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# Awareness of Physical Activity Levels and Sedentary Behaviour: An Assessment of Awareness of Physical Activity Levels and Sedentary Behaviour Among Parents and Children

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A thesis submitted in partial fulfillment of the requirements for the degree in Master of Arts  
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AWARENESS OF PHYSICAL ACTIVITY LEVELS AND SEDENTARY BEHAVIOUR:  
AN ASSESSMENT OF AWARENESS OF PHYSICAL ACTIVITY LEVELS AND  
SEDENTARY BEHAVIOUR AMONG PARENTS AND CHILDREN

(Thesis format: Monograph)

by

Tripat Simran Kaur Grewal

Graduate Program in Kinesiology

A thesis submitted in partial fulfillment  
of the requirements for the degree of  
Master of Arts

The School of Graduate and Postdoctoral Studies  
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## Abstract

The purpose of this study was to assess awareness of physical activity and sedentary behaviour among parents and children aged 10-13 years. Associations between awareness and factors including age, BMI, gender, and obesity status were also examined. A total of 53 parent-child dyads participated in the study. Agreement between parent and child subjective measures (self-report) and objectively measured physical activity was examined to determine awareness. Most parents (87%) and children (83%) overestimated child moderate-vigorous physical activity (MVPA) beyond 30 minutes/day. The majority of parents (87%) and children (85%) also underestimated child sedentary behaviour by at least 3 hours/day. Older children were more likely to overestimate physical activity and underestimate sedentary behaviour than younger children. This study highlighted the lack of awareness among parents and children regarding child physical activity and sedentary behaviour. Health promotion efforts should focus on raising awareness levels among parents and children to initiate behaviour change.

## Keywords

Awareness, Parental awareness, child awareness, physical activity, sedentary behaviour, parent-child concordance

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# Table of Contents

Abstract .....	ii
Acknowledgments.....	iii
Table of Contents .....	vi
List of Tables .....	ix
List of Figures.....	x
List of Appendices .....	xi
Chapter 1 .....	1
1 Introduction and Literature Review .....	1
1.1 Awareness of Physical Activity levels among Children.....	4
1.2 Awareness of Child Physical Activity levels among Parents .....	6
1.3 Discordance between Parent and Child levels of Awareness .....	10
1.4 Measures employed to assess Physical Activity and Sedentary Behaviours among Children.....	10
1.4.1 Physical Activity.....	10
1.4.2 Sedentary Behaviours .....	14
1.5 Purpose of the study.....	14
Chapter 2.....	17
2 Method .....	17
2.1 Participant Characteristics .....	17
2.2 Procedure .....	17
2.3 Measures .....	19
2.4 Statistical Analyses .....	21
Chapter 3.....	24
3 Results .....	24

3.1 Children’s Self-Reported Physical Activity Levels .....	24
3.2 Children’s Objectively Measured (Actical) Physical Activity levels .....	26
3.3 Difference between Child Self-Report and Objective Data.....	30
3.3.1 Child Over and Underestimation .....	30
3.4 Difference between Parent Report and Their Children’s Objective Physical Activity Data.....	38
3.4.1 Parent Over and Underestimation.....	39
3.5 Difference between Parent and Child Self-Reported Physical Activity .....	47
3.6 Correlation between BMI, Age, and Physical Activity Levels.....	49
Chapter 4.....	50
4 Discussion .....	50
4.1 Child Awareness of Physical Activity and Sedentary Behaviour.....	51
4.2 Parent Awareness of Child Physical Activity and Sedentary Behaviour .....	55
4.3 Discordance between Child and Parents’ Awareness of Child’s Physical Activity and Sedentary Behaviour .....	57
4.4 Association between Gender, BMI, Age and Awareness (both Child and Parent) .....	58
4.4.1 Gender Differences .....	58
4.4.2 Age.....	59
4.4.3 BMI.....	59
Chapter 5.....	60
5 Conclusion .....	60
5.1 Limitations of the Study.....	61
5.2 Implications.....	62
References.....	66
Appendices.....	78
Curriculum Vitae .....	103



Curriculum Vitae ..... 104

## List of Tables

Table 1: Participant Characteristics .....	25
Table 2: Average daily minutes/hours of Physical activity and Inactivity measured by the Actical Accelerometers .....	27
Table 3: <i>t</i> -test results comparing Objectively measured Weekday vs. Weekend Physical Activity and Sedentary Behaviour .....	28
Table 4: <i>t</i> -test results comparing Child Self-reported and Objectively measured Physical Activity and Sedentary Behaviour .....	31
Table 5: <i>t</i> -test results comparing Parent-reported and Objectively measured Child Physical Activity and Sedentary Behaviour .....	40
Table 6: <i>t</i> -test results comparing Child Self-reported and Parent-reported Child Physical Activity and Sedentary Behaviour .....	48

