (2010), state that a person's quality of life can be extensively affected by having a negative body image (20). These negative outcomes are especially prevalent in weight conscious children and adolescents (21). Nowak (1998) found that a group of students aged 12-15 who were trying to lose weight were generally dissatisfied with their bodies, with only 36% of the boys and 19% of the girls being satisfied with the way they looked (21). This is important because the psychological effects from a negative body image may potentially impact a child's quality of life throughout childhood, and later in life.

Children and adolescents are living in an environment that fosters negative body image and self-esteem. Everywhere they look children are bombarded with images of emaciated models and told what they are 'supposed' to look like (3). This image

conveyed through the media fosters a thin-ideal, which contributes to desiring a thinner body than they already have (3). The thin ideal is a major contributing factor to body image issues present in children and adolescents (3). Negative body image becomes increasingly difficult to overcome when children live in an environment that also fosters obesity and a sedentary lifestyle. Factors that contribute to this obesogenic environment include lack of safe neighbourhoods for children to play in, decreased physical activity, increased screen time, increased snacking while partaking in screen time and a lack of access to healthy foods (22).These factors coupled with increased pressure to fit a certain body ideal can cause a great deal of stress on children, especially in terms of how they should look.

Children as young as grades one to three have demonstrated weight related concerns, as well as fears that what they eat will make them fat (23). Some of these children have also stated that they have gone on a diet and do not eat when they are hungry due to fear of being overweight (23). Shapiro et al. (1997), found that children as young as eight years of age have extreme preoccupations and dissatisfaction with their weights, and that 30% of boys and 31% of girls were always unhappy with their weight (24). The same group of children also stated throwing up after eating, and using diet foods and exercise to lose weight, while 10% of boys and 13% of girls reported trying to lose weight by going on a diet (24). In the United States between 30-43% of normal weight children have shown tendencies to diet (25, 26). This is alarming considering the amount of damage that dieting at a young age can cause such as low self-esteem, depression, stunted growth and susceptibility to disease (25, 27-30).

There are many contributing factors to body image dissatisfaction; a lot of which are related to weight. Tyler, Johnston, Dalton, and Foreyt (2009), examined the effects of weight status on body image in African American girls and found that the girls had a significant increase in body dissatisfaction when their weight status increased ($p<0.001$)(19). Tyler et al. (2009) also found that these children had increased teasing from peers as their weight increased ($p<0.001$) (19). Weight related teasing might further increase body dissatisfaction among overweight and obese youth. As well, overweight adolescents are more likely to be socially isolated and experience peer exclusion (31). This isolation and exclusion may exacerbate their body dissatisfaction (31). Overweight children seem to be at a particularly increased risk of body dissatisfaction over their normal and underweight peers. Overweight and obese children have been found to have greater body dissatisfaction and lower self-esteem and were also more likely to be depressed than children of the same age who fell in the normal weight category (10, 32, 33). In particular, Davison et al (2000), found that girls as young as five years of age, demonstrated a significant association between a higher BMI and increased body dissatisfaction ($p<0.10$) (10). Lee, Sohn, Lee and Lee (2004), found that there was a potential relationship between changes in weight status and body dissatisfaction (32). Lee et al. (2004) found that children who became overweight over a period of time (but were not previously overweight) ($p<0.01$), and those who remained overweight over time ($p<0.01$) were at a significantly increased risk of having a greater body dissatisfaction than their peers who were of a normal weight throughout the duration of the study (32). As well, Strauss (2000) demonstrated a longitudinal relationship between weight status and self-esteem (34). Strauss examined 1520 children aged 9 to 10 to determine the effect

that obesity has on self-esteem, and found that children who remained obese over time were significantly more likely to have a decreased self-esteem, which may also lead to a decreased body image (34). As well, overweight and obese girls have demonstrated significantly lower self-esteem than normal weight girls, and normal weight and overweight boys have demonstrated a significantly higher self-esteem than obese boys (35).

Gualdi-Russo, Albertini, Argnani, Celenza, Nicolucci, and Toselli (2008) found very similar results to those of Tyler et al (2009). The study was conducted with both female and male school children, with 25% of the children being overweight and 11% of them obese (36). For the children who were overweight and obese significant body dissatisfaction was observed ($p<0.001$) (36). In the same sample, 41.6% of girls and 39.4% of boys desired an overall thinner body and this relationship was observed in both overweight / obese and normal weight children (36). The level of body dissatisfaction was found to be significantly higher in overweight and obese children ($p<0.001$), with 73.6% of overweight and obese girls and 58.3% of overweight and obese boys desiring to be thinner (36). There was a small percentage of children who desired larger bodies (2.8% of girls and 3.4% of boys), but this was found to be due to the children incorrectly perceiving themselves as much thinner than they actually were (36).

The relationship between body image and weight status however, is not only seen in overweight children but also in normal and underweight children. These children may have a desire to have a different body size than they currently have, just as overweight and obese children. Normal and underweight children can sometimes have a desire to be smaller, as seen in many overweight and obese children, but there can also be a desire to

be larger than their current body size (37). Neumark-Sztainer, Story, Hannan, Perry and Irving (2002), studied 4746 children and adolescents, with a mean age of 15 years and found that 68.1% of underweight girls and 49.2% of normal weight boys desired to weigh more (37). This shows that although they did not have the same issue of wanting a smaller body, they did desire a change in the way their current body looked. One possible explanation for the desire to be larger may be related to Gualdi-Russo et al's (2008) suggestion, that children who desired to be larger, in reality, perceived themselves as smaller than their actual body size (36).

2.2.2 Weight Status and Body Size Identification

Saxton, Hill, Chadwick, and Wardle (2009), examined whether or not children could accurately identify their body size on a visual matching scale and whether there was a relationship between weight and ability to accurately identify their body size (38). The study was comprised of mainly normal weight children, with almost equal, but smaller percentages of overweight / obese and underweight children (38). Overall, there was a correlation with actual and perceived body size ($p<0.001$), but children showed a considerable inclination to underestimate their weight status, regardless of their weight status category (38). In contrast to these findings Skemp-Arlt (2006), studied over 700 high school students and found that 25.4% felt that they were slightly overweight and 4.3% felt that they were very overweight, this relationship was found across all weight categories (39). Welch, Gross, Bronner, Dewberry-Moore, and Paige (2004), found that fourth grade children also had a significantly larger view of their self than what they actually were ($p=0.002$), and 42% of the children wanted to lose weight (40).

Maximova, McGrath, Barnett, O'Loughlin, Paradis, and Lambert (2008), found that boys aged 13 years were more likely than girls to overestimate their weight status, but that this switched as soon as they reached 16 years of age (41). This could suggest an increased discrepancy between actual and perceived self-image as children age. This study also found that children who were more familiar with higher levels of overweight and obesity were more likely to underestimate their weight status (41). One possible reason for this was that children perceived themselves as normal weight because their family and friends were also overweight and obese, making this the norm for them (41). The tendency to incorrectly identify their weight status was much more prevalent in overweight children then normal weight children ($p<0.001$) (41).

As mentioned previously, Davison et al. (2002), found that children as young as five have demonstrated a positive correlational relationship between weight status and body dissatisfaction (10). Pallan et al. (2010), found that a relationship may exist in young children, but that the relationship is not as strong as that in older children ($p<0.0001$) (20). Substantial evidence suggests a positive relationship between weight status and body dissatisfaction (10, 19, 32, 33, 36, 37). There is however, evidence that suggests youth who are overweight and obese have a tendency to under estimate their weight status, and thus, perceive themselves as being at an acceptable weight level (38, 41). These discrepancies highlight the need for additional research to investigate the relationship between weight status and body image and self-esteem.

2.3 Physical Activity

The benefits of physical activity are numerous and well documented. The relationship between physical activity and body image is less extensively studied, and

therefore, there is a need for further research in this area. In Canada, only 7% of children and youth are meeting the Canada's Physical Activity Guidelines and the new Canadian Society for Exercise Physiology guidelines of a minimum of 60 minutes of moderate to vigorous physical activity a day, and less than 2% of Canadian children and youth are meeting the Canada's Physical Activity Guidelines of a recommended 90 minutes of moderate to vigorous physical activity on at least six days of the week (42, 43). Active Healthy Kids Canada (2011) also found that 75% of parents claimed their child (aged 6 to 19 years) participated in organized sport in the last year (42). Although this number seems high, it excludes a lot of children coming from low-income families, as assessed by Active Healthy Kids Canada (42). There are inconsistencies in the research around why physical activity levels seem to be lower among low-income populations. Hammerschmidt, Tackett, Golzynski, and Golzynski (2011) examined possible barriers and facilitators to physical activity in low-income populations in Michigan (44). In general, school staff felt that students at their schools received too little nutrition interventions, physical activity, and physical education (44). Some of the major barriers to physical activity within the school system included lack of time, lack of freedom to focus on physical activity (more focus was given to academic subjects), and lack of funding (44). In comparison, Withall, Jago, and Fox (2011), also examined some of the facilitators and barriers to physical activity among low-income populations (45). Withall et al. (2011) studied one of the most economically deprived areas in England and found that, as with Hammerschmidt et al. (2011), cost (or lack of funds) was a major barrier to physical activity in low-income populations (45). In contrast to this, facilitators to physical activity included awareness of the benefits, enjoyment, and the social aspect of

being physically active (45). Finally, Voss, Hosking, Metcalf, Jeffery, and Wilkin (2008) examined physical activity levels among children from low-income families (46). Voss et al. (2008) found that overall boys took part in more physical activity sessions than girls, but that children (boys and girls) from low-income families, were significantly less likely to partake in organized physical activity sessions than their more affluent peers ($p<0.001$) (46). The study did find, however, that children from low-income families were just as likely as their peers to partake in physical activity, mostly being unorganized (46). There was also no relationship demonstrated between parental income and amount of high-intensity activity that the children partook in (46).

Eccles, Barber, Stone, and Hunt (2003), examined extracurricular activities and the role they played in an adolescent's likelihood to engage in risky behaviours such as drinking, smoking, using drugs and skipping school (47). Eccles et al. (2003) found that children who participated in extracurricular activities were less likely to take part in risky behaviours, such as drinking and smoking, than children who were not involved in any sort of extracurricular activity ($p<0.05$) (47). A similar association was seen in a study assessing high school students' involvement in sports. This relationship demonstrated that participants involved in sports had fewer mental and general health problems, as well as fewer eating and dietary problems than their non-athletic peers (48).

Participation in physical activity has been shown to have many positive benefits, including decreased stress rates, increased mood and increased general well being (49-52). A study examining the effect of weight training circuits on body image in college students found that those who participated in the program had significant increases in perceived physical appearance and body image upon program completion ($p<0.01$,

$p<0.05$) (52). Other studies have also found that regular physical activity is associated with increased health and well being, as well as elevated self-esteem, memory and mood, and decreased stress rates (49-51). Along with increased body satisfaction, participation in physical activity also increases a person's level of perceived fitness, and these individuals are therefore, more interested in fitness and activity participation (51).

Abbott and Barber (2011), examined body image in girls in grades 9-11 who were involved in organized sports, were physically active, or were not at all active. Abbott and Barber (2011) found that girls who were involved in either organized sports or physical activity had higher functional body image, defined as how they view their bodies and body parts in terms of the functionality, than those girls who were not physically active (53). Girls who participated in organized sports, compared to general or no physical activity also had a higher functional body image, indicating that sport participation may play a role in increasing body image and self-esteem in adolescents (53). Overall, it was found that participants involved in some type of sport or physical activity had an enhanced body image in comparison to those who were not involved in any form of physical activity. Slater and Tiggemann (2010), found slightly different results to those of Abbott and Barber (2011). Slater and Tiggemann (2010) examined self-esteem, which included body image, in adolescents aged 12 to 16, who were involved in sports (54). This study found that there were very few differences for adolescents who played sports and those who did not in terms of body image and overall self-esteem (54).

In accordance with the results of Abbott and Barber (2011), a study with preadolescent children in grade six, examined the relationship of physical activity, eating patterns and body image and self-esteem. In this study, Sands, Tricker, Sherman,

Armatas, and Maschette (1997), conducted numerous questionnaires, examining different variables related to childhood development (55). Sands et al. (1997) found that females, more so than males, had an increased body image and self-esteem when they were participating in physical activity (55). The children that were less involved in physical activity had a lower self-esteem and a higher body dissatisfaction ($p<0.05$) (55). Additionally, Marsh and Kleitman (2003), examined athletic participation in children in grades 8 and 10 (56). They found that athletic participation was positively associated with numerous benefits for the children, including acting as a significant predictor of positive self-esteem ($p<0.01$) (56).

Duncan and Al-Nakeeb (2004), examined whether there was an association between children's body image and physical activity. The children they studied were between the age of 11 and 14 years and were from both high and low socioeconomic families (57). Duncan and Al-Nakeeb (2004) found that there was no significant relationship between body esteem and daily physical activity levels ($p >0.05$) (57). They also found that boys reported significantly higher self esteem ($p<0.01$) than girls of the same age, which is a consistent finding in the literature (20, 36, 38, 57-60). One possible reason for the discrepancies in these results could be due to the fact that this study was conducted in children, while the majority of previous studies were conducted in adolescents and adults.

2.3.2 Physical Activity and Depression

Involvement in physical activity has also been shown to have a positive protective effect for children and adolescents at risk for being depressed (61, 62). Boone and Leadbeater (2006), examined the relationship between sport involvement and protection

against depressed mood and risky behaviours in middle school children (61). Boone and Leadbeater (2006) found that children who participated in sports had enhanced perceived social acceptance and decreased body dissatisfaction ($p<0.01$), and that these effects were due to positive experiences in the sport environment such as coach and peer support (61). The article also suggested that coaches play a role in this relationship through their position as non-parent mentors for children (61). Gore, Farrell, and Gordon (2001), examined longitudinal data from students in Boston to again, determine if sports involvement played a role in protecting against depressed mood among high school students (62). This study found that highly depressed females participated in sports significantly less often than students suffering from slight to moderate depression ($p<0.005$) (62). In the male group the results were not as telling, but the level of males who were highly depressed and involved in sports was still much lower than the level of males that were slightly or moderately depressed (62). The benefits of athletic participation were seen regardless of whether the children engaged in individual or team sports (56).

2.3.3 A Coach's Influence on Body Image and Self-Esteem

The benefits of sport involvement can be enhanced if the relationship of the athlete with the coach is examined over involvement in the sport in general. Jowett and Cramer (2010), examined the athlete's relationship with their parent and their coach and the impact on the child's self-perception (63). This study examined 173 athletes, aged 13-23 and found that the meaningfulness of the athlete-coach relationship was related to the athlete's descriptions of self, which included body image, and mental and physiological competence (63). The individuals who had a more meaningful relationship with their

coach scored better, showing that a coach-athlete relationship had a protective effect against body dissatisfaction, and may influence general well-being. In connection with this, Coastworth and Conroy (2006), examined coach-athlete relationships in terms of self-esteem (64). Coatsworth and Conroy (2006) examined if differences in self-esteem were evident when coaches received training for enhancing self-esteem (64). It was found that coaches with training made the most difference in children with the lowest self-esteem, but overall, having a positive relationship with the coach was found to enhance athlete self-esteem (64). Younger children were also most likely to benefit when a positive coach-athlete relationship existed; this may be due to the fact that younger children are less cognitively mature and rely more on direct feedback to determine how they feel about themselves (64). These findings suggest that younger children may be more influenced than older children are by their coaches, and therefore a positive relationship is extremely important at a young age.

More research needs to be conducted on the influence that sports and physical activity have on young children's body image and self-esteem. There are other confounding factors that can affect these variables, including being on a team, which can have a positive impact on children and youth (9). There are many aspects of athletic involvement that have been shown to have positive effects on self-esteem and body image (9).

2.4 Diet Quality

Diet quality plays a role in how the body looks, feels and works. According to the 2009 Canadian Community Health Survey (CCHS), three in 10 adolescents have energy intakes that exceed their needs (65). Many Canadian adolescents have inadequate

magnesium, vitamin A and phosphorus, with concerns that they are not consuming enough calcium, potassium and fibre (65). As well, sodium intakes among Canadian adolescents are at an especially high level, with more than 80% having intakes in excess of the tolerable upper intake level (UL), leading to increased disease risk (65).

There are numerous parameters that play a role in what drives the decision for what, how, and why certain foods are chosen on a daily basis. One factor that could play a large role in what children choose to eat is the way they feel about their bodies. Studies have shown that children as young as five have expressed fears about becoming fat, and have demonstrated dissatisfaction with their bodies (10, 24). There is also an increasing number of children and adolescents dieting to lose weight, and as a consequence usually not meeting recommended intakes for certain nutrients (28). Dieting is increasingly being observed in younger children, which is concerning due to possible adverse outcomes such as stunted growth, susceptibility to disease, increased risk for osteoporosis, etc (28).

Socioeconomic status can play a large role in what people choose to eat as well. Shahar, Shai, Vardi, Shahar, and Fraser (2005) examined differences in eating habits between high and low socioeconomic groups in Negev, Israel (66). Numerous differences appeared between groups including lower supplement intake and levels of physical activity among the low-income group, as well as significantly lower intakes of minerals (such as iron, calcium, zinc and magnesium) and vitamins (such as C, B1, B2, B6 and niacin) among the low-income groups ($p<0.001$) (66). Shahar et al (2005) also found that low-income populations had higher intakes of the fats and oils food group, and lower intakes of the dairy, legumes and grains groups than the high-income populations, and within the fruits group the low-income population had much higher intakes of fruit juice

over actual fruit (66). In comparison, Knol, Haughton, and Fitzhugh (2005) examined dietary intakes among children aged two to eight years from low-income families (67). Knol et al. (2005) identified several groups that children from low-income families fell into when making changes to their diet due to their financial situation: substituters, light eaters, low-cost eaters, semi-vegetarians, and big eaters (non-whole grains style and meat and potatoes style) (67). Among two to three year old children the majority fell into the big eaters category, which was categorized by higher energy intakes, including higher intakes of grains, vegetables and meats, and lower intakes of fruit; the majority of the four to eight year old children fell into the light eaters category, which meant they had low energy intake, and rarely consumed the minimum number of servings for each food group (according to the USDA's Food Pyramid) (67). It is important to note that none of the children studied were consuming a balanced diet, with almost every child consuming high levels of sugar and discretionary fat (67). In a 2002 study, Giskes, Turrell, Patterson, and Newman examined differences in fruit and vegetable consumption based on socio-economic status (68). Giskes et al (2002) found that individuals from low-income families were less likely to consume fruit and vegetables than higher income individuals, and that some of the main barriers to fruit and vegetable consumption were cost, and ability to store produce for extended periods of time (68). Finally, Schroder, Marrugat and Covas (2006) examined the cost of food in relation to BMI (69). Schroder et al. (2006) based healthy eating on two diets, the Mediterranean diet, and the healthy eating index (HEI) diet, which was based on the food guide and healthy eating guidelines for Americans (1995) (69). Schroder et al. (2006) found that individuals who followed one of these diets paid approximately $1.00-$2.00 more on a daily basis for food than

individuals who did not (69). Another main finding of this study was that following one of these diets was directly related to a lower BMI, indicating that a higher BMI seen in low-income populations may be due to the higher price of following a healthy diet (69).

2.4.1 Food Attitudes

Wardle and Beales (1986), examined food attitudes and dietary quality in children aged 12-18. The researchers looked at numerous factors such as body image, dieting behaviour, food attitudes, and food intake recall to determine if there was a relationship between these factors (70). It was found that children in all age groups were taking part in restrained eating behaviours, with girls being more likely to partake in these behaviours than boys (70). All of the children reported that they enjoyed fattening foods the most, while girls valued "slimming" or "neutral" foods more than boys, and felt greater guilt when it came to eating these "fattening" foods (70). Males of all ages did share in the feelings of guilt for eating these "fattening" foods but to a lesser extent than females (70). Similarly, females have been found to be more likely to skip meals, restrict portion sizes, and take weight loss pills than males (71).