## List of Figures

Figure 1: Difference between Perceived Vigorous Activity (Child) versus Objectively measured Vigorous Activity .....	32
Figure 2: Difference between Perceived Moderate Activity (Child) versus Objectively measured Moderate Activity.....	35
Figure 3: Difference between Perceived MVPA (Child) versus Objectively measured MVPA .....	36
Figure 4: Difference between Perceived Sedentary (both screen- and non-screen related sedentary behaviours) Activity (Child) versus Objectively measured Sedentary Activity ....	37
Figure 5: Difference between Perceived Vigorous Activity (Parent) versus Objectively measured Vigorous Activity .....	41
Figure 6: Difference between Perceived Moderate Activity (Parent) versus Objectively measured Moderate Activity.....	43
Figure 7: Difference between Perceived MVPA (parent) versus Objectively measured MVPA.....	45
Figure 8: Difference between Perceived Sedentary Activity (both screen- and non-screen related health behaviour) (Parent) versus Objectively measured Sedentary Activity .....	46

## List of Appendices

Appendix A: Invitation Letter.....	78
Appendix B: Information Leaflet (Class Teacher) .....	81
Appendix C: Parent/Guardian Letter of Information.....	84
Appendix D: Child Assent Form .....	91
Appendix E: Modified SHAPES Questionnaire for Children .....	93
Appendix F: Modified SHAPES Questionnaire for Parents.....	98
Appendix G: Ethics Form .....	103

## Chapter 1

### 1 Introduction and Literature Review

Inactivity has been identified as one of the four behavioural risk factors influencing the global non-communicable disease (NCD) epidemic. According to a report published by the World Health Organization (WHO), physical inactivity leads to 3.2 million deaths each year with a 20-30% increased risk of all-cause mortality in individuals (Global Status Report, 2011). Lack of physical activity as a child can lead to many diseases as an adult (Adamo, Prince, Tricco, Connor-Gorber & Tremblay, 2009). As physical activity declines with age, it is important that habits associated to outdoor or recreational sports are developed during early childhood (Corder et al., 2010). The Canadian Physical Activity Guidelines, released by the Canadian Society for Exercise Physiology (CSEP), for all healthy children (5-11 years) and youth (12-17 years) recommend at least 60 minutes of moderate-to-vigorous physical activity (MVPA) daily (Active Healthy Kids Canada, 2011). However, recent Canadian Health Measures Survey (CHMS 2007-09) accelerometer data reveal that on average only 7% of Canadian children and youth are meeting these guidelines. In addition, during the after school period (from 3-6 p.m.), which is considered an important window of opportunity for children and youth to engage in active play, 6-19 year olds in Canada are getting only 14 minutes (8%) of MVPA out of 180 minutes available (Active Healthy Kids Canada, 2011). In contrast, 107 minutes (92% of after school time) is being spent in either light activity (e.g., walking less than 3.2 kilometers per hour, light play) or sedentary pursuits (e.g., motorized transportation, sitting, reclining, standing) (Active Healthy Kids Canada, 2011). The rapid rise of screen-based sedentary behaviours (increased hours in front of a TV or internet/computer use) is substantially contributing to inactive lifestyles in Canadians consequently making physical inactivity a major health concern for Canada (Sari, 2009).

Regular physical activity has consistently been linked to a range of physical and mental health benefits (Active Healthy Kids Canada, 2011; Woods, Mutrie, & Scott, 2002). The positive relationship between physical activity and improved health outcomes

for children has been examined by several reviews in the past (Janssen & LeBlanc, 2010). A US-based systematic review on health and behavioural outcomes associated with regular physical activity supported the beneficial effects of physical activity for overweight/obese and normal weight school-age youth (6-18 years). The evidence-based data strongly supported physical activity-related health benefits on adiposity levels, musculoskeletal health and several markers of cardiovascular health for overweight/obese children. Positive outcomes of physical activity for normal weight children/youth included beneficial effects on adiposity levels, on cardiovascular health markers and fitness (e.g., lipoprotein levels, plasma lipids, blood pressure for normotensive youth, and cardiovascular autonomic tone) and on psychological health predictors (e.g., anxiety, depression, self-concept) (Strong et al., 2005). Janssen and LeBlanc (2010) also conducted an extensive review on effects of physical activity primarily targeting 7 health indicators: “high blood cholesterol, high blood pressure, the metabolic syndrome, obesity, low bone density, depression, and injuries” (p. 1). The recommendations made by the authors conformed to the new guidelines suggesting accumulation of at least 60 minutes of MVPA daily and incorporation of muscle-bone strengthening activities for at least three days of the week to achieve optimal health benefits in children and youth. Hence, strong and consistent evidence links daily participation in physical activity to associated health benefits. A dose-response relationship has been observed, such that increased physical activity has been associated with improved health outcomes (Janssen & LeBlanc, 2010; Active Healthy Kids Canada, 2011).