2.4.2 Eating Behaviours and Body Image

In a 2003 study Lattimore and Halford found that adolescents who were dieting to lose weight were more likely to skip breakfast, and that this was especially prominent in girls ($p<0.001$). The same girls who were dieting to lose weight also ate less sugary, fatty, salty, snack, and low-sugar foods than girls who were not dieting (28). The participants, particularly females, who were identified as "high" risk for eating disorders were also the ones who showed the greatest correlation with dietary restraint, oral control and bulimic behaviours (28). In comparison, Shapiro, Newcomb, and Loeb (1997) examined body

issues and eating patterns in grade three children in Los Angeles. Shapiro et al. (1997) found that 30% of boys and 31% of girls were always afraid of being fat, and 7% of boys and 10% of girls reported that their weight made them unhappy (24). The students also displayed numerous dieting behaviours, with 7% of boys and 11% of girls reporting having thrown up on purpose to lose weight, and 10% of boys and 13% of girls "always" trying to lose weight by going on a diet (24). The girls in this study were also significantly ($p<0.05$) more likely to report eating foods that would help them stay thin, and less likely to eat foods that would make them fat ($p<0.05$) than the boys (24).

To complement the above results, Woodruff, Hanning, Lambraki, Storey, and McCargar (2008), examined the Healthy Eating Index-C (HEI-C) which looks at diet quality, in relation to body weight concerns, weight-loss dieting, and meal skipping patterns, among adolescents in Ontario and Alberta (72). Woodruff et al. (2008) found that 28% of the participants were concerned about a high body weight, and 20% were eating less than normal in order to lose weight; as well significantly more girls than boys ($p<0.001$), and overweight and obese participants than normal weight participants ($p<0.001$) fell into one of the two groups: weight concerned but not dieting, or weight concerned and dieting (72). Of the participants who were normal weight, 26% were dieting or weight concerned, while of those who were overweight or obese 41% were neither dieting, nor weight concerned (72). Approximately 27%, 14% and 7% of the individuals skipped breakfast, lunch and dinner respectively, with the majority of these individuals being female (72). For the majority of the participants, diet quality fell into the needs improvement category, but those who ate breakfast, lunch, and dinner had a better diet quality than those who skipped one or more of those meals (72). Overall, there

was a strong relationship indicating that those with the worst diet quality, were also concerned with a high body weight, and were dieting to lose weight; those participants who skipped breakfast were also shown to have a worse diet quality (72).

In a 2007 study, Vocks, Legenbauer, and Heil examined the relationship between eating patterns, body satisfaction and body image. In this study, 57 females without a clinical eating disorder, as assessed by the Eating Disorder Examination Questionnaire (EDE-Q), were randomly assigned to an experimental or a control group. In the experimental group the women were asked to drink 500 ml of milkshake while watching a movie, while the control group was asked to watch the movie, without milkshake consumption (73). It was found that body dissatisfaction increased after consumption of the milkshake ($p=0.037$) and that there was no significant change in body dissatisfaction in the control group ($p=0.816$); they also found that the discrepancy between "felt" and "ideal" body weight increased upon completion of the milkshake (73). These results demonstrated that both weight and shape satisfaction decreased upon consumption of the milkshake, showing that consumption of food, and more particularly unhealthy food may result in more negative attitudes towards ones body. Similarly, a study examined the effect of exposure to "idealized" images of individual's bodies in relation to dieting behaviour over a period of a few days (74). In this study, all individuals who were exposed to the "idealized" images were more likely to demonstrate dieting behaviour; in contrast when these images were paired with social comparison, high BMI individuals demonstrated dieting behaviours, but low BMI individuals did not (74). These results indicate that negative feelings about the way that one looks can impact their food consumption and dieting behaviours. In contrast to these results, however, Ojserkis,

Sysko, Goldfein, and Devlin (2012) found that in individuals with binge eating disorder, those who overvalued shape and weight and had the most shape and weight concerns were more likely to engage in binge eating behaviours (75). The participants who overvalued shape and weight also indicated having higher levels of depression and lower levels of self-esteem (75). The conflicting results from these studies indicate that body image can impact a person's eating behaviours negatively in both respects, in some cases it may cause individuals to engage in extreme dieting practice, and in others it may cause them to engage in binge eating behaviours.

2.4.3 Dieting and Body Mass Index

Children living in rural areas have also been shown to have issues with their weight, dieting, and diet quality. Packard and Krogstrand (2002), studied girls aged 8-17 and found that half of the girls reported weight concerns and dieting behaviours, and that those girls who reported that they "sometimes" or "always" went on a diet had a higher BMI than those girls who reported that they "never" went on a diet ($p=0.0001$) (11). Of the girls studied, 39% chose the same figures for their current self and ideal self, and although 59% chose thinner bodies as their ideal self, the mean score revealed that girls only wanted to be less than one body size thinner than they already were. This desire to be thinner increased significantly at the age of 11 ($p<0.0001$) (11). In terms of diet quality, 87% of the girls aged 11 to 17 failed to meet the DRI for one or more nutrient, and 20% of the girls were not getting adequate vitamin C, 39% inadequate magnesium, and 43% inadequate calcium (11). This indicates that children who are dissatisfied with their bodies may have a declining dietary intake, increasing their risk of nutrient deficiencies and related diseases.

A study by van Kooten, Ridder, Vollebergh, and van Doresselaer (2007), examined whether there was a relationship between diet quality, other health behaviours, and emotional distress in adolescents aged 12-16. van Kooten et al. (2007) found that emotional distress was related to unhealthier eating behaviours, but that this was not related to anxiety/depression and school related stress (76). It was also suggested that overall unhealthy behaviour is a result of a pattern of risky health behaviours in adolescents, and that risk awareness was not associated with decreased willingness to engage in these behaviours (76). Robinson, Kosmerly, Mansfield-Green, and Lafrance (2013) examined the relationship between disordered eating, with gender, body mass index and difficulties in emotional regulation among male and female university students (77). Through this analysis they discovered that females reported more preoccupation towards dieting and food regulation than males did, as well females reported greater difficulties with emotional regulation skills (77). In terms of the relationships with dieting and BMI, females across all weight categories demonstrated similar likelihoods of engaging in dieting behaviours, while males, were only more likely to engage in these behaviours if they had a higher BMI (77). These results support that women are more affected by the ideals around how one's body should look, and are more likely to engage in weight loss behaviours at any weight category. As well, males who are a lower weight category, may be more likely to engage in behaviours to increase their weight status (77).

2.5 Conclusion

The issues associated with body image and self-esteem in children and adolescents are very complex. As well, very little longitudinal research has examined body image and self-esteem in adolescents from low-income families. The complexity of these issues, and

lack of research in this area, highlights the importance of identifying which factors have an influence on body image and self-esteem to improve programs geared towards children and adolescents. Investigating how weight status, physical activity and diet quality relate to body image and self-esteem among children and adolescents over time will provide unique recommendations for targeted strategies, particularly for a low-income population.

Chapter 3

THEORETICAL FRAMEWORK

3.0 Theoretical Framework

The Social Cognitive Theory (SCT) is the theoretical framework that guides this research project. This theory examines the social aspect of what drives our behaviours and actions. Roux and Auchincloss (2009) have stated that social processes through their influences on social and physical environments, as well as norms and attitudes conveyed through social networks are key influencers in the way people interact and behave (78). As well, Stice and Whitenton (2002), examined social and individual factors as determinants of a negative body image in young adolescent girls aged 11-15 years and found that sociocultural pressure and deficits in social supports contributed to body dissatisfaction (79). These factors included society's interpretation of what is beautiful, which can lead to a thin-ideal in adolescents, weight related teasing, and lack of support from friends, family, and mentors (79). The SCT has been used in pervious research examining body image (80).

3.1 Social Cognitive Theory

The SCT was created by Bandura in 1962 and is grounded in three main factors that are constantly influencing one another (81). The factors are so interrelated that a change in one of them will cause a change in the others; the factors embedded in SCT are behavioural, personal and environmental (81). SCT is used to explain how people acquire and maintain certain behaviours. The environmental factors of SCT play a major role in this theory and can include both the physical environment as well as the cognitive interpretation of the environment (81). The environment provides examples for behaviour (81). SCT relates directly to this study because body image and self-esteem are related to influences of every day life such as weight status, physical activity and diet quality. The

environment is important because it encompasses everything that an individual comes into contact with both physically and socially. As well, learned behaviours from the environment may influence people's actions (for example partaking in physical activity) (81). Learned behaviours include any behaviour that has become normative based on constant influences from the environment and interactions with others. Learned behaviours can include dieting behaviours such as skipping meals to achieve an optimal body weight because of norms set by society or because an adolescent's peers are also skipping meals.

The behavioural component includes everything that a person physically does. SCT follows the theory that if a person can perform a behaviour than they must know what the behaviour is (81). This study will examine how behaviours, particularly eating behaviour and physical activity, are influential of body image and self-esteem. Finally, personal factors are the internalizations that one has about a particular issue. In this study, the personal factors would be those that develop about body image and self-esteem within each program participant, as well as personal characteristics such as the sex of the participant.

The main way to predict behaviour change in SCT is through reinforcements (positive or negative), outcome expectations, outcome expectancies and self-efficacy (81). Positive reinforcement is a response to a behaviour that is likely to increase that behaviour, while negative reinforcement is a response that aims to decrease the behaviour (81). A positive reinforcer would be something that would increase the individual's body image and self-esteem (i.e. participation in physical activity), while a negative reinforcer would decrease body image and self-esteem (i.e. increased weight status). Outcome

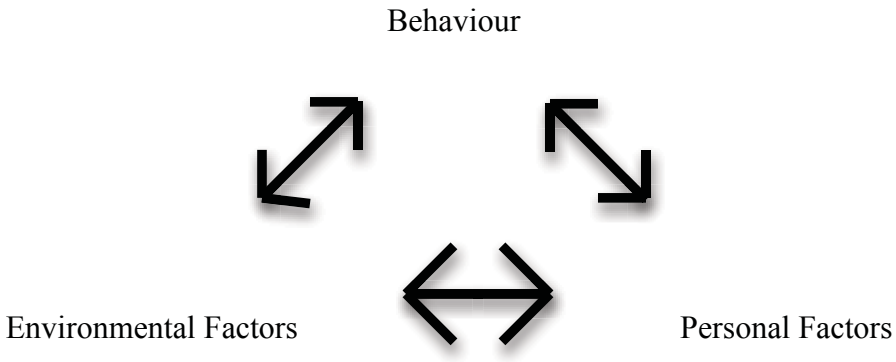
expectations are the events that a person expects to occur following a certain behaviour (i.e. increasing energy intake would lead to weight gain) (81), while outcome expectancies are the values placed on the outcomes of a certain behaviour; they can act like incentives for the behaviour (i.e. it is thought that increasing physical activity levels would lead to weight loss) (81). Finally, self-efficacy is the confidence that a person has in performing an activity; including their confidence to overcome the barriers for that behaviour (i.e. if someone believes they can consume a healthier diet, they are more likely to be successful in doing so) (81).

Due to the complex issues of body image and self-esteem, SCT is an appropriate theoretical framework for this study. SCT helps to make sense of the complexity and interconnectedness between factors that influence body image and self-esteem in children and adolescents. This interconnectedness is evident in the literature particularly with the contributing factors to a negative body image and self-esteem in children and adolescents. While all factors are interconnected and influence one another, there is no one main factor that contributes to negative body image and negative self-esteem. A visual representation of the SCT is shown in Figure 1.

Many ways of examining body image and self-esteem have been studied using different theoretical frameworks. It has been suggested that the best method to use is a combination of frameworks due to the multifactorial etiology of body image and self-esteem issues (82). A number of studies have examined both the social comparison theory and the objectification theory in relation to body image and self-esteem and have found that, while both theoretical frameworks have their place, alone they do not fully provide evidence to support the influences of body image and self-esteem (82, 83). The

SCT encompasses both of these frameworks, while also taking into consideration other factors that could influence body image and self-esteem. As well, the SCT has been used as a framework to define body image in young children and college aged women in research in the past (84, 85).

Figure 1: Social Cognitive Theory



Chapter 4

RESEARCH STATEMENT AND OBJECTIVES

4.0 Research Statement and Objectives

4.1 Research Statement

To investigate the factors associated with body image and self-esteem among adolescents from economically disadvantaged neighbourhoods and to determine if these relationships change over time.

4.2 Objectives

This research project will be comprised of two objectives.

Objective 1: To examine the relationship between weight status, physical activity, diet quality, self-esteem and demographic variables (Table 3) as the predictors and body image as the dependent variable among children and adolescents, and to determine if the same predictors for grade 6 also work in grade 9.

Objective 2: To examine the relationship between weight status, physical activity, diet quality, body image and demographic variables (Table 3) as the predictors and self-esteem as the dependent variable among children and adolescents, and to determine if the same predictors for grade 6 also work in grade 9.

A unique aspect of this research is that it examines the relationship of food group variables (the four food groups as defined by the Canada's Food Guide [CFG] and an "other" food group) in relation to body image and self-esteem.

Chapter 5

METHODS

5.0 Methods

Data for this research project were collected as part of the Better Beginnings, Better Futures (BBBF) study, which is a longitudinal, primary prevention program aimed at neighbourhoods in Ontario that are economically disadvantaged (86). There were two types of sites examined in the BBBF study with programming aimed at children from birth to four years, and others with programming aimed at children from four to eight years (87). For the purposes of this research study, only the older child site focusing on four to eight year olds were examined. The older child sites were recruited through the school system and divided into demonstration and comparison sites; the demonstration site communities included Cornwall, Highfield and Sudbury, while the comparison site communities included an area in the town of Vanier and city of Ottawa, as well as a combination of schools in Etobicoke (88). Baseline samples were collected within the school system, when the children were in junior kindergarten. The children were sent home with a letter explaining the program; parents who were willing to have their child participate returned a completed consent form to the school (88).

The BBBF study has three main goals "1) prevent serious social, emotional, behavioural, physical and cognitive problems in young children 2) promote the social, emotional, behavioural, physical and cognitive development of these children and 3) enhance the abilities of socio-economically disadvantaged families and communities to provide for their children" (89). Each community that took part in the BBBF study developed programs to promote healthy child development, but individual focus was not intended for the purposes of the BBBF study. The study was aimed at community level development, and the intention was not to examine the effect of specific programs and

factors at each community in terms of the success of BBBF, but to examine the total program as a framework for primary prevention (90).

Two quasi-experimental designs were used for the data collection, which included a) a base-line focal design and b) a longitudinal comparison site (a nonrandom control group) (86). Data were collected annually in the older child sites from 1994 to 1998. A supplementary sample of the children in grade 3 at these sites was picked up in 1998. In 2000 and 2001 grade 6 data was collected and in 2003 and 2004 grade 9 data was collected. (88). At the times of data collection over 100 outcome measures were gathered, examining a wide range of factors such as, children's emotional and behavioural problems, academic functioning, child and parent health promotion, family functioning, and neighbourhood quality (91).

The longitudinal phase of this study began in 1994, recruiting families with children born in 1990 and enrolled in junior kindergarten to form the research cohort. Data on body image and self-esteem, as well as some of the other variables of interest were only collected at two time points; therefore, data are from 2000 / 2001 when the students were in grade 6 and 2003 / 2004 when the students were in grade 9.

For each data collection period a comprehensive interview was conducted in the home with one of the child's parents (usually the mother). The parent interview gathered information such as sex and birth date of the child and adolescent, whether it was a single or two parent household, birthplace of the mother, level of education attained by mother, self-reported weight and height of mother, and household income.

The Youth Self Report Form (YSR) was a self-administered questionnaire completed by students in grade six, and again when they were in grade nine. This was completed

during class time, under the supervision of their teachers and a member of the project staff. This questionnaire included 60 questions covering topics such as friends, family, feelings, behaviours, food and health. Questions from the YSR that were used in this study relate to body image and self-esteem, physical activity, and eating behaviours. One question from the YSR was used to examine body image. The question "I like the way I look" allowed for five response categories: false, mostly false, sometimes false / sometimes true, mostly true, and true. The body image variable was dichotomized so that responses of 1.00 (False), 2.00 (Mostly False), and 3.00 (Sometimes False / Sometimes True) were given a value of 0.00 (indicating a poor body image), and responses of 4.00 (Mostly True) and 5.00 (True) were given a value of 1.00 (indicating a strong body image). Body image responses were grouped this way because part of this research looked to examine factors that may put children and adolescents at risk of developing a strong body image or a poor body image. As well, it was thought that children would be more likely to respond as "Sometimes False / Sometimes True" if they had more negative feelings towards the way that their body looked than if they had more positive thoughts. People often choose a neutral response category when they are too insecure to report a definitive response, or when they feel the need to respond in a socially desirable way (92). A child who indicates "Sometimes False / Sometimes True" may want to avoid showing that they have a negative body image, but may also not want to falsely state that they have a positive body image.

The YSR used a self-esteem scale from the National Longitudinal Survey of Children and Youth (NLSCY) to assess self-esteem. The higher the score achieved on this scale the higher the level of self-esteem (8). As with the body image variable, the self-esteem

scale was dichotomized. This scale was dichotomized so that scores below the 25th percentile, which would indicate the lowest level of self-esteem, were given a score of 0.00, while scores above the 25th percentile were given a score of 1.00 to indicate a higher self-esteem. This dichotomization allowed for a distinction between individuals with the lowest self-esteem and those with a higher self-esteem.

Two questions from the YSR were used to examine participation in physical activity. Both questions "During the past 12 months how often have you played sports or done physical activities WITHOUT a coach or an instructor (e.g. biking, skateboarding, etc.)?" and "During the past 12 months how often have you played sports WITH a coach or instructor, other than in gym class (swimming lesions, baseball, hockey, etc.)?" allowed for the response categories: never, less than once a week, 1 to 3 times a week, and 4 or more times a week. The activity questions were dichotomized so that the responses "never" or "less than once a week" were assigned a value of 0.00, and the responses "1 to 3 times a week" and "4 or more times a week" were assigned a value of 1.00. The physical activity variable was dichotomized this way to allow for a distinction between individuals who did not usually participate in physical activity (less than one time per week) and those who did (1 or more times per week). Items from the YSR are shown in Appendix 1.

The eating behaviour questions on the YSR are from the Eating Behaviour Survey (93). The first eating behaviour question asked about frequency of breakfast consumption and the second question examined how often specific foods (from all four food groups, plus a high fat / low nutrient density group) were consumed per week (Table 1). The questions were designed to provide an estimate of the frequency of consumption of

common foods. To validate the Eating Behaviour Survey, 24-hour dietary recalls were conducted with 123 students in grades 5 and 6. Mean intakes were calculated from the survey data. The frequency of intakes of the foods were converted to number of servings per day (at least twice a day = 2, once a day = 1, 4 to 6 times per week = 0.71, and 1 to 3 times per week = 0.29) and subsequently collapsed into the four food groups of Canada's Food Guide (94), plus an 'Other Foods' (high fat / low nutrient density) category (Table 2). In 2007 Health Canada released the new Eating Well with Canada's Food Guide (94). The 2007 Canada's Food Guide was made more age and sex specific and based on development of food intake patterns to achieve nutrient needs. Specific changes in the 2007 food guide include an increased number of servings of Vegetables and Fruit and Grain products. The new recommendations were used as the standard, which should be met by children and adolescents.

Table 1: Foods Examined in the Youth Self-Report Form

Food Group	Foods
Grain products	Bread products; Rice; Pasta; Cold cereals; Cooked cereals
Vegetables and fruit	Potatoes; Salad; Other vegetables; Fruit; Fruit juices
Milk products	Milk; Cheese; Yogurt
Meat and alternatives	Eggs; Beans; Peanut Butter; Meat; Chicken or fish
Other foods	Ice cream; French Fries; Pizza; Cakes or cookies; Snack food; Candy or chocolate; Regular soft drinks

Table 2: Recommended Number of Canada's Food Guide Servings per Day

	Children			Teens	
Age in Years	**2-3**	**4-8**	**9-13**	**14-18**	
Sex	**Girls and Boys**			**Females**	**Males**
Vegetables and Fruit	4	5	6	7	8
Grain Products	3	4	6	6	7
Milk and Alternatives	2	2	3-4	3-4	3-4
Meat and Alternatives	1	1	1-2	2	3

Following established guidelines height and weight were measured twice for each child (95). Height was measured to the nearest 0.1 cm using a modified tape measure (Microtoise, CMS Weighing Equipment, London, UK); weight to the nearest 0.5 lb with a strain-gauge digital scale (Wonderscale, Health-o-meter, Inc., Bridgeview, Illinois). A third measure was taken if the measures differed by 0.5 cm or 0.5 lb respectively; the average of the two closest measures was then recorded.

Using measured height and weight, BMI was calculated to determine the weight status category of the children and adolescents. Children and adolescents who's BMI was greater than or equal to the 85th percentile and less than the 95th percentile were categorized as overweight, while those who's BMI was greater than or equal to the 95th percentile were categorized as obese (96-98). Parental BMI was calculated using self-reported height and weight. Overweight and obesity in adults will follow the Health Canada guidelines of 25.0-29.9, and greater than 30.0 respectively (99). Table 3 outlines a list of variables that were included in the initial analysis.

Table 3: Variable List

Variable Name	Response Categories
Sports with a coach	Never and Less than once a week = 1; 1 to 3 times per week and 4 or more times a week = 0
Sports without a coach	Never and Less than once a week = 1; 1 to 3 times per week and 4 or more times a week = 0
Food group meet CFG recommendations (vegetable/fruit, grains, milk, meat)	Did not meet CFG recs = 0; Met CFG recs = 1
Other food group	Less than 3 servings per week = 0; 3 or more servings per week = 1
NLSCY scale: General self-esteem	Below the 25th percentile (low self-esteem)= 0; Above the 25th percentile (normal/high self-esteem) =1
I like the way I look (Body Image)	Below 3 (false/poor body image) = 0; Above 3 (true/strong body image) = 1
Child's age	Years
Sex of child	Male = 0, Female = 1
Height of child	cm
Weight of child	kg
CES Depression Scale	Below 16 (no depression) = 0; 16 or higher (depressed) = 1
R's (respondent) education level	Less than high school = 0; High school or more = 1
Height of respondent	cm
Weight of respondent	kg
Monthly income	dollars
Birthplace of P (parent)	Born in Canada = 0; Born outside of Canada = 1
Cultural Identity	Anglophone: No = 0; Yes = 1 Francophone: No = 0; Yes = 1 Native: No = 0; Yes = 1
R's (respondent) marital status	Not Married = 0; Married = 1
Site	Demonstration site = 0; comparison site = 1
Poverty status	Above the LICOs = 0; Below the LICOs = 1
Sex of respondent	Male = 0; Female = 1
Child's BMI	Underweight/Normal weight: No = 0; Yes = 1 Overweight: No = 0; Yes = 1 Obese: No = 0; Yes = 1
Respondent's BMI	Underweight/Normal weight: No = 0; Yes = 1 Overweight: No = 0; Yes = 1 Obese: No = 0; Yes = 1

Initially, BMI was broken into four variables, based on the CDC guidelines (Underweight, Normal weight, Overweight and Obese). BMI was then broken down into three variables indicating if an individual was underweight / normal weight, overweight, or obese. The underweight and normal weight variables were combined due to the low

number of underweight individuals identified in this study group (grade 6 n = 26; grade 9 n = 7; respondent grade 6 n = 9, respondent grade 9 n = 8). The underweight variable had too few cases for the analysis to be conducted on it alone. The BMI variables were finally dichotomized so that individuals who did not fall into the specified BMI category (under/normal weight, overweight or obese) for each dichotomization were assigned a code of 0.00, while individuals who did fall within the specified weight category were assigned a code of 1.00 (i.e., "not overweight" = 0.00, "overweight" = 1.00).

Some of the variables used in this analysis were dichotomized, these variables included: site, poverty status, birthplace of parent, parent's education level, body image, self-esteem, the CESD depression scale variable, sports with and without a coach and the "other" food group variable. The site variable indicating the five communities was recoded after preliminary analysis indicated no significant relationships with body image and self-esteem, to indicate whether the participants were from a demonstration or a comparison site. One-way analysis of variance (ANOVA) was run to test for clustering around each site. Clustering was not found to be an issue, so the sample could be treated as a simple random sample. The sites that had interventions (Cornwall, Highfield and Sudbury) were grouped into the demonstration category and given a value of 0.00, and the sites that had no intervention (Etobicoke and Ottawa-Vanier) were grouped into the comparison category and given a value of 1.00.

For poverty status, income was reported for each family and this was used along with household size and city of residence to determine poverty status according to the low-income cut-offs (LICOs) in 2003 (100). The LICOs are published according to whether a family is from a rural or urban community, community size and number of

people in a family (100). The published LICOs were used to determine if the family fell above the LICO or below the LICO and these were the categories used for the analysis. All families that fell above the LICO were assigned a code of 0.00, while the families that fell below the LICO were assigned a code of 1.00.

Birthplace of parent was recoded to reflect whether the parent was born inside or outside of Canada. The participants of this study helped in creating the questionnaires and stated that they would prefer less specific information than their exact place of birth to be used in analysis. As well, there were a small number of participants in a number of the response categories, and not a lot of variation occurred between the different response categories. All of the parents who were born outside of Canada were grouped together and assigned a code of 1.00 (born outside of Canada), while those born inside of Canada were assigned a code of 0.00 (born inside Canada).

The "respondent education level" variable was dichotomized to indicate whether the parents had a high school education or higher, or less than high school education. This variable was dichotomized this way to remain consistent with pervious BBBF studies that included this variable and dichotomized it in the same manner, and to remain consistent with this current study (101). As well, there were a small number of responses in many of the categories that indicated an education level below high school. The variable was dichotomized in such a way that the response "less than high school" was given a value of 0.00 and the response "high school or greater" was given a value of 1.00.

The original depression variable, based on the Center for Epidemiological Studies Depression Scale (CES-D) on a scale of 0 to 60 with a higher score indicating a higher level of depression, was recoded so that a score of 16 or more indicated that the

individual was at risk for being depressed and a score of 15 or less indicated that there was no depression present. A dichotomization with the same cut-off values has also been used in other studies (102-104) of children and adolescents when using the CES-D scale.

The sports with and without coach variables measured the amount of times in a week that the children participated in sports either with or without a coach present. The original variable was broken down into four categories "Never", "Less than once a week", "1 to 3 times a week", and "4 or more times per week". These response categories were then recoded into "Never and less than once per week" and "1-3 or 4 or more times per week", with the first dichotomy receiving a value of "0.00" and the second dichotomy receiving a value of "1.00". The variables were dichotomized this way to separate the children who regularly participated in physical activity from those who rarely or never did. This variable was also broken down into four variables to represent each level of physical activity for analysis in relation to body image and self-esteem. This allowed for a more in depth analysis of frequency of participation in relation to body image and self-esteem.

Finally, the "other food group" variable was dichotomized so that any less than three servings per week was considered a low intake and three or more servings per week were considered a high intake. This was done to indicate a reasonable level of high and low consumption from the "other" food group. It has been demonstrated that children who consume foods from the "other" food group (or foods identified as "junk food") three or more times per week were more likely to consume less fruits and vegetables and weigh more than their peers who consumed these foods less than three times per week (105, 106). As well the children who consumed these foods three or more times per week

were more likely to have increased risk of health problems such as asthma (105, 106). All of these studies found that consuming 3 or more servings per week of other foods was an appropriate cut-off to indicate a high intake of these other foods. This variable was therefore dichotomized for 3 or more servings per week to remain consistent with past research that has examined the relationships with high and low consumption of foods from the other food group.

5.1 Limitations

Using secondary data precludes collecting additional information that could support the research objectives. Dietary intake was estimated by a survey with only 25 items; therefore some foods that may have contributed to daily intake could be missing. As well, limited information of the type and frequency of physical activity is available and there is no marker for intensity or additional free play activities. The body image and self-esteem scales were also based on a limited number of questions for each; only one question was used to indicate body image and two questions to indicate self-esteem.

BMI in itself is not a great indicator of body fatness in children and adolescents because there are many varying factors that may influence a child's BMI; as well BMI cannot distinguish between body fatness, muscle mass and skeletal mass (107). For these reasons, BMI is a better indicator in children with a higher degree of body fatness, as opposed to more slender children (107). In recent years, waist circumference has been touted as a more accurate measurement of body fatness in children and adolescents (108). Due to the secondary nature of this study, BMI was the only measure that was available for analysis. As well, BMI has been used as a standard measure of body fatness in past

research. In future research, waist circumference measurements would be an important addition to the data set.

5.2 Ethical Considerations

This project received ethical approval from the Mount Saint Vincent University Research Ethics Board (MSVU REB) prior to the commencement of the data analysis. Secondary data analysis poses minimal risk to participants. No identifying information of the participants was available to the researcher, as the data had been stripped. All confidential information is stored on a personal, password-protected computer. Upon completion of the study confidential data will be destroyed. Access to this information was restricted the thesis committee and the researcher.

5.3 Data Analysis

Data was coded and analyzed using SPSS statistical analysis software (version 19.0 and 20.0, SPSS Inc., Chicago, Illinois). Statistical procedures included univariate analysis, Chi-Square test for independence, and linear and logistic regression analysis. Differences were considered significant at the $p<0.05$ level.

The research objectives as previously stated in chapter 4 were to examine the relationships of weight status, physical activity, diet quality and various demographic variables with self-esteem and body image at two points in time (grade 6 and grade 9). An important focus is on the individuals who have lower self-esteem and lower body image, and on the variables associated with being in these categories. As mentioned previously, scale measures of body image and self-esteem included in the YSR were dichotomized to classify adolescents into higher and lower categories of self-esteem and body image. For the purposes of clarity, the dichotomized versions of body image and

self-esteem have the identifier "status" attached (ex. Body image- status); while the scale version have the identifier "score" attached (ex. Body image- score).

Univariate analyses were conducted to summarize the study characteristics of the respondents. Significant pairwise associations between body image and self-esteem and each of the predictors were identified using the Chi-Square test for independence. In order to study how combinations of predictors were related to the individual's body image or self-esteem status, logistic regression models were developed. Predictors with significant pairwise associations with self-esteem and body image formed the initial pool of explanatory variables. These included weight status, physical activity, diet quality, and demographic variables (Table 3). The addition of variables that were not significant in the pairwise analysis would have decreased the sample size for the logistic regression models. As well, many of the variables that were excluded based on the pairwise analysis were ones that have not been previously identified in the literature as significant predictors of body image and self-esteem. Optimal models were identified using both "Forward" and "Backward" selection methods for both grade 6 and grade 9.

In models defined by logistic regression, the odds ratio (OR) represents the factor by which (on average) the odds of an individual having a strong body image or self-esteem will change if an individual moves from one response category to another, controlling for the other variables. For example, an individual who had a parent who was born outside of Canada had a 2.597 times higher odds of that individual being in the strong body image category compared to someone who had parents that were born in Canada (Table 16). In models defined by linear regression, the slope (B-value) represents the average changes in the response variable if the explanatory variable changes by one unit. For example, a

child who had parents who were born outside of Canada demonstrated an average 0.458 increase in their body image score (Table 18).

Another focus of the analysis was to identify variables associated with individuals' perception of self-esteem and body image. Linear regression, using the scale measure of self-esteem and categorical measure of body image from the YSR as response variables, was used to develop models using the variables in the study. Predictors with significant pairwise associations formed the initial pool of explanatory variables. Optimal models, including a subset of these predictors, were identified using "Forward" and "Backward" selection for both grade 6 and grade 9.

A unique aspect of this research was that it examined the consumption of foods from the four food groups (as identified from the Canada's Food Guide [CFG]) and an "other" food group in relation to body image and self-esteem. These variables were added into the regressions separately to examine how they influenced the overall model. As well, body image and self-esteem were added in at the final step because they are both strong predictors of one another. Adding them in at an earlier stage may have masked the effect of the other variables.

Finally, to examine the longitudinal relationship with the predictor variables and body image and self-esteem, models that were found to be significant in grade 6 were tested with the corresponding variables in grade 9. This was done to determine if the same factors impacting body image and self-esteem in grade 6 would impact body image and self-esteem in grade 9. Additionally, models for self-esteem and body image in grade 9 were developed from the pool of predictors from both grade 6 and grade 9. This was done to determine if significant predictors in grade 6 would have an impact on the child's

body image / self-esteem over time (in grade 9). Both of these analyses were carried out for the dichotomized and scale versions of the response variables using logistic regression and linear regression, respectively.

When using stepwise methods, cases with missing values in any of the variables in the original pool are excluded from the analysis. After the smaller set of variables included in the optimal models was identified, the analysis was repeated using these variables and all the available cases with non-missing values. The resulting final models were reported in the results section (Chapter 6).

To ensure the regression analyses were appropriate, a check for collinearity among the predictor variables was carried out. The Variance Inflation Factors (VIF) were below 10%, and the Condition number (CN) was below 30, indicating that collinearity was not a concern. Similarly, case analyses for each model indicated that the number and severity of extreme or influential observations were within acceptable limits. Most often, less than 5% of the observations had standardized residuals greater than 2. For each linear regression model, plots of the standardized residuals against standardized fitted values, histograms of the standardized residuals and normal probability plots examined to check statistical assumptions. In some cases the residual plots exhibited a weak negative trend with increasing size of the fits, and some of the normal plots showed larger proportions in the central areas compared to the tails. The final models were then checked for goodness of fit. Hosmer and Lemeshow test results are reported for logistic regression models and the Pearson R-square are reported for linear regression.

A small number of variables were excluded from the regression analyses because the responses were skewed too far in one direction or the other. The “sex of respondent”

variable was removed from the logistic regression analysis because a very large majority of the respondents were female so the response was very much skewed towards the female category. As well, the “native” variable was removed from the regression analysis because less than 5% of the respondents answered “yes” to this question.

Chapter 6

RESULTS

6.0 Results

6.1 Participant Demographics

The older cohort of the BBBF study included a sample of 1000 children with a fairly even split of males and females (males (gr 6) n = 391; females (gr 6) n = 339); males (gr 9) n = 350; females (gr 9) n = 323); while the majority of the parents who participated in this study were female (the child's mother) (males (gr 6) n = 59; females (gr 6) n = 671; males (gr 9)n = 48; females (gr 9) n = 625). The participants were also fairly evenly distributed between the demonstration and comparison sites, with 60.4% of the children from the demonstration sites and 39.6% of the children from the comparison sites. Baseline demographics of the study participants are listed in Table 4.

Table 4: Characteristics of The Study Group

Variable	Response	Percent
Sex of Respondent (Gr 6)	Male: 59 Female: 671	8.1% 91.9%
Sex of Respondent (Gr 9)	Male: 48 Female: 625	7.1% 92.9%
Sex of Child (Gr 6)	Male: 391 Female: 339	53.6% 46.4%
Sex of Child (Gr 9)	Male: 350 Female: 323	52% 48%
Child BMI (Gr 6)	Underweight: 26 Normal weight: 338 Overweight: 112 Obese: 96	4.5% 59.1% 19.6% 16.8%
Child BMI (Gr 9)	Underweight: 7 Normal weight: 186 Overweight: 49 Obese:31	2.6% 68.1% 17.9% 11.4%
Respondent BMI (Gr 6)	Underweight: 9 Normal weight: 320 Overweight: 194 Obese: 116	1.4% 50.1% 30.4% 18.1%
Respondent BMI (Gr 9)	Underweight: 8 Normal weight: 284 Overweight: 200 Obese: 111	1.3% 47.1% 33.2% 18.4%
Site	Demonstration: 604 Comparison: 396	60.4% 39.6%
Poverty Status	Above LICOs: 295 Below LICOS: 241	55% 45%
Cultural Identity (Gr 6)	Anglophone: 193 Francophone: 240 Native: 21	42.5% 52.9% 4.6%
Cultural Identity (Gr 9)	Anglophone: 203 Francophone: 201 Native: 19	48% 47.5% 4.5%
Respondent education (Gr 6)	Less than HS: 107 HS or more: 615	14.8% 85.2%
Respondent education (Gr 9)	Less than HS: 75 HS or more: 588	11.3% 88.7%
Respondent marital status (Gr 6)	Married: 635 Single: 93	87.2% 12.8%
Respondent marital status (Gr 9)	Married: 562 Single: 108	83.9% 16.1%
Birthplace of Parent (Gr 6)	Inside Canada: 294 Outside Canada: 237	55.4% 44.6%
Birthplace of Parent (Gr 9)	Inside Canada: 266 Outside Canada: 203	56.7% 43.3%
Body Image- status (Gr 6)	Low: 152 High: 519	22.7% 77.3%
Body Image- status (Gr 9)	Low: 162 High: 361	31.0% 69.0%

Table 4: Characteristics of The Study Group Cont'd

Variable	Response	Percent
Body Image – score (Gr 6) Based on the question: "I like the way that I look"	False (1): 19 Mostly false (2): 32 Sometimes true/false (3): 100 Mostly true (4): 182 True (5): 335	2.8% 4.8% 15.0% Min: 1 Max: 5 27.2% Mean: 4.17 50.2% Std dev: 1.035
Body Image – score (Gr 9) Based on the question: "I like the way that I look"	False (1): 29 Mostly false (2): 20 Sometimes true/false (3): 110 Mostly true (4): 175 True (5): 186	5.6% 3.8% 21.2% Min: 1 Max: 5 33.6% Mean: 3.90 35.8% Std dev: 1.104
Self-esteem- status (Gr 6)	Low: 163 High: 502	24.5% 75.5%
Self-esteem- status (Gr 9)	Low: 121 High: 394	23.5% 76.5%
Self-esteem – score (Gr 6)	Scale: 0-20	Min: 6 Max: 20 Mean: 17.03 Std dev: 2.553
Self-esteem- score (Gr 9)	Scale: 0-20	Min: 4 Max:20 Mean: 16.38 Std dev: 3.003
Sports with a coach (Gr 6)	Less than once/week: 321 More than once/week: 355	47.5% 52.5%
Sports without a coach (Gr 6)	Less than once/week: 131 More than once/week: 546	19.4% 80.6%
Sports with a coach (Gr 6)	Never: 221 Less than once/week: 102 1-3 times/ week: 230 4 or more times a week: 126	32.5% 15.0% 33.9% 18.6%
Sports without a coach (Gr 6)	Never: 52 Less than once/week: 79 1-3 times/ week: 173 4 or more times a week: 376	7.6% 11.6% 25.4% 55.4%
Sports with a coach (Gr 9)	Less than once/week: 213 More than once/week: 307	41.0% 59.0%
Sports without a coach (Gr 9)	Less than once/week: 329 More than once/week: 193	63.0% 37.0%
Sports with a coach (Gr 9)	Never: 239 Less than once/week: 71 1-3 times/ week: 112 4 or more times a week: 101	45.7% 13.6% 21.4% 19.3%
Sports without a coach (Gr 9)	Never: 84 Less than once/week: 110 1-3 times/ week: 132 4 or more times a week: 199	16.0% 21.0% 25.1% 37.9%
Vegetable/fruit meet CFG (Gr 6)	Meet recs: 114 Doesn't meet recs: 546	17.3% 82.7%
Vegetable/fruit meet CFG (Gr 9)	Meet recs: 27 Doesn't meet recs: 492	5.2% 94.8%
Grain meet CFG (Gr 6)	Meet recs: 64 Doesn't meet recs: 595	9.7% 90.3%
Grain meet CFG (Gr 9)	Meet recs: 16 Doesn't meet recs: 503	3.1% 96.9%

Table 4: Characteristics of The Study Group Cont'd

Variable	Response	Percent
Meat meet CFG (Gr 6)	Meet recs: 569 Doesn't meet recs: 91	86.2% 13.8%
Meat meet CFG (Gr 9)	Meet recs: 178 Doesn't meet recs: 342	34.2% 65.8%
Milk meet CFG (Gr 6)	Meet recs: 342 Doesn't meet recs: 329	51.0% 49.0%
Milk meet CFG (Gr 9)	Meet recs: 211 Doesn't meet recs: 309	40.6% 59.4%
Other FG (Gr 6)	Less than 3 svgs: 431 3 or more svgs: 229	65.3% 34.7%
Other FG (Gr 9)	Less than 3 svgs: 386 3 or more svgs: 142	73.1% 26.9%
Depression (Gr 6)	No depression: 294 Depression: 423	41.0% 59.0%
Depression (Gr 9)	No depression: 302 Depression: 353	46.1% 53.9%

6.2 Pairwise Relationships with Body Image and Self-Esteem

To examine whether each of the variables (Table 4) were significantly related to body image or self-esteem in grade 6 or grade 9, the Chi-Square test for independence was conducted. Tables 5-8 outline the significant ($p<0.05$) relationships between the initial pool of demographic variables and body image / self-esteem in grade 6 and grade 9.