To date, public health agencies have focused extensively on physical activity, and have paid minimal attention to the evidence suggesting sedentary behaviour as a distinct health issue (Active Healthy Kids Canada, 2011). There is no doubt that lack of MVPA has negative effects on health. However, researchers argue that sedentary behavior has its own unique set of effects on health outcomes, including metabolism and physical fitness. Hence, excessive sedentary behaviour, apart from lack of MVPA, should be considered a separate construct with unique implications for health (Tremblay, Colley, Saunders, Healy & Owen, 2010). Recent evidence suggests that increased time spent in sedentary behaviours is associated with increased risk of metabolic dysfunction (which includes a cluster of cardiovascular disease and Type 2 diabetes risk factors) and

cardiovascular disease, deleterious effects on bone and vascular health, unfavorable body composition (increased adiposity, obesity), negative effects on psychosocial health (e.g. decreased self-esteem, lower body satisfaction, behavioural problems), and poorer school performance (Active Healthy Kids Canada, 2011; Tremblay et al., 2010). Similar to physical activity, a dose-response relationship is observed linking greater sedentary activity with greater adverse outcomes (Tremblay, et al., 2010). The new Canadian Sedentary Behaviour Guidelines recognize two indicators of sedentary behaviours: Screen-Based Sedentary Behaviours (e.g., TV, computer, smart phones) and Non-Screen Sedentary Behaviours (e.g., motorized transport, doing school work/studying, socializing) (Active Healthy Kids Canada, 2011). Canadian children spend an average of 8.6 hours per day (62% of their waking hours) engaging in various screen- and non-screen based sedentary pursuits (CHMS, 2007-09). This is a cause of great concern given the deleterious effects of increased sedentary behaviour on health outcomes (Active Healthy Kids Canada, 2011). Considering children do fulfill the New Canadian Physical Activity Guidelines (60 minutes MVPA/day), they still have 23 hours left in a day within which the time allocated for sleeping, school, work or “free time” can vary widely (Active Healthy Kids Canada, 2011). Targeting this “free time” may serve as an effective strategy to encourage incidental movement and active play, and thus, limit excessive sedentary behaviour (Active Healthy Kids Canada, 2011).

The abovementioned statistics on Canadian children’s levels of daily physical activity and sedentary behaviour are alarming and highlight the need for children’s physical activity and sedentary behaviour to change. However, health promotion interventions aiming towards behavioural change “should be based on empirical knowledge about present behaviour, behavioural determinants and mechanisms of behavioural change” (Ronda, Van Assema, & Brug, 2001, p. 305). One such mechanism/process of health-related behavioural change is explained by the Transtheoretical model. The Transtheoretical model (TTM), an integrative and comprehensive model of behaviour change, has been applied to various health related behaviours including exercise (Woods, et al., 2002; Ronda et al., 2001). One of the key organizing concepts in the TTM is the construct of stages of change, which represents behaviour change as a process rather than one single event (Cobb, 2011). According to the

aforementioned theory, an individual goes through different stages before actually changing his/her health-related behavior. Initially, the individual is unaware or unwilling to change, then slowly starting to recognize and considering the need for change, but still does not change his/her behavior. Finally, the person takes action and makes the change, sustaining the changed behavior (Cobb, 2011). In the context of a child's physical activity and a parent's potential role, the stages are: (1) pre-contemplation- the parent/child is unaware of the problem (too little physical activity) and therefore there is no intention to change; (2) contemplation-the parent/child acknowledges the problem and the need to change behaviour but still has not taken action; (3) preparation- the parent/child have begun identifying ways to change health related behaviour; (4) action- the parent/child is actively involved in changing sedentary behaviour (but for less than six months); (5) maintenance- the parent/child sustains behaviour change for at least six months so the changes eventually become routine (Sealy & Farmer, 2011). Therefore, awareness has been identified as an independent correlate of behaviour change and awareness of risk behaviour is supposed to be especially important to motivate movement from pre-contemplation to contemplation of behaviour change (Ronda, et al., 2001; Kremers, Dijkman, de Meij, Jurg, & Brug, 2008).

## 1.1 Awareness of Physical Activity levels among Children

To date, very few studies have investigated awareness of physical activity levels among young children and adolescents. Kremers, Dijkman, de Meij, Jurg, and Brug (2008) explored the awareness levels of Dutch school children aged 8-13 years and the degree to which their physical activity was habitual. The authors also tested the potential influence of factors such as "awareness" and habit strength" on determining exercise behaviours. The majority of the study population (64%) was unaware of their physical activity levels, and children who were aware of their own physical activity behaviour were reported to be more physically active on an average of 20 minutes per day compared to their unaware counterparts. Out of the total 64%, 23% consisted of under estimators while 41% were over estimators. Thus, this study highlighted the importance of awareness of physical activity behaviour on physical activity levels in children. However, the study used self-reports to quantify physical activity, which provides a less



accurate outlook on child physical activity behaviour compared to objective measures. In a more recent study, Corder et al. (2010) assessed physical activity level awareness among British children aged 9-10 years and found a lack of awareness of physical activity behaviour among inactive children. This study examined the agreement between self-reported physical activity perception and an objective measure of physical activity. Of the total 30.9% of children who were inactive, 40% overestimated their physical activity levels and lacked awareness.

In this light, an accurate perception of behaviour (e.g., level of physical activity and sedentary behaviour) should be a significant factor in the promotion of positive change. Individuals who are unaware of their inadequate physical activity level have less positive intention to increase their physical activity levels as compared to those who perceive themselves as less physically active or inactive (Ronda, et al., 2001). An accurate perception of health behaviour is associated with increased intention to change health-risk behaviour compared to an inaccurate perception. Children unaware of their own activity levels are less likely to introduce positive behavioural changes in their lifestyle (Kremers, et al., 2008). Lack of awareness of physical activity among children is likely to make them “less susceptible to educational programmes primarily based on influencing attitudes, norms, self-efficacy or other cognitive factors, because they will not perceive a need to change” (Kremers, et al., 2008, p. 483). This also explains the lack of effectiveness of physical activity interventions since awareness of physical activity and sedentary levels among the general population has received minimal attention (Corder et al., 2010). Therefore, researchers argue that to effectively promote physical activity, such health education programmes should primarily focus on raising awareness levels among children (Kremers, et al., 2008). More importantly, children’s perceptions about a particular behaviour should not be neglected when implementing programs to initiate behaviour change and improve physical activity (Cottrell et al., 2012). Investigating children’s perceptions about their own physical activity and sedentary behaviour may lead to a better understanding of the target population and provide evidence-based information to health providers and policy makers to develop interventions accordingly. Findings from the study demonstrate that health providers and policy makers should avoid focusing only on the parent as the audience for the health related behaviour change.

As children move from childhood to early adolescence, they tend to apply their own perceptions and beliefs for various health-related behaviours (Cottrell et al., 2012). Hence, incorporating children's perceptions and reports may prove to be beneficial and increase effectiveness of physical activity interventions (Cottrell et al., 2012).

## 1.2 Awareness of Child Physical Activity levels among Parents

Apart from child awareness, exploring other potential factors that influence child physical activity and sedentary behaviour is crucial to overcome the large gap between current health and national recommendations (Hennessy, Hughes, Goldberg, Hyatt and Economos, 2010). One factor that has attracted considerable research attention in the past is parents' influence on children's physical activity and sedentary behaviour (Trost & Loprinzi, 2011; Jago, Fox, Page, Brockman, & Thompson, 2010). During childhood and adolescence, family plays a critical role in modifying and encouraging the acquisition of behaviours, including health-related behaviour (Hedwig, 2009; Ornelas, Perreira, & Ayala, 2007). Children rely on their immediate family (especially their parents) to learn positive behaviors and beliefs (Kirby, Levin, & Inchley, 2011). Hence, within the family dynamics, parents are in a position to influence their child's health-related behaviours through several mechanisms (Cottrell et al., 2012). Parents influence their children directly through specific parenting practices such as: providing a supportive and nurturing environment; rewarding and praising healthy behaviour; incorporating physical activity routine in family recreation time; providing transportation to sports events; establishing acceptance and/or expectations for certain activities around the house; restricting sedentary activities; encouraging active leisure choices; and making available various sports equipment at home and the community (Ha, Abbot, Macdonald & Pang, 2009; Cottrell et al., 2012).

Furthermore, parents, being the primary caregivers of their children are often viewed as their mentors and role models (Cottrell et al., 2012). They are generally seen as the central agents of change in the promotion of healthy behaviours such as healthy eating and activity in their children (Slater, Bowen, Corsini, Golley & Noakes, 2009). Socialization theory emphasizes the active role of parents as role models for their

children helping them understand the norms regarding behaviour, and thus, inactive/obese parents can downplay the importance of physical activity (Hedwig, 2009). Also, young children rely on their role models' perceptions to shape their own perceptions about current and future lifestyles (Hedwig, 2009). As a result, parents as role models can play an active role in encouraging children to acquire healthy behaviours (such as regular exercise) and sustaining them or vice-versa (Hedwig, 2009).

The reviewed literature on role of parents in child physical activity suggests that parents exert a widespread influence on a child's health-related behaviours. Parents serving as role models and central agents of change should have the ability to influence change in certain health-risk behaviours such as physical inactivity and excessive sedentary behaviour. However, previous research has indicated that most parents tend to misperceive their children's physical activity levels. Parents tend to think their children are active enough, and thus, do not recognize the fact that their child's activity levels may not be meeting the recommended guidelines of daily physical activity required for optimal health (Chiang, Molin, Byrd, & Crawford, 2009; Corder et al., 2011). Corder, Crespo, van Sluijs, Lopez, and Elder (2012) assessed parental awareness of child physical activity over a period of 7 days. Results revealed that most parents (80%) lacked awareness and tended to overestimate their children's physical activity on more than one measurement day. Although children only met the physical activity guidelines (i.e., 60 minutes/day of MVPA) on 43% of the days, parents overestimated their child's physical activity on 75% of the days when children were found to be inactive. Another study conducted by Mota and Queiros (1996) compared parental perception and child self-reported activity. The authors found that parents' perceptions of their children's activities were contradictory to those reported by the children. Most parents believed their children to be equally or more active than their peers and as active as they should be despite the fact that more than half of the study population was not involved in athletic training and regular after-school physical activity programmes. Children and youth involved in organized sports or after school physical activity have been reported to accumulate 1,600 more daily steps compared to those who do not participate. However, this difference can be easily covered by children engaging themselves in active play or unstructured physical activity to accommodate for the extra 1,600 steps that children in organized sport