Table 5: Demographic variables significantly related to body image (grade 6)

Variable	Poor body image (%)	Strong body image (%)	Chi-square df = 1
Married			n = 644
No	33.8	66.2	6.188
Yes	21.3	78.7	p = 0.013
Francophone			n = 644
No	20.5	79.5	4.204
Yes	27.9	72.1	p = 0.040
Birthplace of P			n = 469
In Canada	29.9	70.1	11.672
Outside of Canada	16.3	83.7	p = 0.001
Sex of child			n = 646
Male	17.7	82.3	10.562
Female	28.5	71.5	p = 0.001
Site			n = 668
Demonstration	25.2	74.8	5.276
Comparison	17.2	82.8	p = 0.022

Table 6: Demographic variables significantly related to body image (grade 9)

Variable	Poor body image (%)	Strong body image (%)	Chi-square df = 1
Francophone			n = 512
No	25.2	74.8	15.780
Yes	42.5	57.5	p = 0.000
Birthplace of P			n =362
Inside Canada	35.7	64.3	4.761
Outside Canada	24.8	75.2	p = 0.029
Sex of child			n = 512
Male	19.3	80.7	36.027
Female	43.8	56.2	p = 0.000
Site			n = 520
Demonstration	35.5	64.5	12.266
Comparison	20.5	79.5	p = 0.000

Table 7: Demographic variables significantly related to self-esteem (grade 6)

Variable	Low Self-Esteem (%)	High Self-Esteem (%)	Chi-square df = 1
Married			n = 640
No	35.0	65.0	5.790
Yes	22.7	77.3	p = 0.016

Table 8: Demographic variables significantly related to self-esteem (grade 9)

Variable	Low Self-Esteem (%)	High Self-Esteem (%)	Chi-square df = 1
Birthplace of P			n = 359
Inside Canada	26.6	73.4	6.843
Outside Canada	14.9	85.1	p = 0.009
Sex of child			n = 507
Male	19.1	80.9	7.047
Female	29.2	70.8	p = 0.008
Site			n = 515
Demonstration	27.5	72.5	9.206
Comparison	15.4	84.6	p = 0.002

Table 9 highlights the significant relationships between weight status and body image through initial Chi-Square analysis. Weight status was significantly related to body image in grade 6 and grade 9, but no significant relationships were identified between weight status and self-esteem. If a child was normal weight or underweight in grade 6

they were significantly more likely to have a higher body image than their peers who were overweight or obese ($X^2(1) = 4.965$, $p = 0.026$). In comparison, if a child was obese in grade 6, they were significantly more likely to have a lower body image than their peers who were not obese ($X^2(1) = 8.148$, $p = 0.004$). The same relationships were demonstrated with body image in grade 9 for children who were normal weight or underweight ($X^2(1) = 4.013$, $p = 0.045$), as well as children who were obese ($X^2(1) = 6.720$, $p = 0.010$).

Table 9: Significant relationships between weight status and body image

Variable	Poor body image (%)	Strong body image (%)	Chi-square df = 1
cBMI Normal/ under weight (gr 6)			n = 564
Under/normal weight	20.4	79.6	4.965
Not	28.6	71.4	p = 0.026
cBMI Obese (gr 6)			n = 564
Obese	34.7	65.3	8.184
Not	21.1	78.9	p = 0.004
cBMI Under/Normal weight (gr 9)			n = 265 4.013
Under/normal weight	27.6	72.4	p = 0.045
Not	40.0	60.0	
cBMI Obese (gr 9)			n = 255
Obese	51.6	48.4	6.720
Not	28.6	71.4	p = 0.010

Table 10 highlights the significant relationships between physical activity and body image through initial Chi-Square analysis. Participation in any form of physical activity in grade 6 demonstrated a significant relationship with improved body image and self-esteem. Body image was significantly higher in children in grade 6 who played sports one or more times per week, than in those who did not, this relationship was demonstrated when the children played sports with a coach ($X^2(1) = 8.679$, $p = 0.003$), and without a coach ($X^2(1) = 5.545$, $p = 0.019$). Children who played sports with a coach

($X^2(1) = 2.880$, p = 0.090), and without a coach ($X^2(1) = 12.512$, p = 0.000), one or more times per week in grade 9 demonstrated a lower body image.

Table 10: Significant relationships between physical activity and body image

Variable	Poor body image (%)	Strong body image (%)	Chi-square df = 1
Sports w/o a coach (gr 6)			n = 667
Never	30.5	69.5	5.545
1 or more times per week	20.8	79.2	p = 0.019
Sports w/ a coach (gr 6)			n = 666
Never	27.7	72.3	8.679
1 or more times per week	18.1	81.9	p = 0.003
Sports w/o a coach (gr 9)			n = 517
Never	25.3	74.7	12.512
1 or more times per week	40.2	59.8	p = 0.000
Sports w/ a coach (gr 9)			n = 515
Never	26.5	73.5	2.880
1 or more times per week	33.6	66.4	p = 0.090

Table 11 highlights the significant relationships between weight status and self-esteem through initial Chi-Square analysis. Physical activity also played a role in influencing a child's self-esteem. In grade 6 children, those who played sports one or more times per week demonstrated a significantly higher self-esteem than those who did not, this relationship was apparent whether the child played sports with a coach ($X^2(1) = 22.341$, p = 0.000), or without a coach ($X^2(1) = 13.744$, p = 0.000). As with body image, the opposite relationship was demonstrated for self-esteem in grade 9; children who played sports one or more times per week were significantly less likely to have a higher self-esteem than those who did not, whether with a coach ($X^2(1) = 5.548$, p = 0.019) or without a coach ($X^2(1) = 12.788$, p = 0.000).

Table 11: Significant relationships between physical activity and self-esteem

Variable	Low Self-Esteem (%)	High Self-Esteem (%)	Chi-square df = 1
Sports w/o coach (gr 6)			n = 665
Never	37.3	62.7	13.744
1 or more	21.5	78.5	p = 0.000
Sports w/ coach (gr 6)			n = 664
Never	32.8	67.2	22.341
1 or more	17.0	83.0	p = 0.000
Sports w/o coach (gr 9)			n = 512
Never	18.5	81.5	12.788
1 or more	32.4	67.6	p = 0.000
Sports w/ coach (gr 9)			n = 510
Never	18.4	81.6	5.548
1 or more	27.4	72.6	p = 0.019

Table 12 highlights the significant relationships between food group variables and body image through initial Chi-Square analysis. Table 13 highlights the significant relationships between food group variables and self-esteem through initial Chi-Square analysis. Vegetable and fruit consumption was significantly related to body image and self-esteem in grade 6 children only. These children were significantly more likely to fall into the strong body image category when they were meeting the Canada's Food Guide recommended intakes for fruits and vegetables ($X^2(1) = 8.322$, $p = 0.004$). As well, these children were significantly more likely to fall into the high self-esteem category when they were meeting the Canada's Food Guide recommendations for fruits and vegetables ($X^2(1) = 4.867$, $p = 0.027$). Grains consumption was significantly related to self-esteem in grade 6 only. Children in grade 6 were more likely to fall into the high self-esteem category when they were meeting the Canada's Food Guide recommended intakes for grains ($X^2(1) = 3.894$, $p = 0.048$).

The only food group that demonstrated a significant relationship with body image in grade 9 was the "other" food group. Children in grade 9 were more likely to have a

higher body image when they had a higher consumption of foods from the "other" food group ($X^2(1) = 5.378$, $p = 0.020$).

Table 12: Significant relationships between food choices and body image

Variable	Poor body image (%)	Strong body image (%)	Chi-square df = 1
Veg Fruit meet CFG (gr 6)			n = 647
No	24.9	75.1	8.322
Yes	12.4	87.6	p = 0.004
Other FG (gr 9)			n = 520
Low intake	33.4	66.6	5.378
High intake	22.9	77.1	p = 0.020

Table 13: Significant relationships between food choices and self-esteem

Variable	Low Self-Esteem (%)	High Self-Esteem (%)	Chi-square df = 1
Veg fruit meet CFG (gr 6)			n = 645
No	25.9	74.1	4.867
Yes	16.1	83.9	p = 0.027
Grains meet CFG (gr 6)			n = 645
No	25.9	74.1	3.894
Yes	14.5	85.5	p = 0.048

Table 14 highlights the significant relationships between depression and self-esteem through initial Chi-Square analysis. Depression was significantly related to self-esteem in grade 6 children. Depression and self-esteem had an inverse relationship, meaning that a child who had a high level of depression was significantly more likely to have a low self-esteem in grade 6 ($X^2(1) = 4.875$, $p = 0.027$).

Table 14: Significant relationship between depression and self-esteem

Variable	Low Self-Esteem (%)	High Self-Esteem (%)	Chi-square df = 1
Depression (gr 6)			n = 496
Low	37.0	63.0	4.875
High	48.5	51.5	p = 0.027

Table 15 highlights the significant relationships between body image and self-esteem through initial Chi-Square analysis. Body image and self-esteem were directly

related to one another in grade 6 and grade 9. Results indicated that individuals with a low self-esteem in grade 6 were significantly more likely to have a poor body image in grade 6 ($X^2(1) = 127.187$, $p = 0.000$). The same relationship was true in grade 9, where a low self-esteem was significantly related to a poor body image ($X^2(1) = 121.190$, $p = 0.000$), and vice-versa.

Table 15: Significant relationships between body image and self-esteem

Variable	Poor body image (%)	Strong body image (%)	Chi-square df = 1
Self-esteem (gr 6)			n = 661
Low	54.9	45.1	127.187
High	12.2	87.8	p = 0.000
Self-Esteem (gr 9)			n = 415
Low	70.2	29.8	121.190
High	17.8	82.2	p = 0.000

6.3 Factors Related to Body Image and Self-Esteem

Final models for body image and self-esteem (based on the objectives stated in Chapter 4) were identified through logistic and linear regression, which were conducted with the variables that demonstrated significant pairwise relationships. Models were developed from an initial set of predictors, then with food group variables added in, and finally with body image or self-esteem added in.

6.3.1 Predictors of Body Image in Grade 6

Analyses to examine the predictors that put children at risk for a poor body image in grade 6 (using the dichotomized variable) revealed that birthplace of parent was a direct predictor of body image in grade 6. A child whose parents who were born outside of Canada had increased odds of being in the strong body image category, on average by a factor of 2.597, compared to those with parents who were born inside Canada and who had similar characteristics on the other variables in the model, allowing for the effects of

other variables (OR = 2.597, p = 0.001). Being female decreased the odds of being in the strong body image category on average by a factor of 0.446, compared to being male (OR = 0.446, p = 0.004). As well, if a child was obese the odds of them being in the strong body image category decreased on average by a factor of 0.523, compared with children who were not obese. (OR = 0.523, p = 0.032). These relationships were demonstrated across all models for body image in grade 6. Playing sports without a coach increased the odds of being in a strong body image category on average by a factor of 2.345, compared with children who never played sports without a coach (OR = 2.345, p = 0.003) (Table 16).

In the final model, self-esteem levels in grade 6 demonstrated a direct relationship with body image in grade 6. Having a high self-esteem increased the odds of having a strong body image on average by a factor of 10.369, compared with children who had a low self-esteem (OR = 10.369, p = 0.000). Meeting the CFG recommended intakes for vegetable and fruit consumption increased the odds of being in the strong body image category on average by a factor of 2.487, compared with not meeting the CFG recommended intakes (OR = 2.487, p = 0.029). Tables 16 and 17 highlight the above findings in relation to body image in grade 6.

Table 16: Logistic regression for body image in grade 6

Variable	OR	SE of B	Sig. (p-value)
Birthplace of parent	2.942	0.264	**0.000**
Sex of child	0.567	0.241	**0.019**
C's BMI (Obese)	0.523	0.302	**0.032**
Sport w/o coach	2.345	0.289	**0.003**
c/ food group variables added			
Birthplace of parent	2.424	0.248	**0.000**
Sex of child	0.560	0.238	**0.015**
C's BMI (Obese)	0.518	0.298	**0.027**
c/ self-esteem added			
Birthplace of parent	2.597	0.286	**0.001**
Sex of child	0.446	0.280	**0.004**
C's BMI (Obese)	0.366	0.346	**0.004**
Veg/fruit meet CFG	2.487	0.417	**0.029**
Self-esteem- status	10.369	0.302	**0.000**

*non-significant variables included parents marital status, francophone status, site, being normal or under weight, and playing sports with a coach
** The odds ratio (OR) is the exponent of the slope

Table 17: Summary statistics for body image in grade 6

Summary statistic	Value
# of cases included	407
Model chi-square	$X^2 = 31.452$, df = 4 p = 0.000
Hosmer & Lemeshow Test	$X^2 = 0.388$, d = 6, p = 0.999
c/ food group variables added	
# of cases included	407
Model chi-square	$X^2 = 22.912$, df = 3, p = 0.000
Hosmer & Lemeshow Test	$X^2 = 3.227$, df = 5, p = 0.665
c/ self-esteem added	
# of cases included	388
Model chi-square	$X^2 = 97.953$, df = 5, p = 0.000
Hosmer & Lemeshow Test	$X^2 = 3.865$, df = 7, p = 0.795

Analyses examining the frequency of sport participation in more depth revealed that children who played sports without a coach less then once per week had decreased odds of being in the strong body image category on average by a factor of 0.395 (OR = 0.395, p = 0.003), compared to those who didn't. As well, when children never played sports with a coach they had decreased odds of being in the strong body image category

on average by a factor of 0.227 (OR = 0.227, p = 0.003), compared to those who did. When children played sports with a coach less then once per week they had decreased odds of being in the strong body image category on average by a factor of 0.254 (OR = 0.254, p = 0.003) and when they played with a coach 1-3 times per week they had decreased odds of being in the strong body image category on average by a factor of 0.389 (OR = 0.389, p = 0.024), compared to those who didn't. Tables 18 and 19 highlight the above findings in relation to body image in grade 6 with the sport categories.

Table 18: Logistic regression for body image in grade 6 (sport category)

Variable	OR	SE of B	Sig. (p-value)
Birthplace of parent	2.695	0.250	**0.000**
Sex of child	0.633	0.228	**0.045**
Sport w/o coach (<1/week)	0.395	0.317	**0.003**
Sport w/ coach (never)	0.277	0.427	**0.003**
Sport w/ coach (<1/week)	0.254	0.469	**0.003**
Sport w/ coach (1-3/week)	0.389	0.419	**0.024**
c/ self-esteem added			
Birthplace of parent	2.5961	0.285	**0.001**
Sex of child	0.532	0.276	**0.022**
C's BMI (Obese)	0.416	0.339	**0.010**
Self-esteem- status	9.944	0.304	**0.000**

*non-significant variables included parents marital status, francophone status, site, being normal or under weight, playing sports with a coach 4 or more times per week and playing sports without a coach never or 1 or more times per week
**The odds ratio (OR) is the exponent of the slope

Table 19: Summary statistics for body image in grade 6 (sport category)

Summary statistic	Value
# of cases included	469
Model chi-square	$X^2 = 42.138$, df = 6 p = 0.000
Hosmer & Lemeshow Test	$X^2 = 8.771$, d = 8, p = 0.362
c/ self-esteem added	
# of cases included	402
Model chi-square	$X^2 = 102.143$, df = 7, p = 0.000
Hosmer & Lemeshow Test	$X^2 = 4.764$, df = 8, p = 0.782

Analyses to examine how changes in the explanatory variables would influence changes in body image in grade 6 (using the scale variable) revealed that playing sports with a coach was significantly related to body image in grade 6. Children who played sports with a coach, on average had a 0.210 increase in their body image score, compared to those who did not and had similar characteristics on the other variables in the model, allowing for the effects of other variables ($p = 0.050$). As well, fruit and vegetable consumption was a significant predictor for an increased body image. Meeting the CFG recommended intakes for fruit and vegetable consumption increased their average body image score by 0.404, compared to those who did not meet the recommendations ($p = 0.003$). Self-esteem was also significantly related to body image in grade 6. Every one-unit increase in a child's self-esteem scale increased their body image score on average by 0.237 ($p = 0.000$). Table 20 highlights the significant findings from linear regression in relation to body image in grade 6.

Table 20: Linear regression for body image in grade 6

Variable	B-value	Sig.
Birthplace of parent	0.458	**0.000**
C's BMI (Obese)	-0.296	**0.029**
Sport w/o coach	0.278	**0.033**
Sport w/ coach	0.210	**0.048**
Model $R^2 = 0.068$		
c/ food group variables added		
Birthplace of parent	0.408	**0.000**
C's BMI (obese)	-0.321	**0.021**
Veg/fruit meet CFG	0.404	**0.003**
Sex of child	-0.237	**0.025**
Sport w/ coach	0.210	**0.050**
Model $R^2 = 0.091$		
c/ self-esteem added		
Birthplace of parent	0.267	**0.002**
C's BMI (obese)	-0.316	**0.005**
Sex of child	-0.176	**0.037**
Self-esteem- score	0.237	**0.000**
Model $R^2 = 0.382$		

*non-significant variables included parents marital status, francophone status, site, and being normal or underweight

Analyses examining the frequency of sport participation in more depth revealed that children who played sports with a coach 1-3 times per week on average had a 0.213 decrease in their body image score, compared to those who didn't ($p = 0.016$). As well, children who played sports with a coach 4 or more times per week on average had a 0.321 increase in their body image score, compared to those who did not. Finally, children who played sports without a coach less than 1 time per week had on average a 0.335 decrease in their body image score ($p = 0.025$), compared to those who didn't. Table 21 highlights the significant findings from this linear regression in relation to body image in grade 6.

Table 21: Linear regression for body image in grade 6 (sport category)

Variable	B-value	Sig.
Birthplace of parent	0.411	**0.000**
C's BMI (Obese)	-0.281	**0.038**
Sports w/o coach (<1/week)	-0.335	**0.025**
Sports w/ coach (>4/week)	0.379	**0.003**
Model $R^2 = 0.081$		
c/ food group variables added		
Birthplace of parent	0.372	**0.000**
C's BMI (Obese)	-0.324	**0.019**
Veg/fruit meet CFG	0.393	**0.004**
Sex of child	-0.223	**0.035**
Sports w/ coach (>4/week)	0.321	**0.015**
Model $R^2 = 0.096$		
c/ self-esteem added		
Birthplace of parent	0.223	**0.006**
C's BMI (Obese)	-0.318	**0.004**
Sex of child	-0.172	**0.040**
Sports w/ coach (1-3/week)	-0.213	**0.016**
Self-esteem- score	0.243	**0.000**
Model $R^2 = 0.391$		

*non-significant variables included parents marital status, francophone status, site, being normal or underweight, playing sports with a coach less than one time per week or never, and playing sports without a coach never, less than one time per week, or 1-3 times per week

6.3.2 Predictors of Body Image in Grade 9

Analyses to examine the factors that put adolescents at risk of a poor body image in grade 9 (using the dichotomized variable) indicated that being Francophone was inversely related to body image. Being Francophone decreased the odds of being in the strong body image category in grade 9 by a factor of 0.493, compared to not being Francophone, allowing for the effects of other variables (OR = 0.493, p = 0.003). Being female decreased the odds of being in the strong body image category by a factor of 0.302, compared to being male (OR = 0.302, p = 0.000). In the final model, self-esteem demonstrated a direct relationship with body image in grade 9 (OR = 11.306, p = 0.000), meaning that being in the high self-esteem category increased the factor of being in the strong body image category by 11.306, compared to being in the low self-esteem category. Tables 22 and 23 highlight the above findings in relation to body image in grade 9.

Table 22: Logistic regression for body image in grade 9

Variable	OR	SE of B	Sig. (p-value)
Francophone	0.484	0.207	**0.000**
Sex of child	0.317	0.204	**0.000**
c/ self-esteem added			
Francophone	0.493	0.239	**0.003**
Sex of child	0.302	0.236	**0.000**
Self-esteem- status	11.306	0.246	**0.000**

*non-significant variables include birthplace of parent, site, playing sports without a coach, being under or normal weight, being obese, and other food consumption
**The odds ratio (OR) is the exponent of the slope

Table 23: Summary statistics for body image in grade 9

Summary statistic	Value
# of cases included	512
Model chi-square	$X^2 = 48.692$, df = 2, p = 0.000
Hosmer & Lemeshow Test	$X^2 = 0.045$, df = 2, p = 0.978
c/ self-esteem added	
# of cases included	507
Model chi-square	$X^2 = 151.277$, df = 3, p = 0.000
Hosmer & Lemeshow Test	$X^2 = 0.305$, df = 4, p = 0.989

Analyses to examine how changes in the explanatory variables would influence changes in body image in grade 9 (using the scale variable) revealed that an adolescent who was underweight or normal weight, on average had a 0.513 increase in their body image score, compared to those who were not underweight or normal weight and had similar characteristics for the other variables in the model (p = 0.000). As well, adolescents from comparison sites, on average had higher body image scores by 0.482 points compared to those from demonstration sites, allowing for the effects of other variables (p = 0.000). An adolescent who was obese had an average decrease in their body image by 0.494 points (p = 0.001). Body image was directly related to self-esteem as well. A one-unit increase in an adolescent's body image score was associated with an average 0.226 point increase in the adolescent's self-esteem score (p = 0.000). Finally, the other food group variable was directly related to body image when self-esteem was added to the model. Adolescents who had a higher consumption of foods from the other food group had an average increase in their body image score by 0.224 points in grade 9 (p = 0.023). Table 24 highlights the significant findings from linear regression in relation to body image in grade 9.

Table 24: Linear regression for body image in grade 9

Variable	B-value	Sig.
C's BMI (under/norm wt)	0.513	**0.000**
Sex of child	-0.699	**0.000**
Francophone	-0.360	**0.004**
Demo vs comparison site	0.482	**0.000**
Model $R^2 = 0.239$		
c/ self-esteem added		
C's BMI (Obese)	-0.494	**0.001**
Sex of child	-0.534	**0.000**
Other FG	0.224	**0.023**
Self-esteem -score	0.226	**0.000**
Model $R^2 = 0.550$		

*non-significant variables include birthplace of parent and playing sports without a coach

6.3.3 Predictors of Self-Esteem in Grade 6

Analyses to examine factors that would put a child at risk for a low self-esteem in grade 6 (using the dichotomized variable) revealed that physical activity was directly related to self-esteem. Playing sports with a coach one or more times per week, increased the odds of being in the high self-esteem category on average by a factor of 2.030 (OR = 2.030, p = 0.000); while playing sports without a coach one or more times per week increased the odds of being in the high self-esteem category by a factor of 1.880 (OR = 1.880, p = 0.010), compared to children who never played sports and had similar characteristics for the other variables in the model, allowing for the effect of other variables in the model. Being depressed decreased the odds of being in the high self-esteem category on average by a factor of 0.626, compared with not being depressed (OR = 0.626, p = 0.034). As well, parent's marital status was directly related to self-esteem in grade 6. Having parents who were married increased the odds of being in the high self-esteem category on average by a factor of 1.794, compared to having parents who were not married (OR = 1.794, p = 0.026).

Finally, Body image was directly related to self-esteem in grade 6. Being in the strong body image category increased the odds of being in the high self-esteem category on average by a factor of 7.900, compared to a child who was in the low self-esteem category (OR = 7.900, p = 0.000). Tables 25 and 26 highlight the significant findings in relation to self-esteem in grade 6.

Table 25: Logistic regression for self-esteem in grade 6

Variable	OR	SE of B	Sig. (p-value)
Marital Status	1.794	0.263	**0.026**
Sport w/o coach	2.065	0.225	**0.001**
Sport w/ coach	2.069	0.196	**0.000**
Depression	0.618	0.201	**0.017**
c/ body image			
Sport w/o coach	1.880	0.246	**0.010**
Sport w/ coach	2.030	0.215	**0.001**
Depression	0.626	0.221	**0.034**
Body Image- status	7.900	0.218	**0.000**

*non-significant variables include vegetable and fruit consumption and grains consumption
**The odds ratio (OR) is the exponent of the slope

Table 26: Summary statistics for self-esteem in grade 6

Summary statistic	Value
# of cases included	633
Model chi-square	$X^2 = 40.284$, df = 4, p = 0.000
Hosmer & Lemeshow Test	$X^2 = 4.239$, df = 7, p = 0.752
c/ body image	
# of cases included	630
Model chi-square	$X^2 = 130.573$, df = 4, p = 0.000
Hosmer & Lemeshow Test	$X^2 = 3.154$, df = 6, p = 0.789

Analyses examining the frequency of sport participation in more depth revealed that children who never played sports without a coach had decreased odds of being in the high self-esteem category on average by a factor of 0.387 (OR = 0.387, p = 0.007), compared to those who did; also children who played sports without a coach less than

one time per week had decreased odds of being in the high self-esteem category on average by a factor of 0.499 (OR = 0.499, p = 0.011), compared to those who didn't. As well, children who never played sports with a coach had decreased odds of being in the high self-esteem category on average by a factor of 0.592 (OR = 0.592, p = 0.028), compared to those who did and children who played sports with a coach less than one time per week had decreased odds of being in the high self-esteem category by a factor of 0.335 (OR = 0.335, p = 0.000), compared to those who did not. Tables 27 and 28 highlight the significant findings in relation to self-esteem in grade 6 using the sport category variable.

Table 27: Logistic regression for self-esteem in grade 6 (sport category)

Variable	OR	SE of B	Sig. (p-value)
Marital status	1.767	0.264	**0.031**
Sport w/o (never)	0.455	0.331	**0.017**
Sport w/o (<1/week)	0.499	0.273	**0.011**
Sport w/ (never)	0.537	0.217	**0.004**
Sport w/ (<1/week)	0.393	0.265	**0.000**
Depression	0.607	0.202	**0.013**
c/ body image			
Sport w/o (never)	0.387	0.353	**0.007**
Sport w/ (never)	0.592	0.239	**0.028**
Sport w/ (<1/week)	0.335	0.290	**0.000**
Depression	0.600	0.223	**0.022**
Body Image- status	8.715	0.221	**0.000**

*non-significant variables include vegetable and fruit consumption, grains consumption, playing sports without a coach 1-3 and 4 or more times per week, and playing sports with a coach 1-3 and 4 or more times per week
**The odds ratio (OR) is the exponent of the slope

Table 28: Summary statistics for self-esteem in grade 6 (sport category)

Summary statistic	Value
# of cases included	633
Model chi-square	$X^2 = 41.646$, df = 6, p = 0.000
Hosmer & Lemeshow Test	$X^2 = 1.483$, df = 6, p = 0.961
c/ body image	
# of cases included	630
Model chi-square	$X^2 = 134.170$, df = 5, p = 0.000
Hosmer & Lemeshow Test	$X^2 = 2.575$, df = 6, p = 0.860

Analyses to examine how changes in the explanatory variables would influence changes in self-esteem in grade 6 (using the scale variable) revealed that having parents who were married increased self-esteem scores by an average of 0.847 points, compared to having parents who were not married and had similar characteristics for the other variables in the model, allowing for the effect of the other variables in the model (p = 0.005). Playing sports with a coach one or more times per week increased self-esteem scores by an average of 0.754 points (p = 0.000); while playing sports without a coach one or more times per week increased self-esteem scores by an average of 0.501 points (p = 0.018), compared to children who never played sports. Being depressed decreased self-esteem scores by an average of 0.350 points, compared to children who were not depressed (p = 0.009). As well, meeting the CFG recommendations for vegetables and fruit increased self-esteem scores by an average of 0.621 points, compared to not meeting the CFG recommendations (p = 0.020). Finally, a one-unit increase in a child's body image was associated with an on average 1.325 point increase in the child's self-esteem (p = 0.000). Table 29 highlights the significant findings from linear regression in relation to self-esteem in grade 6.

Table 29: Linear regression for self-esteem in grade 6

Variable	B-value	Sig.
R's marital status	0.782	**0.009**
Sport w/o coach	0.805	**0.002**
Sport w/ coach	1.064	**0.000**
Depression	-0.469	**0.019**
Model R^2 = 0.088		
c/ food group variables		
R's marital status	0.847	**0.005**
Sport w/o coach	0.780	**0.003**
Sport w/ coach	0.975	**0.000**
Depression	-0.529	**0.009**
Veg/fruit meet CFG	0.621	**0.020**
Model R^2 = 0.095		
c/ body image variable		
Sport w/o coach	0.501	**0.018**
Sport w/ coach	0.754	**0.000**
Depression	-0.350	**0.035**
Body Image- score	1.325	**0.000**
Model R^2 = 0.382		

*non-significant variables include grains consumption

Analyses examining the frequency of sport participation in more depth revealed that playing sports without a coach less then one time per week was associated with a decrease in a child's self-esteem on average by 0.912 points (p = 0.004), compared with children who didn't. As well, children who never played sports with a coach had a decreased self-esteem on average by 0.668 points (p = 0.001), and children who played sports with a coach less then once per week had a decreased self-esteem on average by 0.964 points (p = 0.000) and children who played sports with a coach 1-3 times a week had on average increased self-esteem scores by 0.952 points (p = 0.000) and children who played more than 4 times per week had on average increases in their self-esteem by 1.452 points (p = 0.000) compared to children who didn't. Table 30 highlights the significant findings from linear regression in relation to self-esteem in grade 6 with the sport category.

Table 30: Linear regression for self-esteem in grade 6 (sport category)

Variable	B-value	Sig.
Marital status	0.816	**0.006**
Sport w/o coach (<1/week)	-0.978	**0.002**
Sport w/ coach (1-3/week)	0.952	**0.000**
Sports w/ coach (>4/week)	1.452	**0.000**
Depression	-0.456	**0.023**
Model $R^2 = 0.094$		
c/ food group variables		
Marital status	0.890	**0.003**
Sport w/o coach (<1/week)	-0.912	**0.004**
Sports w/ coach (never)	-0.975	**0.000**
Sports w/ coach (<1/week)	-0.737	**0.017**
Depression	-0.498	**0.014**
Veg/fruit meet CFG	0.580	**0.032**
Model $R^2 = 0.098$		
c/ body image		
Sports w/ coach (never)	-0.668	**0.001**
Sports w/ coach (<1/week)	-0.964	**0.000**
Depression	-0.368	**0.028**
Body Image- score	1.357	**0.000**
Model $R^2 = 0.382$		

*non-significant variables include grains consumption, and playing sports without a coach never, 1-3 times per week or 4 or more times per week

6.3.4 Predictors of Self-Esteem in Grade 9

Analyses to examine factors that put an adolescent at risk for a low self-esteem in grade 9 (using the dichotomized variable) revealed that playing sports without a coach was inversely related to self-esteem in grade 9. Playing sports without a coach, one or more times per week decreased the odds of being in the high self-esteem category on average by a factor of 0.607, compared to never playing sports without a coach for individuals who had similar characteristics for the other variables in the model, allowing for the effect of the other variables in the model (OR = 0.607, p = 0.038). The demonstration versus comparison site variable was directly related to self-esteem in grade 9. Being from a comparison site increased the odds of being in the high self-esteem category on average by a factor of 2.010, compared with being from a demonstration site (OR = 2.010, p = 0.005).

Finally, body image was directly related to self-esteem in grade 9. Being in the strong body image category increased the odds of being in the high self-esteem category on average by a factor of 10.214, compared with being in the poor body image category (OR = 10.214, p = 0.000). Tables 31 and 32 highlight the significant findings in relation to self-esteem in grade 9.

Table 31: Logistic regression for self-esteem in grade 9

Variable	OR	SE of B	Sig. (p-value)
Demo vs comp site	2.010	0.247	**0.005**
Sport w/o coach	0.487	0.213	**0.001**
c/ body image			
Sport w/o coach	0.607	0.241	**0.038**
Body image-status	10.214	0.240	**0.000**

*non-significant variables include sex of the child, birthplace of parent, and playing sports with a coach
**The odds ratio (OR) is the exponent of the slope

Table 32: Summary statistics for self-esteem in grade 9

Summary statistic	Value
# of cases included	512
Model chi-square	$X^2 = 21.034$, df = 2, p = 0.000
Hosmer & Lemeshow Test	$X^2 = 0.000$, df = 2, p = 1.000
c/ body image	
# of cases included	512
Model chi-square	$X^2 = 117.348$, df = 2, p = 0.000
Hosmer & Lemeshow Test	$X^2 = 0.840$, df = 2, p = 0.657

Analyses examining the frequency of sport participation in more depth revealed that adolescents who never played sports with a coach had decreased odds of being in the high self-esteem category on average by a factor of 0.501 (OR = 0.501, p = 0.020), compared to adolescents who did, as well, adolescents who played sports without a coach 4 or more times per week had increased odds of being in the high self-esteem category on average by a factor of 1.707 (OR = 1.707, p = 0.031), compared to those who didn't.

Tables 33 and 34 highlight the significant findings in relation to self-esteem in grade 9 with sport category.

Table 33: Logistic regression for self-esteem in grade 9 (sport category)

Variable	OR	SE of B	Sig. (p-value)
Demo vs comp site	2.098	0.249	**0.003**
Sport w/o coach (never)	0.531	0.276	**0.022**
Sport w/o coach (>4/week)	1.707	0.249	**0.031**
c/ body image			
Sport w/o coach (never)	0.501	0.298	**0.020**
Body image – status	10.527	0.240	**0.000**

*non-significant variables include sex of the child, birthplace of parent, playing sports with a coach never, less than one time per week, 1-3 times per week or 4 or more times per week, and playing spots without a coach less than one time per week or 1-3 times per week
**The odds ratio (OR) is the exponent of the slope

Table 34: Summary statistics for self-esteem in grade 9 (sport category)

Summary statistic	Value
# of cases included	512
Model chi-square	$X^2 = 24.678$, df = 3, p = 0.000
Hosmer & Lemeshow Test	$X^2 = 0.437$, df = 4, p = 0.979
c/ body image	
# of cases included	512
Model chi-square	$X^2 = 118.360$, df = 2, p = 0.000
Hosmer & Lemeshow Test	$X^2 = 1.394$, df = 2, p = 0.498

Analyses to examine how changes in the explanatory variables would influence changes in self-esteem in grade 9 (using the scale variable) revealed that sex of the child was significantly related to self-esteem. Females had, on average, self-esteem scores lower by 0.771 points, compared with being male for individuals who had similar characteristics for the other variables in the model, allowing for the effect of the other variables in the model (p = 0.003). As well, being from a comparison site was associated with an average increase in self-esteem scores by 1.053 points, compared with being from a demonstration site (p = 0.000). Finally, a one-unit increase in an adolescents body

image score increased an adolescents self-esteem score by an average of 0.770 points (p = 0.000). Table 35 highlights the significant findings in relation to self-esteem in grade 9.

Table 35: Linear regression for self-esteem in grade 9

Variable	B-value	Sig.
Sex of child	-0.997	**0.000**
Demo vs comp site	1.338	**0.000**
Model $R^2 = 0.083$		
c/ body image		
Body image- score	0.770	**0.000**
Demo vs comp site	1.053	**0.000**
Sex of child	-0.771	**0.003**
Model $R^2 = 0.146$		

*non-significant variables include birthplace of parent, playing sports without a coach and playing sports with a coach

Analyses examining the frequency of sport participation in more depth revealed that adolescents who never played sports without a coach had, on average, self-esteem scores lower by 1.583 points (p = 0.000), compared to adolescents who did, as well adolescents who played sports without a coach less than one time per week had on average, self-esteem scores lower by 1.379 points (p = 0.000), compared to adolescents who didn't. Adolescents, who never played sports with a coach also had on average, lower self-esteem scores by 0.631 points (p = 0.017), compared to those who did. Table 36 highlights the significant findings in relation to self-esteem in grade 9 with sport category.

Table 36: Linear regression for self-esteem in grade 9 (sport category)

Variable	B-value	Sig.
Sex of child	-0.805	**0.003**
Demo vs comp site	1.065	**0.000**
Sport w/o coach (never)	-1.132	**0.005**
Sport w/o coach (<1/week)	-0.911	**0.013**
Sport w/ coach (never)	-0.631	**0.017**
Model $R^2 = 0.098$		
c/ body image		
Demo vs comp site	0.976	**0.000**
Body image- score	0.743	**0.000**
Sport w/o coach (never)	-1.583	**0.000**
Sport w/o coach (<1/week)	-1.379	**0.000**
Model $R^2 = 0.185$		

*non-significant variables include birthplace of parent, playing sports without a coach 1-3 times per week or 4 or more times per week, and playing sports with a coach less than one time per week, 1-3 times per week or 4 or more times per week

6.4 Longitudinal Relationships with Body Image and Self-Esteem

6.4.1 Body Image in Grade 9 Based on Significant Models in Grade 6

The next analysis was conducted to determine whether or not the relationships changed over time (between grades 6 and 9) for body image and self-esteem, as well as to determine if significant predictors of body image / self-esteem in grade 6 were still significant predictors of the same in grade 9. Logistic regression, using the grade 9 analogues of the response and predictor variables from grade 6 was tested. Analyses to examine factors that put an adolescent at risk for a poor body image (using the dichotomized variable) revealed that being Francophone was inversely related to body image in grade 9. An adolescent who was Francophone had decreased odds of being in the strong body image category on average by a factor of 0.493, compared with a child who was not Francophone for individuals who had similar characteristics for the other variables in the model, allowing for the effect of the other variables in the model (OR = 0.493, p = 0.003). Females had decreased odds of being in the strong body image category on average by a factor of 0.302, compared with males (OR = 0.302, p = 0.000).

As well, an adolescent's self-esteem was directly related to their body image in grade 9. Being in the high self-esteem category increased the odds of being in the strong body image category on average by a factor of 11.306, compared with being in the low self-esteem category (OR = 11.306, p = 0.000). Tables 37 and 38 highlight the significant findings in relation to body image in grade 9.