accumulate (Active Healthy Kids Canada, 2011). In the Mota and Querios (1996) study, despite parents perceiving their children to be sufficiently active and as active as other children, children were found to be only moderately active. Thus, the findings of the study highlighted the disconnect between parent perception and reported child physical activity. The findings of the study, however, need to be interpreted with caution since the accuracy of parental perception/awareness was assessed based on subjective information rather than objective measures of physical activity. As most health policies and interventions rely on parental report of child physical activity, improved awareness among parents is essential to accurate reporting of child inactivity. The lack of awareness of child activity levels among parents may result in parental misperception and inactive children “being overlooked or neglected in health promotion efforts as these commonly target self-rated inactive populations” (van Slujis, Griffin, & van Poppel, 2007).

Chiang, Molin, Byrd, and Crawford (2009) also conducted a study on 407 parent-child dyads to determine the accuracy of parent perceptions of child weight status, diet and amount of physical activity engaged in by the child. Parents were asked to describe their child’s weight status and also report on their perceptions of the child’s physical activity and diet. In all, 76% of parents of overweight children viewed the child as healthy weight rather than overweight, and nearly 90% of parents of obese children viewed the child as healthy weight or only slightly overweight. With regards to physical activity, 92% of the parents of overweight children and 82% of the parents of obese children viewed their child as either very or fairly physically active. Of normal-weight children, more than 95% of parents described their child to be as either very or fairly physically active. Although, parental accuracy of child weight status was found to be unrelated to their perceptions of the child being active versus inactive, an objective physical activity measurement was not used to assess the accuracy of parental perception of the child’s activity levels which may serve as a limitation.

Corder et al. (2010) assessed awareness of physical activity levels among British school children aged 9-10 years and their parents. This study explored the agreement between perceived (child and parent reported) physical activity and objectively measured physical activity. A total of 80% of parents of inactive children lacked awareness of their

child's activity levels and assumed their child to be sufficiently active. The study conducted by Corder et al. utilized an objective measure of physical activity to classify awareness levels among children and parents. Based on the British physical activity recommendations, a threshold of an average of 60 minutes of MVPA per day was used to derive a dichotomous MVPA variable classifying the child as active or inactive. The subjective measure asked children to report perceived physical activity based on one of the five categories (much more active, more active, about average, less active, or much less active). Parental perception was also taken into account. Data were then grouped into four physical activity awareness groups; realistic active, under estimator, realistic inactive and over estimator. However, the categorization of the objective and subjective data collectively into four physical activity groups of awareness seemed to place overestimators only among inactive children. It might be a possibility that some children only attaining the minimum threshold of 60 min/day perceived themselves to be much more active than others in the same category reflecting on overestimation among those active children, ultimately posing as a barrier to engage in more physical activity. The data presented did not predict the extent to which children and parents misperceived their child's physical activity on daily basis. This may serve as a methodological limitation since the subjective questions assessing awareness were not directly comparable to what the accelerometer was measuring. Therefore, a study design comparing self-reported data directly with the accelerometer data using the same units (e.g., minutes/day, kcal/day) may provide a more accurate picture of physical activity awareness among parents and children.

Despite the shortcomings of the previous studies, a consistent lack of parental awareness of child physical activity and sedentary behaviour has been observed. Parents' lack of awareness or misperception of their child's physical activity levels may have important implications. For instance, parental ignorance regarding the need for change may act as a barrier to behaviour change in children rendering public health messages concerning physical activity ineffective (van Sluijs, et al., 2007). Parents may be less likely to encourage their children to increase their activity levels and modify risk behaviour if they wrongly presume their child to be sufficiently active (Corder et al., 2011).

### 1.3 Discordance between Parent and Child levels of Awareness

Behavior change may also rely on the degree of discordance in perception between a parent and child (Cobb, 2011). Therefore, examining the concordance between parent and child awareness of the child's physical activity and sedentary behaviour may lead to a clearer understanding of family dynamics (Cobb, 2011). Given the important role that the parents' and child's awareness of health risk behaviours play in the acquisition of healthy behaviours in children, any discordance between the parent and child's levels of awareness may hinder progression through different stages of change. The parent may be aware of the child's health-risk behaviour and willing to change; however, the child may be unaware and may not feel the need to change. The disagreement between the parent's and child's perception of activity levels and sedentary behavior may pose a barrier to health behaviour change in a family-based intervention that targets the involvement of both the parent and the child.