Table 37: Logistic regression for body image in grade 9 (significant models from grade 6)

Variable	OR	SE of B	Sig. (p-value)
Francophone	0.484	0.207	**0.000**
Sex of child	0.317	0.204	**0.000**
c/ self-esteem			
Francophone	0.493	0.239	**0.003**
Sex of child	0.302	0.236	**0.000**
Self-esteem- status	11.306	0.255	**0.000**

*non-significant variables include parent's marital status, birthplace of parent, site, being normal or underweight, being obese, playing sports without a coach, playing sports with a coach, and vegetable and fruit consumption
**The odds ratio (OR) is the exponent of the slope

Table 38: Summary statistics for body image in grade 9 (significant models from grade 6)

Summary statistic	Value
# of cases included	512
Model chi-square	$X^2 = 48.692$, df = 2, p = 0.000
Hosmer & Lemeshow Test	$X^2 = 0.045$, df = 2, p = 0.978
c/ self-esteem	
# of cases included	507
Model chi-square	$X^2 = 151.277$, df = 3, p = 0.000
Hosmer & Lemeshow Test	$X^2 = 0.305$, df = 4, p = 0.989

Linear regression, using the grade 9 analogues of the response and predictor variables from grade 6 were also tested Analyses to examine how changes in the explanatory variables would influence changes in body image in grade 9 (using the scale variable) revealed that an adolescent who was underweight or normal weight

demonstrated a direct relationship with body image. An adolescent who was underweight or normal weight demonstrated increased body image scores by an average of 0.307 points, compared with not being underweight or normal weight for individuals who had similar characteristics for the other variables in the model, allowing for the effect of the other variables in the model (p = 0.011). Being from a comparison site was associated with an average increase in body image scores by 0.425 points, compared with being from a demonstration site (p = 0.001) (Table 30). As well, a one-unit increase in an adolescent's self-esteem was associated with an average increase in an adolescent's body image by 0.223 points (p = 0.000). Table 39 highlights the findings from the linear regression in relation to body image in grade 9.

Table 39: Linear regression for body image in grade 9 (using significant models from grade 6)

Variable	B-value	Sig.
Francophone	-0.360	**0.004**
Sex of child	-0.699	**0.000**
Demo vs. comp site	0.482	**0.000**
C's BMI (under/normal wt)	0.513	**0.000**
Model $R^2 = 0.239$		
c/ food group variables		
Francophone	-0.346	**0.006**
Sex of child	-0.723	**0.000**
Demo vs. comp site	0.452	**0.001**
C's BMI (Under/normal wt)	0.371	**0.019**
Model $R^2 = 0.247$		
c/ self-esteem		
Sex of child	-0.518	**0.000**
C's BMI (Under/normal wt)	0.307	**0.011**
Self-esteem- score	0.223	**0.000**
Model $R^2 = 0.553$		

*non-significant variables include parent's marital status, birthplace of parent, being obese, playing sports without a coach, playing sports with a coach, and vegetable and fruit consumption

6.4.2 Self-Esteem in Grade 9 Based on Significant Models in Grade 6

Logistic regression, using the grade 9 analogues of the response and predictor variables from grade 6 was tested. Analyses to examine factors that put adolescents at risk for a low self-esteem (using the dichotomized variable) revealed that playing sports without a coach was significantly and inversely related to self-esteem in grade 9. Adolescents who played sports without a coach one or more times per week had decreased odds of falling into the high self-esteem category on average by a factor of 0.447, compared with adolescents who never played sports without a coach for individuals who had similar characteristics for the other variables in the model, allowing for the effect of the other variables in the model (OR = 0.447, p = 0.001). Adolescents who were depressed had decreased odds of being in the high self-esteem category on average by a factor of 0.628, compared with not being depressed (OR = 0.628, p = 0.033). Tables 40 and 41 highlight the significant findings in relation to self-esteem in grade 9.

Table 40: Logistic regression for self-esteem in grade 9 (significant models from grade 6)

Variable	OR	SE of B	Sig. (p-value)
Sport w/o coach	0.489	0.216	**0.001**
Depression	0.637	0.220	**0.041**
c/ food group variables			
Sport w/o coach	0.477	0.215	**0.001**
Depression	0.628	0.219	**0.033**
c/ body image			
Body Image- status	10.436	0.242	**0.000**

*non-significant variables include parent's marital status, playing sports with a coach, vegetable and fruit consumption, and grains consumption
**The odds ratio (OR) is the exponent of the slope

Table 41: Summary statistics for self-esteem in grade 9 (significant models from grade 6)

Summary statistic	Value
# of cases included	491
Model chi-square	$X^2 = 20.290$, df = 3, p = 0.000
Hosmer & Lemeshow Test	$X^2 = 2.732$, df = 6, p = 0.842
c/ food group variables	
# of cases included	494
Model chi-square	$X^2 = 16.748$, df = 2, p = 0.000
Hosmer & Lemeshow Test	$X^2 = 0.906$, df = 2, p = 0.636
c/ body image	
# of cases included	496
Model chi-square	$X^2 = 111.433$, df = 2, p = 0.000
Hosmer & Lemeshow Test	$X^2 = 0.558$, df = 2. p = 0.757

Analyses examining the frequency of sport participation in more depth revealed that adolescents who never played sports without a coach had decreased odd of being in the high self-esteem category on average by a factor of 0.571 (OR = 0.571, p = 0.045), compared to adolescents who did; as well adolescents who played sports without a coach 4 or more times per week had increased odds of being in the high self-esteem category on average by a factor of 1.758 (OR = 1.758, p = 0.024). Tables 42 and 43 highlight the significant findings in relation to self-esteem in grade 9 with sport category.

Table 42: Logistic regression for self-esteem in grade 9 (significant models from grade 6, with sport category)

Variable	OR	SE of B	Sig. (p-value)
Sport w/o coach (never)	0.571	0.279	**0.045**
Sport w/o (>4/week)	1.758	0.250	**0.024**
Depression	0.624	0.219	**0.032**
c/ body image			
Body Image- status	10.436	0.242	**0.000**

*non-significant variables include parent's marital status, playing sports with a coach never, less than one time per week, 1-3 times per week and 4 or more times per week, playing sports without a coach less than one time per week or 1-3 times per week, vegetable and fruit consumption, and grains consumption
**The odds ratio (OR) is the exponent of the slope

Table 43: Summary statistics for self-esteem in grade 9 (significant models from grade 6, sport category)

Summary statistic	Value
# of cases included	494
Model chi-square	$X^2 = 18.934$, df = 3, p = 0.000
Hosmer & Lemeshow Test	$X^2 = 0.094$, df = 4, p = 0.999
c/ body image	
# of cases included	496
Model chi-square	$X^2 = 111.433$, df = 2, p = 0.000
Hosmer & Lemeshow Test	$X^2 = 0.558$, df = 2. p = 0.757

Linear regression, using the grade 9 analogues of the response and predictor variables from grade 6 was tested. Analyses to examine how changes in the explanatory variables would influence changes in self-esteem (using the continuous variable) revealed that playing sports without a coach one or more times per week decreased an adolescent's self-esteem score on average by 0.456 points, compared with never playing sports without a coach for individuals who had similar characteristics for the other variables in the model (p = 0.030). Adolescents who were depressed had decreased average self-esteem scores by 0.530 points, compared with not being obese (p = 0.008). As well, a one-unit increase in an adolescent's body image increased their self-esteem on average by 1.811 points (p = 0.000). Table 44 highlights the findings from the linear regression in relation to self-esteem in grade 9.

Table 44: Linear regression for self-esteem in grade 9 (using significant models from grade 6)

Variable	B-value	Sig.
Sport w/o coach	-1.228	**0.000**
Depression	-0.701	**0.009**
Model $R^2 = 0.053$		
c/ body image		
Sport w/o coach	-0.456	**0.030**
Depression	-0.530	**0.008**
Body Image- score	1.811	**0.000**
Model $R^2 = 0.476$		

*non-significant variables include parent's marital status, playing sports with a coach, vegetable and fruit consumption, and grains consumption

Analyses examining the frequency of sport participation in more depth revealed that adolescents who never played sports with a coach on average had a 0.397 decrease in their self-esteem (p = 0.049), compared to adolescents who did. As well, adolescents who never played sports without a coach on average had a 1.084 point decrease in their self-esteem (p = 0.012) and adolescents who played sports without a coach less than one time per week had an average decrease in their self-esteem score by 0.868 points (p = 0.029), compared to those who did. Table 45 highlights the findings from the linear regression in relation to self-esteem in grade 9 with sport category.

Table 45: Linear regression for self-esteem in grade 9 (using significant models from grade 6, with sport category)

Variable	B-value	Sig.
Sport w/o coach (never)	-1.084	**0.012**
Sport w/o coach (<1/week)	-0.868	**0.029**
Sport w/ coach (never)	-0.561	**0.040**
Depression	-0.667	**0.014**
Model $R^2 = 0.065$		
c/ body image		
Sport w/ coach (never)	-0.397	**0.049**
Depression	-0.517	**0.010**
Body image- score	1.839	**0.000**

*non-significant variables include parent's marital status, playing sports with a coach less than one time per week, 1-3 times per week or 4 or more times per week, playing sports without a coach 1-3 times per week or 4 or more times per week, vegetable and fruit consumption, and grains consumption

6.4.3 Body Image in Grade 9 using Significant Grade 6 Variables

To determine if variables that were significant predictors of body image in grade 6 played a role in influencing the adolescent's body image in grade 9, logistic regression was run with significant predictors for body image in grade 6 in relation to body image in grade 9. Analyses to examine the factors that would put an adolescent at risk for a poor body image (using the dichotomized variable) indicated that a child who was Francophone in grade 6 had decreased odds of being in the strong body image category in grade 9 on average by a factor of 0.547, compared with not being Francophone for individuals who had similar characteristics for the other variables in the model, allowing for the effect of other variables in the model (OR = 0.547, p = 0.006). Being female decreased the odds of being in the strong body image category in grade 9 on average by a factor of 0.217, compared with being male (OR = 0.217, p = 0.000). Being from a comparison site in grade 6 increased the odds of being in the strong body image category in grade 9 on average by a factor of 0.2617, compared with being from a demonstration site (OR = 2.617, p = 0.000). Finally, being in the high self-esteem category in grade 6 increased the odds of being in the strong body image category on average by a factor of 3.889, compared with being in the low self-esteem category (OR = 3.889, p = 0.0000). Tables 46 and 47 highlight the significant findings in relation to body image in grade 9.

Table 46: Logistic regression for body image in grade 9 (significant variables from grade 6)

Variable	OR	SE of B	Sig. (p-value)
Francophone	0.547	0.218	**0.006**
Sex of child	0.258	0.217	**0.000**
Demo vs comp site	2.072	0.237	**0.002**
c/ self-esteem			
Sex of child	0.217	0.241	**0.000**
Demo vs comp site	2.617	0.273	**0.000**
Self-esteem- status	3.889	0.258	**0.000**

*non-significant variables include parent's marital status, birthplace of parent, being normal or underweight, being obese, playing sports without a coach, playing sports with a coach, vegetable and fruit consumption, and body image
**The odds ratio (OR) is the exponent of the slope

Table 47: Summary statistics for body image in grade 9 (significant variables from grade 6)

Summary statistic	Value
# of cases included	480
Model chi-square	$X^2 = 62.670$, df = 3, p = 0.000
Hosmer & Lemeshow Test	$X^2 = 2.275$, df = 5, p = 0.810
c/ self-esteem	
# of cases included	483
Model chi-square	$X^2 = 93.061$, df = 4, p = 0.000
Hosmer & Lemeshow Test	$X^2 = 2.438$, df = 8, p = 0.965

Linear regression was run with significant predictors for body image in grade 6 in relation to body image in grade 9. Analyses to examine how changes in the explanatory variables would influence changes in self-esteem in grade 9 (using the continuous variable) revealed children who were obese in grade 6, on average, had body image scores that were lower by 0.453 points in grade 9, compared with children who weren't obese for individuals who had similar characteristics for the other variables in the model, allowing for effects from the other variables in the model (p = 0.000). As well, being Francophone in grade 6 was associated with an, on average, 0.290 point decrease in body image in grade 9, compared with not being Francophone (p = 0.002). Females had, on

average, body image scores lower by 0.671 points than males (p = 0.000), as well children from comparison sites in grade 6, on average, had body image scores higher by 0.319, compared to those from demonstration sites (p = 0.000) in grade 9. Finally, a one-unit increase in body image in grade 6 was associated with an average increase in body image in grade 9 by 0.215 points (p = 0.000). As well, a one-unit increase in self-esteem in grade 6 was associated with an average increase in body image in grade 9 by 0.070 points (p = 0.002). Table 48 highlights the significant findings from linear regression in relation to body image in grade 9.

Table 48: Linear regression for body image in grade 9 (significant variables from grade 6)

Variable	B-value	Sig.
Francophone	-0.366	**0.000**
Sex of child	-0.760	**0.000**
Demo vs. comp site	0.404	**0.000**
C's BMI (Obese)	-0.619	**0.000**
Model $R^2 = 0.236$		
c/ self-esteem		
Francophone	-0.290	**0.004**
Sex of child	-0.671	**0.004**
Demo vs comp site	0.319	**0.000**
C's BMI (Obese)	-0.453	**0.000**
Self-esteem- score	0.070	**0.002**
Body Image- score	0.215	**0.000**
Model $R^2 = 0.331$		

*non-significant variables include parent's marital status, birthplace of parent, being normal or underweight, playing sports without a coach, playing sports with a coach, and vegetable and fruit consumption

6.4.4 Self-Esteem in Grade 9 using Significant Grade 6 Variables

Logistic regression was run with significant predictors for body image in grade 6 in relation to self-esteem in grade 9. Analyses to examine the factors that would put an adolescent at risk for a low self-esteem (using the dichotomized variable) indicated that playing sports with a coach in grade 6 increased the odds of being in the high self-esteem category in grade 9 on average by a factor of 1.648, compared to children who never

played sports with a coach for individuals who had similar characteristics for the other variables in the model (OR = 1.648, p = 0.025). Being in the strong body image category in grade 6 increased the odds of being in the high self-esteem category in grade 9 on average by a factor of 1.918, compared to being in the poor body image category in grade 6 (OR = 1.918, p = 0.015). As well, being in the high self-esteem category in grade 6 increased the odds of being in the high self-esteem category in grade 9 on average by a factor of 2.993, compared with being in the low self-esteem category in grade 6 (OR = 2.993, p = 0.000) Tables 49 and 50 highlight the significant findings in relation to self-esteem in grade 9.

Table 49: Logistic regression for self-esteem in grade 9 (significant variables from grade 6)

Variable	OR	SE of B	Sig. (p-value)
Sport w/ coach	1.648	0.224	**0.025**
c/ body image			
Self-esteem- status	2.993	0.262	**0.000**
Body image- status	1.918	0.267	**0.015**

*non-significant variables include parent's marital status, playing sports without a coach, depression, vegetable and fruit consumption, and grains consumption
**The odds ratio (OR) is the exponent of the slope

Table 50: Summary statistics for self-esteem in grade 9 (significant variables from grade 6)

Summary statistic	Value
# of cases included	460
Model chi-square	$X^2 = 5.024$, df = 1, p = 0.025
Hosmer & Lemeshow Test	$X^2 = 0.000$, df = 0, p = -
c/ body image	
# of cases included	448
Model chi-square	$X^2 = 36.307$, df = 2, p = 0.000
Hosmer & Lemeshow Test	$X^2 = 0.025$, df = 2, p = 0.988

Analyses examining the frequency of sport participation in more depth revealed that children who never play sports without a coach had decreased odds of being in the

high self-esteem category in grade 9 by a factor of 0.582 (OR = 0.582, p = 0.018), compared to those who did. Tables 51 and 52 highlight the significant findings in relation to self-esteem in grade 9 with the sport category.

Table 51: Logistic regression for self-esteem in grade 9 (significant variables from grade 6, with sport category)

Variable	OR	SE of B	Sig. (p-value)
Sport w/ coach (never)	0.582	0.229	**0.018**
c/ body image			
Self-esteem- status	2.993	0.262	**0.000**
Body image- status	1.918	0.267	**0.015**

*non-significant variables include parent's marital status, playing sports without a coach less than one time per week, 1-3 times per week or 4 or more times per week, depression, vegetable and fruit consumption, and grains consumption
**The odds ratio (OR) is the exponent of the slope

Table 52: Summary statistics for self-esteem in grade 9 (significant variables from grade 6, with sport category)

Summary statistic	Value
# of cases included	460
Model chi-square	$X^2 = 5.463$, df = 1, p = 0.019
Hosmer & Lemeshow Test	$X^2 = 0.000$, df = 0, p = -
c/ body image	
# of cases included	448
Model chi-square	$X^2 = 36.307$, df = 2, p = 0.000
Hosmer & Lemeshow Test	$X^2 = 0.025$, df = 2, p = 0.988

Linear regression was run with significant predictors for body image in grade 6 in relation to self-esteem in grade 9. Analyses to examine how changes in the explanatory variables would influence changes in self-esteem in grade 9 (using the continuous variable) revealed that a one-unit increase in body image score in grade 6 was associated with, on average, an increase in self-esteem score in grade 9 by 0.481 points (p = 0.001). As well, a one-unit increase in self-esteem score in grade 6 was associated with, on

average, an increase in self-esteem score in grade 9 by 0.304 points (p = 0.000). Table 53 highlights the findings from linear regression in relation to self-esteem in grade 9.

Table 53: Linear regression for self-esteem in grade 9 (significant variables from grade 6).

Variable	B-value	Sig.
Self-esteem- scale	0.304	**0.000**
Body image- scale	0.481	**0.001**
Model $R^2 = 0.147$		

*non-significant variables include parent's marital status, playing sports without a coach never, less than one time per week, 1-3 times per week or 4 or more times per week, playing sports with a coach never, less than one time per week, 1-3 times per week or 4 or more times per week, depression, vegetable and fruit consumption, and grains consumption

Chapter 7

DISCUSSION

7.0 Discussion

This study is unique in that it examines a low-income population to determine factors that are related to the body image and self-esteem of young children and adolescents. As well, this study examines whether a child meeting the recommended intakes for the four food groups (as outlined by Canada's Food Guide [CFG]), and an "other foods" food group is related to their body image and self-esteem. This is especially interesting, as this relationship has not been extensively studied in the past. Another unique aspect of this research is that it examines relationships with body image and self-esteem over time from grade 6 to grade 9 and assesses whether certain factors in grade 6 were significantly related to either an increased or decreased body image / self-esteem in grade 9. This research investigated the relationship of certain demographic variables (Table 4), weight status (of child and parent), food choices, physical activity, and depression with body image and self-esteem. Through this investigation, numerous factors (environmental, personal and behavioural) were identified as significant contributors to both body image and self-esteem in children in grade 6 and grade 9. These findings can provide frameworks for interventions for children and adolescents using the social cognitive theory as the main framework for intervention strategies.

7.1 The relationship between body image and self-esteem

Body image and self-esteem demonstrated very close relationships with one another, indicating that a change in one may induce a change in the other. There was a clear indication that body image and self-esteem were significantly and directly related to one another; meaning that if a child presented with a high self-esteem, they were significantly more likely to have a strong body image (Table 16,22). Similarly, if a child

presented with a strong body image they were significantly more likely to have a high self-esteem (Table 25, 31). This relationship between body image and self-esteem is supported by previous research which indicated that someone who demonstrated improved levels of body image or self-esteem, were also found to demonstrate improved levels of the other (109-112). Due to the close relationship identified between body image and self-esteem, programming that improves one may be helpful in improving the other. This is supported by a study conducted by O'Dea and Abraham (2000) who demonstrated that programming focused on improving self-esteem in adolescents was successful at also improving body image (113). This is important to note because if program resources are limited and can only focus on one aspect this alone may be enough to help improve the other. Yet, the relationship as described through the results indicates that body image and self-esteem are very closely related, regardless of what the child's body image or self-esteem is. This is contradictory to results found by Svaldi, Zimmerman and Naumann (2012), who determined that the tight relationship between body image and self-esteem was only really present in individuals who were presenting with high, but not low levels of body dissatisfaction (111). The findings from our results show that, for this population, the relationship is present regardless of body image and self-esteem level.

The social cognitive theory supports the identified relationship, if we examine body image and self-esteem as reinforcers of the other. If body image is a positive reinforcer for self-esteem then an increase in body image would be associated with an increase in self-esteem, and vice-versa. This reasoning is consistent with the results found in this research. As well, programs focused on improving one aspect (either body image or self-esteem) have demonstrated improvements in the other (113). This supports that

body image and self-esteem can be used as reinforcers of one another and helps provide support for the use of the social cognitive theory as an appropriate framework to examine this relationship and to help shape programs for children and adolescents. It is important to note the strength of the relationship demonstrated between body image and self-esteem in this study, which helps to illustrate that although these variables in themselves are multifactorial, the influence they have on one another is very strong. Due to the fact that both body image and self-esteem are strong predictors of one another, they can often be predicted from each other alone (without other variables providing input). This accounts for why some variables were removed from the regression models as being significant once body image and self-esteem were added to the model.

7.2 Food consumption

Children who met the CFG recommendations for vegetable and fruit intake were significantly more likely to fall into the strong body image category in grade 6 (Table 16). As well, meeting the recommended intakes for fruit and vegetables was a predictor for increasing body image and self-esteem in grade 6 children (Table 20,29). There were no significant relationships identified for vegetable and fruit consumption with body image or self-esteem in grade 9. This indicates that a child's food choices may play a larger role in influencing whether a child has a higher body image or self-esteem when they are younger. As well, this could indicate that parents influence children's food choices more when they are younger, as children tend to eat family meals less often as they age (114). As children age, into adolescence, the family influence appears to become less prominent, while the peer influence appears to strengthen (114, 115). The relationship demonstrated between vegetable and fruit consumption in grade 6, but not in

grade 9 could be the result of changing influences in the child's life. The differences in these results indicate that other factors are coming into play to affect body image and self-esteem in the older children and identifies an area where programming may need to change as children age (71, 116). Focusing on improving consumption of fruits and vegetables may not be as beneficial or important when children reach grade 9. There is limited research supporting specific eating behaviours in relation to body image and self-esteem. This is supported by a study conducted by van Kooten, de Ridder, Vollenbergh, and van Dorsselaer (2007), who found that emotional distress is not significantly related to eating behaviours (76). The results from this research may indicate a new area for programming to promote a positive body image, specifically in younger children, by increasing fruit and vegetable intake in these children.

Interestingly, a higher consumption of foods from the "other" food group in grade 9 was a significant predictor of increased body image; indicating that children were significantly more likely to have a higher body image when they had a higher consumption of foods from the "other" food group (Table 24). This could indicate that as children age, those who are more comfortable with their bodies are more willing to consume higher levels of foods from the "other" foods group. This is supported by Ridder, Heuvelmans, Visscher, Seidell, and Renders (2010) who found that as long as adolescents perceived themselves to be healthy then making healthful choices (such as healthy food choices and physical activity) was not as important (117). This is even further supported by the fact that fruit and vegetable consumption demonstrated no significant relationship with body image or self-esteem in grade 9. With increased age the focus on healthy eating (namely increasing consumption of fruit and vegetables) may not

be as helpful or necessary for the promotion of a healthy body image and self-esteem in adolescents. The relationships identified between body image, self-esteem and the eating behaviours support the theory that behavioural aspects of an individual's life will influence body image and self-esteem. This is supported by the social cognitive theory, which states that behavioural, as well as environmental and personal factors impact on people's behaviours and feelings.

7.3 Physical activity

Playing sports with or without a coach, one or more times per week was significantly related to body image and self-esteem. In grade 6, children who played sports without a coach one or more times per week were significantly more likely to fall into the strong body image and self-esteem category (Table 16,25), while children who played sports with a coach one or more times per week were also significantly more likely to fall into the high self-esteem category (Table 25). These relationships were examined further for the frequency of participation in physical activity and demonstrated that playing sports without a coach less than one time per week and with a coach less than one time per week or 1-3 times per week were actually associated with decreases in their body image (Table 18). As well, any involvement in physical activity one or more times per week was a predictor of increasing body image and self-esteem in grade 6 children (Table 18,30). Children who played sports with a coach 1 or more times per week were more likely to have increases in their self-esteem and more than 4 times per week were more likely to have increases in their body image (Tables 21). This finding is supported by Tremblay, Inman and Willms (2000), who examined the relationship between self-esteem and physical activity in grade 6 children in New Brunswick and

found that physical activity levels were significantly related to self-esteem in both male and female students (regardless of socioeconomic status) (118). As well, this study found that an increase in vigorous physical activity was associated with improvements in self-esteem in both males and females (118). The findings in our study indicate that children who participate in physical activity more often will be more likely to have improved body image and self-esteem. This relationship may be associated with improved confidence from participation in the sport and improved body image due to the increased participation in physical activity. These results also support that physical activity at a young age can set a child up for improved quality of life as evidenced by the positive impact of physical activity on body image and self-esteem. These findings support the idea that an increased level of physical activity (of any kind) is related to a significantly higher body image and self-esteem (119).

Interesting to note is that playing sports without a coach was significantly associated with a child being in the low self-esteem category in grade 9 (Table 31). For grade 6 children playing sports without a coach was significantly related to a child being in the high self-esteem category, which was not the case in grade 9. Further analysis into the frequency of sport participation revealed that participation in physical activity less than one time per week was associated with a lower self-esteem, but similar to the relationship identified with self-esteem in grade 6, participation in physical activity 4 or more times per week without a coach was associated improved self-esteem. These findings support that the presence of a coach may increase self-esteem, and indicate that a coach may offer more of a protective effect on self-esteem when children are older than when they are younger (120-122). It can therefore, be determined that at a young age,

physical activity is associated with an improved body image and self-esteem, but as children age, the absence of a coach's presence may actually have a negative effect on the child's self-esteem. Another important point to make is that increasing participation in physical activity (in terms of frequency) has been associated with improved body image and self-esteem in past research (55, 123). An important focus in programming should therefore be on increasing the amount of time that children and adolescents have for participating in physical activity. It is important to note that the type of physical activity that the children and adolescents were participating in is unknown in this study. Future research should examine frequency of physical activity, presence of a coach, as well as type of physical activity. Individuals who are involved in more esthetically focused sports (such as figure skating and gymnastics) may demonstrate a lower body image due to the nature of their sport being focused around the way that the body looks (54). The physical activity variable is an interesting one because it encompasses two separate aspects of the social cognitive theory: behavioural and environmental. Physical activity is a behavioural component, as well as environmental when you consider the role of a coach being present or not, and the interactions associated with having a coach present. The relationship demonstrated with the physical activity variables and body image / self-esteem are a prime example of how the social cognitive theory outlines the close relationships demonstrated in this study.

7.4 A child's weight status

A child who was obese in grade 6 was at a significantly greater risk of being in the poor body image category than a child who was not obese (Table 16). As well, obesity in grade 9 children was a predictor for a decreased body image, while falling into

the underweight or normal weight BMI category was a predictor for an increased body image (Table 20). These results are supported by previous research, which suggests that children and adolescents are significantly more likely to have a decreased body image when they fall into the overweight or obese categories (10, 32, 36, 124-126). In children and adolescents weight can be a major influencer on their body image. Weight is a tangible way that people can measure the way that their body looks in comparison to social norms or desirability. Because weight status is a very visible way of influencing body image it may be an even more important area to focus in terms of improving body image. Research has suggested as well, that obese people may feel more cultural pressures to be thin which can exacerbate the negative effect on their body image (127).

It is important to target obesity prevention at a young age as well; from our results we can see that body image at a young age can carry over later in the individuals life. Therefore, even if the individual was no longer obese, they may still have a poor body image due to body image issues that remained with them from childhood (127). Programming that begins at an early age may help to prevent this from happening. Our results also support the close relationship between the way that obese children view their bodies and the dissatisfaction that this draws. Mizra, Davis and Yanovski (2005) maintain this in their findings that children who perceived themselves as overweight, or who were trying to lose weight were more likely to have higher levels of body dissatisfaction (125). These results point to the importance of obesity prevention at a young age to provide a protective effect on a child's body image. This relationship is also supported by the social cognitive theory, which states that personal factors often play a role in the behavioural outcome, with obesity being the personal factor. The role of obesity in influencing body

image may be something that is unique from person to person, therefore maintaining it as a personal factor, with multiple external influencers.

It is interesting to note that weight status did not play a significant role in terms of self-esteem in children in grade 6 or grade 9. It was expected that body image and self-esteem, no matter the age of the child, would be influenced by the child's weight status (i.e., normal weight children would be expected to have a higher body image and self-esteem, while overweight and obese children would be expected to have a lower body image or self-esteem) (32, 36). Our results indicate that for this population, weight status may not be as significant of a predictor of self-esteem in children and adolescents as was originally thought, and that other aspects of an individual's life may be more important influencers of self-esteem (128). Ozmen et al (2007) found that self-esteem was significantly related to perceived weight status in adolescents, but not to actual weight status (129). This means that adolescents who perceived themselves to be overweight were more likely to demonstrate a low self-esteem, while those adolescents who were actually overweight did not demonstrate any significant relationships with self-esteem (129). This indicates that in future research an important predictor to include would be "perceived weight status" as well as actual weight status and body image to examine in relation to self-esteem. Including a "perceived weight status" variable would help to strengthen support for intervention methods for improving body image and self-esteem, as it would allow one aspect of the program to focus on providing children and adolescents with an improved view of their bodies. As well, examining perceived weight status may further explain the relationship of weight status with self-esteem, by examining another aspect of an individual's weight that influences self-esteem.

7.5 Depression

Depression demonstrated a significant relationship with self-esteem in grade 6 children only (Tables 25,29), such that children who had a higher level of depressive symptoms were significantly more likely to fall into the low self-esteem category. As well, a higher level of depression was a significant predictor for decreasing self-esteem in grade 6 children. These results are consistent with the results identified by Gaymen, Lloyd and Ueno (2010) who found that depression at a young age is associated with a decreased self-esteem (130). The authors hypothesized that individuals who are depressed develop negative self-schemas which translate into a negative self-esteem, especially at a young age (130). This theory helps to explain why depression only demonstrated a significant relationship with self-esteem in grade 6 children, but not when they were older. The relationship of depression with self-esteem may be the most prominent when children are younger, and may play less of a role in influencing self-esteem as children age. While the research by Gaymen at al helps to validate the results found in our research, there are still a lot of questions surrounding the relationship of depression with body image and self-esteem. Millings, Buck, Montgormery, Spears, and Stallard (2012) found that self-esteem was significantly related to having depressive symptoms in adolescents (131). The findings of Millings et al. (2012) indicate that a relationship may exist between self-esteem and depression as children age and grow into adolescence (131). These results are not supportive of our findings, however, support that inconsistencies have been found in the literature in regards to body image and self-esteem with depression, which may help to explain why depression did not demonstrate more of a relationship as a predictor for either body image or self-esteem.

There is very little research to support that depression, body image and self-esteem are closely related to one another. Recent research suggests that factors such as anxiety, obesity and body dissatisfaction are closely related to self-esteem, but have not been able to demonstrate significant relationships between depression, body dissatisfaction or self-esteem (132, 133). Depression may be influenced by other factors in an individual's life, and the presence of depression may be seen completely separate from the presence of body dissatisfaction or declined self-esteem. Depressed individuals may demonstrate more concerns with their body shape and weight, as well as eating concerns and a higher BMI than their non-depressed peers (134, 135), but this depression is not directly related to their body image and self-esteem. It is evident that eating concerns and a higher BMI are more influential factors of depression, and depression therefore may not cause body dissatisfaction or low self-esteem, Our findings indicate that the relationship of depression with body image and self-esteem is minimal, with significant findings only present in grade 6 children's self-esteem, indicating that depression is more of a predictor for self-esteem at a younger age.

7.6 The role of demographic variables

A number of demographic variables (Table 3) were introduced into Chi-Square and regression analysis to determine the significant relationships with body image and self-esteem.

7.6.1 Birthplace of parent and cultural identity

A parent's birthplace was significantly related to a child's body image in grade 6, such that children whose parents were born in Canada were significantly more likely to fall into the poor body image category, while children whose parents were born outside

of Canada were significantly more likely to fall into the strong body image category (Table 16). As well, when a child's parents were born outside of Canada this was a significant predictor of an increased body image in grade 6 children (Table 20). Another interesting finding was that Francophone children were significantly more likely to fall into the poor body image category in grade 9, over children identifying as any other cultural identity (English or Native) (Table 22). Being Francophone was also a significant predictor of decreasing body image in grade 9 adolescents (Table 24). Having a parent who was born inside of Canada, as well as being Francophone were both negative reinforcers for body image.

The differences seen with cultural identity and birthplace of parent may be due to the cultural differences in the home. Western culture tends to favor a more slender view of the way that one's body should look, over other cultures in the world. A classic example of this comes from the Fiji study by Anne Becker (2007) who found that once television was introduced to a small town, that traditionally favored a larger body as more beautiful, the rate of eating disorders and body dissatisfaction dramatically increased (136). Becker's findings illustrate the effect of Western views on body image and self-esteem, and can help to demonstrate why there may have been increased body dissatisfaction in younger children whose parents were born in Canada. The finding in relation to birthplace of parent is supported by previous research that indicates that the Western culture values thinness, and that obesity is one of the most stigmatized groups over any other minority (137, 138). The children whose parents were born outside of Canada may not have been raised with the same beliefs of what a person's body should look like as a child whose parents were born in Canada. The same factors may come into

play when looking at Francophone children. The cultural ideals conveyed within the home of a Francophone family may resemble those traditionally seen inside of Western cultures. These results highlight the importance of transitioning our way of thinking about what is considered ideal in terms of how one's body looks and promoting a healthy body to our children.

It is interesting to note that birthplace of parent and being Francophone did not demonstrate the same significant relationship with body image in grade 9 as it did in grade 6. This could be due to the fact that children place more value in what they are taught by their parents at a younger age, and as children get older they may place more value on their peers and external influences, outside of family values (115). The cultural influence would therefore play less of a role as adolescents would be basing their feelings towards body image and self-esteem on peer influences most often. It was also interesting that birthplace of parent and being Francophone demonstrated no significant relationship with self-esteem in children. This could be due to the fact that Western culture has defined values for what someone's body should look like, but research around self-esteem and cultural values is needed. Therefore, children and adolescents would not have set ideals to base their self-esteem on as is sometimes seen with body image. As well, body image may be more influenced by the Western ideal of how the body should look, whereas self-esteem is not as tangible.

7.6.2 Sex of child

The sex of the child was significantly related to body image in both grade 6 and grade 9 children (Tables 16,20,22,24,35). As well, sex of the child was significantly related to self-esteem in grade 9. Males in both grades were found to be significantly

more likely to have a higher body image than females were, as well as a higher self-esteem in grade 9. These results are supportive of previous research that suggests that females are the most affected by pressures to look a certain way and fit a certain body image; females have also been shown to be more likely to demonstrate depressive symptoms than males (139-143). One reason for this could be due to the pressures on females to fit such a small physique in order to fill the perceived idea of beauty (144). Females often feel pressure to fit one ideal, while males have more lenient views of how their body should look, which may indicate the differences identified between sexes (144). Although these findings in themselves are not new in regards to the research, they help to set the tone for the variety of factors that come into play in regards to a child's and adolescent's body image and self-esteem. The majority of children and adolescents are shown to demonstrate some sort of body dissatisfaction in their lives, but this dissatisfaction may present differently in different children (1). Although it has been shown that females are more likely to have a lower body image and self-esteem, this does not indicate that males are not suffering from similar issues (139-143). Males can often desire that their body look differently (often wanting a larger physique), while females can desire to have a smaller physique (135).

7.6.3 Location

Being from a comparison site was a significant predictor of increased self-esteem in grade 9 adolescents (Tables 24,31). The interesting thing about this relationship is that individuals from the comparison sites were significantly more likely to have a higher self-esteem, while those from the demonstration sites were significantly more likely to have a lower self-esteem. This variable examines the environmental aspect of influencers

on self-esteem. Each of the three demonstration sites had similar types of programming, but each community developed individualized programs (145). The programming within the three older cohort communities all shared project staff, followed child development and referred participants to other programs if necessary (145). Child and family focused programs in each community included home visits to provide support to families and children through someone to talk to, and help to support optimal health and development of the children (145). In the older cohort a lot of the programming was focused around the school and each school had volunteers that helped to facilitate this (145). School programming included helping with school subjects, as well as snack programs, cultural fairs and helping to facilitate the parent's involvement within the school (145). Each site also had parent and community focused programming, which included pre and post natal programming and parental discussion groups as well as community gardens, celebrations for special events and increased access to resources (145). None of the programming in any of the demonstration sites was focused solely on body image or self-esteem, which points out that although programs can focus on providing a balance within multiple of aspects in an individuals life, body image and self-esteem in themselves are very complex. The detailed programs, such as those listed above may not improve the areas that need to be improved in relation to self-esteem. There was no programming in the comparison sites, which makes the fact that these children demonstrated a higher self-esteem in grade 9 all the more surprising. The sites, both demonstration and comparison, were vary comparable in terms of demographic characteristics, which would indicate, that outside of programming, the sites should be comparable. Because the programming

did not positively impact body image or self-esteem, there are other underlying factors that are impacting body image and self-esteem in these children.

7.6.4 Marital status

A child's parent's marital status was found to be significantly and directly related to a child's self-esteem in grade 6, meaning that a child who had married parents was significantly more likely to fall into the high self-esteem category (Table 25). As well, having parents who were married was a significant predictor for increasing self-esteem (Table 29). Children from divorced families are significantly more likely to have a lower self-esteem than children who come from families that are not divorced, which supports our findings (146-148). One of the reasons for this could be increased turmoil in the home. There were no identified relationships with a parent's marital status and body image in grade 6 or grade 9, a relationship that has not been widely defined in past research.

7.7 Longitudinal Relationships

7.7.1 Body Image

Two separate analyses were run to determine the predicting factors for longitudinal relationships with body image and self-esteem. The first analysis examined significant models from grade 6, which were re-run in grade 9 to see if the models to predict body image in grade 6 would do the same when children were older (in grade 9). This analysis revealed that models to predict body image in earlier years cannot be used as definitive models to predict body image as children age. The majority of the factors that were predictive of body image in grade 6 children (Tables 16,20) were no longer significant in predicting body image in grade 9 children when the same model was used

(Table 40,42). This is supported by Paxton, Eisenberg and Neumark-Sztainer (2006) who found that body image at a younger age is very unstable because children are still growing; indicating that multiple varying factors may appear as significant predictors of body dissatisfaction at a young age (149). As children got older, into middle adolescence, the predictors for body dissatisfaction became more prominent (149). The only similarities between the two models in our research were that the sex of the child and self-esteem were significant predictors of body image. Females have been shown to demonstrate higher levels of body dissatisfaction than males across a wide range of age groups from early childhood to young adulthood (24, 36, 77). As well, sex of the child was significantly related to body image in grade 9 children in previous analysis (Tables 37, 39). Body image and self-esteem have demonstrated very close relationships with one another across all analyses and have been shown in the past to be significant predictors of one another (109-112). It is therefore not surprising that the relationship with self-esteem was present in both models.

When examining factors that would predict an increase in body image in grade 9, using grade 6 models, different relationships also emerged. The findings indicated that models to predict increases or decreases in body image at a young age cannot be used to predict the same when children were older (and into adolescence). Again, in the model that emerged for grade 9, there were only a small number of similarities to the model from grade 6: sex of the child, self-esteem, and obesity. In this analysis, adolescents who were in the underweight or normal weight category were more likely to have an increased body image, which is supported by past research (38). Saxton, Hill, Chadwick and Wardle (2009) found that normal weight children tend to correctly identify their body

shape based on their weight, which is associated with how the child feels about their body (38). Having different models demonstrated in both analyses confirms that models to predict body image in younger children (grade 6) cannot be used as the same models to predict body image when the children age. Some similarities were present, but overall, the models change, which is most likely due to the fact that children are growing and maturing more when they are younger (149). As a child gets older, the influencers that matter for influencing their body image are no longer the same as they were in younger children, which accounts for the changing relationships demonstrated across the three-year span.