### 1.4 Measures employed to assess Physical Activity and Sedentary Behaviours among Children

#### 1.4.1 Physical Activity

Physical activity is considered a complex multi-dimensional behaviour, and thus, difficult to assess because individuals are active in different ways and settings. Hence, determining if one is exercising enough may be difficult to evaluate (van Sluijs, et al., 2007). When determining how to measure level of physical activity, researchers and practitioners should carefully consider "participant age, sample size, respondent burden, type of physical activity data required (data output), time frame, method/delivery mode, and measurement error and cost (instrument and administration)" (Loprinzi & Cardinal, 2011). A range of measures can be used to evaluate physical activity in children. These include subjective measures such as questionnaires, proxy-report from parents, teachers and objective measures such as heart rate, pedometers, accelerometry, and direct observation (Loprinzi & Cardinal, 2011). To capture sedentary behaviour, data is

commonly acquired using self-report surveys, self-report diaries, parental reporting, and direct observation.

**Self-report.** The most common and low-cost method of measuring PA in research is via self-report. Self-report measures used to evaluate the physical activity behaviour of children generally include self-reports (questionnaires), interview-administered recalls, and diaries/logs. Self-report measures are widely used because they are cost-effective, easy to administer (e.g., low participant burden, general acceptance), and tend to provide information on the type, and context of physical activity (Loprinzi & Cardinal, 2011; Adamo, et al., 2009). However, self-report methods are subject to limitations such as misinterpretation of questions, response and recall bias. Children are thought to have difficulty recalling their physical activity behaviour as they tend to engage in PA in sporadic bouts with varied intensities (Loprinzi & Cardinal, 2011; Adamo, et al., 2009). In addition, social desirability observed among children and adolescents may also affect the validity of subjective measures. Previous literature evaluating psychometric properties of self-report measures reported self-report measures to have reliability coefficients ranging from 0.56 to 0.93 and validity coefficients within the range of 0.03 to 0.88 (Loprinzi & Cardinal, 2001). Validity was reported to improve with age of the child. Therefore, children younger than age 10 should not be expected to provide usable recalls of their physical activity. A study assessing reliability of several self-report measures by Sallis, Buono, Roby, Micale, and Nelson (1993) found that a delay in recall proved to be a significant factor influencing reliability. On the other hand, memory skills were not reported to influence reliability of physical activity recall (PAR). Methods with shorter interval between the activity and recall (e.g., previous day recall, 3-day PAR) can be more reliable in young children compared to 7-d PAR. Sallis et al. (1996) also identified that children aged 10-16 years can provide reasonably reliable and valid accounts of their physical activity levels.

**Proxy report.** In children younger than 10, self-reports of physical activity patterns may not be accurate or reliable, and thus, proxy reports by parents and teachers have been considered as an alternative. Proxy reports have demonstrated moderate correlation with activity monitor counts ( $r = 0.41-0.60$ ) (Loprinzi & Cardinal, 2011). Past

research examining reliability and validity of proxy-reports have concluded that proxy-reports provide an acceptable degree of accuracy in estimation of child physical activity levels. However, previous studies assessing parental and child perception of physical activity have found perceived weight status to play an important role in perceiving activity levels in children. Findings from a study by Eckstein et al. (2006) suggest that perception of weight status can interfere with the perception of PA and exercise behaviours. Mathieu, Drapeau and Tremblay (2010) also concluded that misperception of weight status interferes with the accurate assessment of eating habits and physical activity levels among underweight, overweight and obese children. Most parents who overestimate their child's physical activity levels have been found to have children with a lower fat mass index (Corder et al., 2011). Hence, parents who have children with a lower fat mass index or favorable body composition may perceive their child as sufficiently active and consequently see no need to encourage them to increase their activity over current levels. Objective measurement of physical activity levels of these children may serve as a promising strategy to provide feedback on actual physical activity levels and improve awareness among parents and children. Although parental and child perception of child's weight status may serve as an important factor affecting the accuracy of the awareness of a child's activity levels, several factors such as parental monitoring, and supervision may also account for lack of awareness among parents (Hedwig, 2009).

**Objective measures.** Objective (direct) measures of physical activity are often used to provide a more accurate picture of individual physical activity levels and to validate subjective measures. Objective measures are perceived to remove the potential issues of recall and response bias associated with subjective measures (Adamo, et al., 2009). Such measures include heart rate monitoring, pedometers, accelerometers and direct observation. While heart rating monitoring helps provide an objective (yet indirect) measure of the frequency, duration and physical activity, there are several limitations of this approach. First, heart rate response occurs after movement so there is a natural delay. Secondly, there are other biological or environmental factors such as age, body size, emotional stress, cardiorespiratory fitness, temperature and humidity which tend to affect one's heart rate. Finally, there is no universal definition for "resting heart rate"



which makes it difficult to benchmark physical activity (Loprinzi & Cardinal, 2011; Rowlands & Eston, 2007).

The pedometer is another instrument often used to objectively measure physical activity. By measuring the number of steps taken by a person, the pedometer can give a measure of physical activity over a certain time period. However, the pedometer cannot measure intensity (e.g. running vs. walking) or changes in energy expenditure (Rowlands & Eston, 2007). Some utilize direction observation as another tool to measure physical activity, where a trainer records the activity of a child during a certain period of time. However, direction observation has various limitations: such as the time consuming process of observer training and data coding, and also the potential issue of increase in subject reactivity during data collection (Loprinzi & Cardinal, 2011; Rowlands & Eston, 2007).

Accelerometers are currently recognized as the optimal objective measure of physical activity in children because they are small, lightweight, easily wearable (worn above the waist), and provide information on frequency, intensity and duration of physical activity. They work by recording the frequency and magnitude of acceleration along three orthogonal planes (vertical, mediolateral, and anteroposterior) (Colley et al., 2011; Rowlands & Eston, 2007). The unit of measure is an ‘accelerometer’ or ‘activity’ count, where the counts are aggregated over a specified time period or “epoch” (e.g., 1 second, 15 seconds, 30 seconds, 1 minute). The counts can be used to estimate either energy expenditure or classify physical activity by intensity (sedentary, light, moderate, vigorous) using prediction equations (Loprinzi & Cardinal, 2011; Rowlands & Eston, 2007). Several studies have been conducted to evaluate the validity of accelerometers against other objective measures such as direct observation and indirect calorimetry. A review of these studies found associations between accelerometers and direct observation ranging from 0.38 to 0.87. When compared to indirect calorimetry, associations ranged from 0.37 to 0.94 (Loprinzi & Cardinal, 2011). In terms of obtaining reliable estimates of physical activity among children, a period of 4-9 days of monitoring was recommended (Loprinzi & Cardinal, 2011).

### 1.4.2 Sedentary Behaviours

Sedentary behavior is often defined as time children spend engaging in passive activities (e.g. watching TV, using the computer, or playing video games). However, children are found to be physically inactive during many other activities, including homework, motorized transport, and while “sitting and talking” with friends at school (Loprinzi & Cardinal, 2011). Thus, an overall assessment of time spent in screen and non-screen based sedentary behaviours is recommended to capture a complete picture of child inactivity (Active Healthy Kids Canada, 2011). The usual methods to capture sedentary activity include self-reports, proxy-reports, diaries/logs, and direct observation. However, recent studies have reported accelerometers as a valuable method to capture overall sedentary activity (Loprinzi & Cardinal, 2011)

## 1.5 Purpose of the study

There appear to be gaps in the literature pertaining to awareness of physical activity/inactivity levels among parents and their children. No previous study has investigated parent and child awareness of different intensities of physical activity with directly comparable objective data. This may shed light on whether parents and children are able to accurately classify child physical activity in different categories and if parents tend to misperceive the intensity of physical activity accumulated by their child on a daily basis. Since most public health messages convey a recommended dose of physical activity in terms of type, duration, and intensity (e.g., the Canadian Physical Activity Guidelines recommend 60 minutes of MVPA/day which constitutes engagement in vigorous activity for at least 3 days of the week), it is imperative to examine physical activity awareness among parents and children on the basis of duration and intensity. This may shed light on how the guidelines are perceived by parents/children and the areas that need to be improved when promoting parent and child awareness of physical activity. Awareness of physical activity levels remains an under explored barrier to behaviour change among children and parents. Previous studies of physical activity awareness have presented several methodological constraints. Most studies have used self-reported physical activity to assess awareness levels among parents and children and objective measures have rarely been used. It is widely known that self-report is prone to response

bias, and thus, the use of an objective measure provides a more accurate, precise and thorough assessment of the gap between perceived and true activity levels (Corder et al., 2012). Also, no previous study has examined the concordance/discordance between parent and child awareness of child physical activity levels and sedentary behaviour irrespective of the obesity status of the child. Parent-child concordance may be an important factor in predicting successful behaviour change among children. Finally, despite considerable evidence suggesting sedentary behaviour to be seen as an independent health issue, no previous study has assessed awareness of child sedentary behaviours among parents and children. Physical activity levels have been shown to steeply decline in young people, with ages 10-13 years thought to be a critical age at which physical activity begins to diminish (Craggs, Corder, van Sluijs, Griffin, 2011). Sedentary behaviour also tends to become more common at this age (Springer, Kelder, & Hoelscher, 2006). A number of studies have also shown that physical activity and sedentary behaviour in children and adolescents aged 10-17 years is greatly influenced by parental support, activity participation, encouragement, role modeling etc. (Kirby, Levin, & Inchley, 2011; Springer, et al., 2006; Ornelas, Perreira, & Ayala, 2007; Heitzler, Martin, Duke, & Huhman, 2006; Sallis, Prochaska, & Taylor, 2000). This highlights the need to identify the factors, such as parent and child awareness of physical activity and sedentary behaviour that contribute to children's participation in regular physical activity at this age.