The second analysis was run with the significant variables in grade 6 against body image in grade 9. This analysis was run to determine what, if any, factors in grade 6 would influence body image in grade 9. The initial analysis revealed that certain factors that would not change as the child aged including being Francophone, the sex of the child, and the site that the child came from were significant predictors of body image in grade 9. The site variable did not previously demonstrate a significant relationship with body image in previous grade 9 analyses, but being Francophone and sex of the child both did. As well, being obese in grade 6 was a predictor for a decreased body image in grade 9 (Table 48). This means that a child who was obese in grade 6 would have a lower body image in grade 9. This is supported by previous research that indicated that weight status was a significant predictor of body image, and that children who became obese or remained obese over time were significantly more likely to have a lower body image (34).

Both body image and self-esteem in grade 6 children were associated with increased body image in grade 9. This is supported by research, which suggests that body image and self-esteem at a younger age is associated with body image, as children get older (112, 149, 150). This means that if a child had a higher body image and or self-esteem in grade 6 they would be expected to have a higher body image in grade 9. The focus in grade 6 should therefore be, on improving a child's body image, self-esteem and body weight to improve their body image later in the child's life. Based on our results from previous analyses, programming should also include promoting participation in physical activity and following a healthy diet, as well as promotion of a healthy body weight. The PACE program located in California focused on diet, physical activity and a healthy body weight in children and adolescent and found that through dietary counseling and physical activity the weight of some participants improved (151). Participants who had an improved weight status demonstrated an improved body image and self-esteem as well (151). An important point in this intervention was that weight was not a focus of the study and any improvements were made through the programming itself (151). This is important to keep in mind when developing programming, because a program focused around weight may exacerbate or develop weight issues in children (152). Discussions around individual body weight and size should be avoided unless eating disorder issues are also addressed in the programming (152). As well, programming may need to be offered for extended periods of time or multiple times over a course of a few years, especially when children are entering early adolescence (i.e., grade 6) (153). This is a time that has been identified for increased risk of body dissatisfaction and a lower self-

esteem and offering repeat or extended programming can help children work through these issues as they get older (153).

The SCT helps to define a program model based on the above-mentioned qualities. The program aims to improve the child's overall body image and self-esteem, by taking into account the interaction between environmental (physical activity with a coach present), personal (body weight, body image and self-esteem) and behavioural (physical activity and diet) factors in an individual's daily life, which is necessary for the success of a program of this kind.

7.7.2 Self-esteem

The models that were found to be significant in relation to self-esteem in grade 6 were re-run in grade 9 to determine if they could predict self-esteem in grade 9 as well. The results of this analysis revealed that, similar to body image, the models to predict self-esteem at a younger age (grade 6) cannot be used to predict self-esteem as children aged (in grade 9). This is supported by Robins and Trzesniewski (2005) who found that as individuals develop across the lifespan they go through high and low levels of self-esteem (154). The changes in their self-esteem are caused by the different challenges and experiences that an individual is facing at each point in their life (154). As children get older, the relationships that may be important predictors of self-esteem may change as the child has new experiences and matures.

Playing sports without a coach and depression were both found to be inversely related to self-esteem in grade 9 (Table 49). This means that children who played sports without a coach, one or more times per week, and children who demonstrated higher levels of depression were significantly more likely to fall into the low self-esteem

category. Further examination into physical activity frequency revealed that adolescents who participated in physical activity without a coach less than one time per week were more likely to have a low self-esteem, while adolescents who participated greater than four times per week were more likely to have higher self-esteem. The physical activity variable demonstrated this relationship with self-esteem in previous analyses (Table 33) in grade 9. Past research by Coastworth and Conroy (2006) found that the presence of a coach with children at a young age is very beneficial to the child because of the strong bond developed early on in the child's life (155). The findings of Coatsworth and Conroy may help to explain the inverse relationship demonstrated with physical activity and the presence of a coach when the children were older. There was no relationship with physical activity when a coach was present in grade 9, which indicates that the absence of a coach's presence may actually cause a negative relationship with self-esteem and physical activity. Other research has suggested that the coach-athlete relationship is more influential in later years in a child's development (120-122). These findings also provide support for the fact that the absence of a coach in the child's life may provide detrimental effect on the child's self-esteem, especially if the adolescent is participating in physical activity less often. In times when they participate more than 4 times per week the absence of a coach does not appear to have a negative effect on the adolescent's self-esteem, which was also demonstrated in the pervious analysis with self-esteem in grade 9.

Interestingly depression showed a relationship with self-esteem in grade 9, when it had not previously. Past research with depression has demonstrated very mixed results as to whether depression and self-esteem are significantly related to one another (132, 134). Millings, Buck, Montgormery, Spears, and Stallard (2012) have found, however,

that there is an inverse relationship with depression and self-esteem, such that individuals with a higher level of depression will also have a low self-esteem (131). As well, body image was found to be a predictor of self-esteem. If a child had a higher body image they were more likely to have a high self-esteem and demonstrate increases in their self-esteem. Body image and self-esteem have demonstrated very close relationships to one another in the past, where an increase in one would cause an increase in the other (109-112). The previously identified relationships between body image and self-esteem helps to explain the close relationship demonstrated in this research.

The second model that was run (using the variables that were significant in grade 6) to determine what, if any, factors in grade 6 would influence body image in grade 9 indicated that playing sports with a coach in grade 6 was a significant predictor of a child having a high self-esteem in grade 9. This indicates that the presence of a coach in the sports atmosphere at an early age can provide a protective effect on that child's self-esteem even later in the child's life (155). The presence of a coach at an early age may also improve a child's self-esteem when they grow into adolescence, due to the coach athlete relationship and the positive influence on the child's life from this relationship (155). These results highlight the importance of a coach's presence in the physical activity environment. This is an area that programming can focus to improve body image and self-esteem as well, through the provision of a coach in intervention strategies.

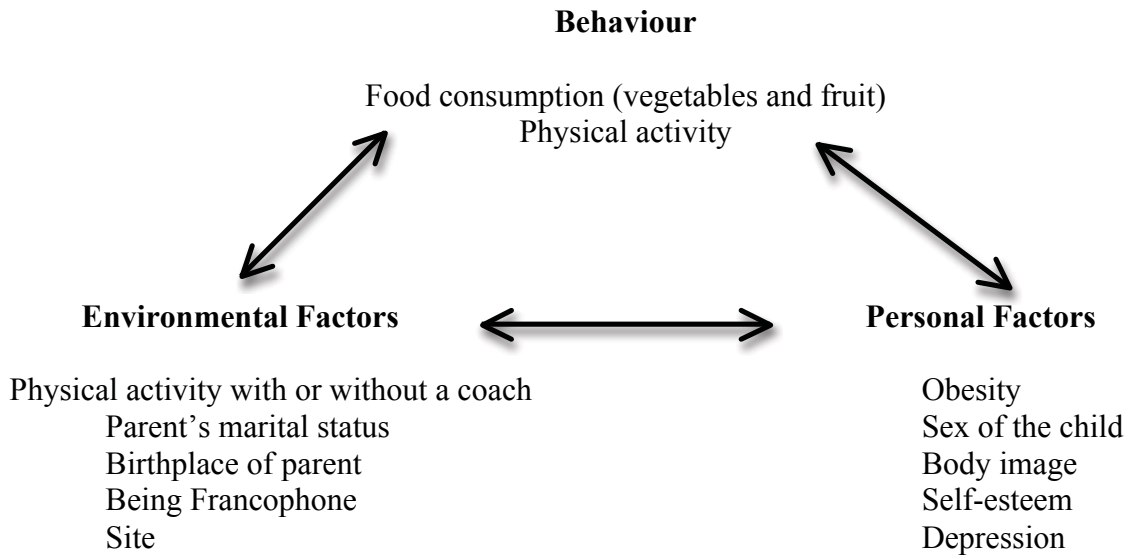
Both body image and self-esteem in grade 6 were directly related to self-esteem in grade 9 (Table 53). This means that children, who had a lower body image or self-esteem while in grade 6, were significantly more likely to fall into the low self-esteem category in grade 9. As well, increases in body image and self-esteem in grade 6 were

both found to be positive predictors for an increased self-esteem in grade 9 adolescents (Table 53). This means that a child who demonstrates with a strong body image or self-esteem in grade 6 is significantly more likely to have an increased self-esteem in grade 9. These results are supported by the close relationship identified between body image and self-esteem in previous research, where a change in one will induce a change in the other (109-112). As well, the strength of the relationships identified between body image and self-esteem point to the fact that these factors can play a role in influencing one another as a child develops. These results highlight the importance of promoting a positive body image and self-esteem to children at a young age through the appropriate programming and intervention methods focusing on physical activity, healthy eating, and improving obesity rates in children and adolescents.

The social cognitive theory (SCT) helps to explain the relationships identified with body image and self-esteem, because at both points in time, behavioural, environmental and personal factors come into play to influence both body image and self-esteem. As well, multiple factors were identified in relation to body image and self-esteem longitudinally, which encompassed all three aspects of the SCT. Figure 2 depicts an adapted model of the SCT based on the results in this study. The SCT defines a model based on influencers in an individual's every day life and examines the way these influencers interact to predict the overall model (156). Every predictor of body image and self-esteem listed in Figure 2 are common factors that come into play in daily life and interact with one another to develop an individual's body image and self-esteem. As well, the models to define body image and self-esteem include predictors from each category (behavioural, environmental and personal) indicating that the SCT adequately defines the

models for both body image and self-esteem in grade 6, grade 9 and longitudinally. Programming to improve body image and self-esteem should be based around the SCT model as it provides a balance in each area in a person's life to help improve their body image and self-esteem as well as improve their overall well-being. Successful programming in the past has incorporated similar models to improve both body image and self-esteem for long term benefits (151).

Figure 2: Adapted Social Cognitive Theory



7.8 Conclusion

The primary contribution of this research is support for the factors that influence a child's body image and self-esteem; this research also contributes by advancing the understanding of the relationships with body image and self-esteem longitudinally, amongst a low-income population. In conclusion, body image and self-esteem are very closely related to one another and a change in one will induce a change in the other. There is no defined model for determining body image or self-esteem in both grades 6 and 9, as the factors impacting these variables change as children age. Some variables,

such as sex of the child, physical activity levels, and weight status may provide insight into a child's body image and self-esteem over time. Unique relationships with body image and self-esteem were not uncovered through this research, which may indicate that low-income children do not differ in terms of their risk factors for a poor body image or self-esteem. Future research should further investigate the differences between low-income populations and more affluent populations in terms of their body image and self-esteem.

Programming that promotes fruit and vegetable consumption and physical activity through education as well as practice in younger children may help to improve body image and self-esteem later in the child's life. Programming should teach children about the basics of healthy eating and the importance of physical activity, as well as allow them to prepare healthy snacks and incorporate a physical activity component into their daily life. Allowing for the presence of a coach in the physical activity component would also help to positively influence body image and self-esteem in program participants. While these interventions may help to improve obesity rates in young children, particular focus on improving overall obesity rates will also help to improve a child's body image. Programming aimed at decreasing obesity should focus on promoting a healthy body image in children as well as improving diet quality and physical activity levels, while avoiding direct focus on weight of the child (151). This can help to avoid any issues such as eating disorder behaviours that could develop as a result of focus on individual body weight (151). Body image and self-esteem are directly related in grades 6 and 9, but models to predict body image and self-esteem in grade 6 cannot be used to predict the same in grade 9. Future research should include the examination of type and frequency of

physical activity, as well as the presence of a coach in the physical activity environment. Examination of weight status as well as perceived weight status in relation to body image and self-esteem is also an important aspect to focus on.

Chapter 8

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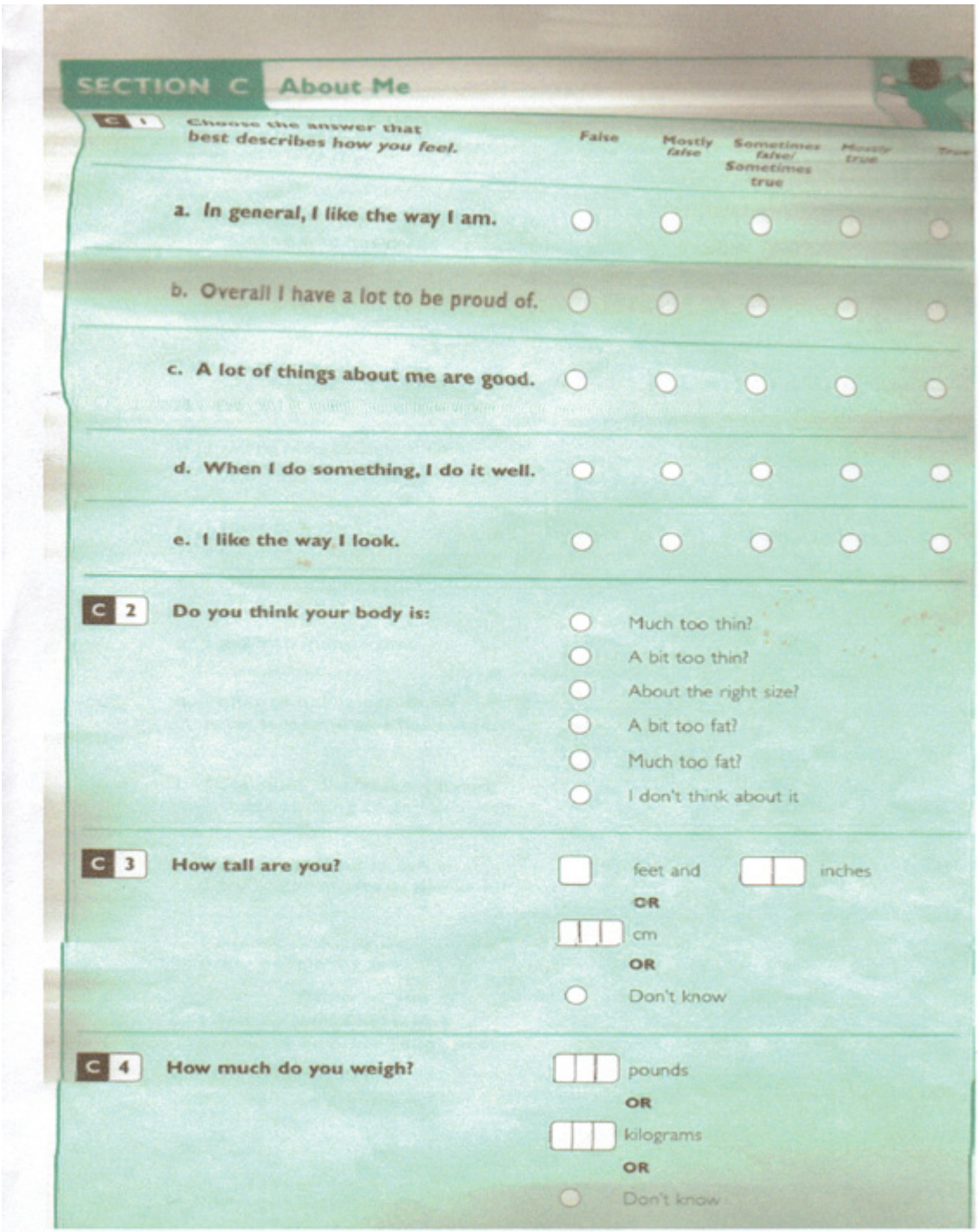
Appendix 1

YOUTH SELF REPORT FORM



SECTION C About Me

C 1 Choose the answer that best describes how you feel.

	False	Mostly false	Sometimes false/ Sometimes true	Mostly true	True
a. In general, I like the way I am.	○	○	○	○	○
b. Overall I have a lot to be proud of.	○	○	○	○	○
c. A lot of things about me are good.	○	○	○	○	○
d. When I do something, I do it well.	○	○	○	○	○
e. I like the way I look.	○	○	○	○	○

C 2 Do you think your body is:

- ○ Much too thin?
- ○ A bit too thin?
- ○ About the right size?
- ○ A bit too fat?
- ○ Much too fat?
- ○ I don't think about it

C 3 How tall are you?

☐ feet and ☐☐ inches

OR

☐☐☐ cm

OR

○ Don't know

C 4 How much do you weigh?

☐☐☐ pounds

OR

☐☐☐ kilograms

OR

○ Don't know

SECTION G Activities

G 1 During the past 12 months, how often have you ...	Never	Less than once a week	1 to 3 times a week	4 or more times a week
a. played sports or done physical activities WITHOUT a coach or an instructor (e.g. biking, skateboarding, etc.)?	○	○	○	○
b. played sports WITH a coach or instructor, other than in gym class (swimming lessons, baseball, hockey, etc.)?	○	○	○	○
c. taken part in dance, gymnastics, karate or other groups or lessons, other than in gym class?	○	○	○	○
d. taken part in art, drama or music groups, clubs or lessons outside of class?	○	○	○	○
e. taken part in clubs or groups such as Guides or Scouts, 4-H club, community, church or other religious groups?	○	○	○	○
f. done a hobby or craft (drawing, model building, etc.)?	○	○	○	○
g. played computer or video games?	○	○	○	○
h. done odd jobs (a paper route, babysitting, etc.)	○	○	○	○

G 2 On average, about how many hours a day do you watch TV or videos?

- ○ I don't watch TV or videos
- ○ Less than one hour a day
- ○ 1 to 2 hours a day
- ○ 3 to 4 hours a day
- ○ 5 to 6 hours a day
- ○ 7 or more hours a day

G 3 How often do you read for fun (not for school)?

- ○ Every day
- ○ A few times a week
- ○ Once a week

SECTION H Food

H 1 How often do you have something for breakfast?

- ○ Every day
- ○ Some days
- ○ Rarely
- ○ Weekends only
- ○ Never

H 2 How often have you eaten any of these foods in the last seven days? For each food, please fill in the circle.

	At least twice a day	Once a day	4 to 6 times/ week	1 to 3 times/ week	Never
a. Milk (alone or on cereal)	○	○	○	○	○
b. Cheese	○	○	○	○	○
c. Yogurt and frozen yogurt	○	○	○	○	○
d. Eggs	○	○	○	○	○
e. Ice Cream	○	○	○	○	○
f. French fries	○	○	○	○	○
g. Other kinds of potatoes	○	○	○	○	○
h. Salad	○	○	○	○	○
i. Other vegetables	○	○	○	○	○
j. Beans (baked, kidney beans, lentils, tofu)	○	○	○	○	○
k. Peanut butter	○	○	○	○	○
l. Fruit	○	○	○	○	○
m. Fruit juice	○	○	○	○	○
n. Bread, bagels, pitas, English muffins, crackers, tortillas	○	○	○	○	○
o. Rice	○	○	○	○	○
p. Spaghetti, macaroni, or other pasta	○	○	○	○	○

H 2 How often have you eaten any of these foods in the last seven days? For each food, please fill in the circle.	At least twice a day	Once a day	4 to 6 times/ week	1 to 3 times/ week	Never
t. Hamburgers, beef, pork, hot dogs, sausages, lunch meats, other meat	○	○	○	○	○
u. Chicken, turkey, fish	○	○	○	○	○
v. Cakes, cookies, pie, doughnuts	○	○	○	○	○
w. Potato chips, tortilla or nacho chips, Cheesies, pretzels, other snack foods	○	○	○	○	○
x. Candy, chocolate bars	○	○	○	○	○
y. Regular (not diet) soft drinks	○	○	○	○	○