The first objective of the study was to assess the differences between children's subjective assessment (i.e., self-report) of their PA/sedentary behaviour and the objective measure derived from the accelerometer. A second objective was to assess the difference between parents' subjective assessment (i.e., self-report) of their child's PA/sedentary behaviour and the objective measure (i.e., accelerometer). A third objective was to examine the disparity between parent and child subjective assessment (awareness) of child's physical activity and sedentary behaviour. Finally, the last objective was to examine the association between the variables BMI, gender, age and subjective assessment (both parent and child) of child's physical activity and sedentary behaviour. With regards to the first and second objective, it was hypothesized that there would be a significant difference between the subjective assessments (both parent and child) of child

physical activity/sedentary behaviour and the objective measure (i.e. accelerometer). Parents and children were expected to over report minutes spent engaged in physical activity while under reporting time spent engaging in various sedentary behaviours. In relation to disparity between parent and child's subjective assessment, it was anticipated that children and parents would differ on their subjective assessment scores. Finally, in terms of the last objective, it was expected that child's BMI, age and gender may be related to the subjective assessment of the child's physical activity and sedentary behaviour.

## Chapter 2

### 2 Method

The present study was based on a descriptive and cross-sectional research design. Two self-report questionnaires (parent and child) were utilized to provide a subjective measure of physical activity and sedentary behaviour. The self-report questionnaires were designed to collect demographic data and assess parent and child awareness of the child's daily physical activity and sedentary behaviour. The present study also utilized an accelerometer (i.e., the Actical) to provide an objective measure of the child's physical activity and inactivity levels (i.e., sleep hours and sedentary hours).

#### 2.1 Participant Characteristics

A school-based sample of grade 5-8 students and their parents were recruited to participate. Five schools in Brampton, Ontario were contacted for the study. Two schools consented and were included in the study. The majority of the students in the participating schools were South Asians with both Canadian born or immigrant parents. Consent to participate and the ability to comprehend the questionnaires formed the inclusion criteria for parent/guardians and children. The parent who was present with their child throughout the day (e.g., in the morning, after school and the evening) was encouraged to fill out the questionnaires. Since mothers were the ones most often present during the day, a majority of the parent study sample was comprised of mothers. In addition, children who did not satisfy the age criteria (i.e., younger than 10 years of age or older than 13 years of age) and had a physical/mental disability were excluded from the study.

#### 2.2 Procedure

Recruitment and data collection took place during May and June 2012. Beginning in May 2012, principals at selected schools were contacted with an invitation letter (see Appendix A) and a detailed description of the study was provided. At the time of this visit, teachers of Grades 5-8 were also provided with an information packet containing a copy of the ethics approval and an information leaflet (see Appendix B, G) containing

details of the study. Once the school administration verbally agreed to participate, the researcher visited the participating school(s) and introduced the study to all grade 6-8 students. Students were also provided with a similar information packet containing Letters of Information for both parent and child, and consent forms (see Appendix C, D). The researcher also asked the teacher to reinforce the message that a completed consent form would be required to ensure participation in the study. Students were requested to return signed consent forms to the school prior to the data collection. Only students with a completed consent form on the day of data collection were included in the study.

On the first day of data collection, upon receiving the consent and assent forms, the researcher obtained the anthropometry measurements. Children's anthropometric data were collected two days prior to handing out the accelerometers and was required for descriptive purposes. Body weight and height was obtained with participants dressed in light clothing. Participating students were also informed that they were required to fill out questionnaires on Friday and Monday morning, with the researcher available for assistance.

Following participation in the above mentioned data collection process, the researcher informed the children about the day the Actical accelerometers were to be distributed. The Actical (Mini Mitter Respironics, USA) is an "omnidirectional" tri-axial accelerometer which measures and records movement in all directions, thus providing an accurate measure of physical activity intensity. There are several advantages to using the Actical since it is small, lightweight, water resistant, and has proved to be a reliable and valid measure of physical activity in children and adolescents (Colley et al., 2011). On the assigned day, the Actical accelerometers were initialized to begin recording data at a specified time. Children were asked to wear the Actical over their right hip on an elasticized belt. Written and verbal instructions were provided to each participant. Children were asked to: (i) wear the Actical during waking hours (except during water activities such as bathing and swimming) for a minimum of ten hours per day to obtain valid data; (ii) remove the Actical before going to bed; and (iii) press a button located on the back of the Actical each time the Actical was worn or removed. The accelerometer data was collected over a period of four consecutive days: Thursday, Friday, Saturday,

and Sunday. Two weekend days and two weekdays were included to assess differences between awareness levels on weekdays and weekends, since parents may be accompanying their children on weekends compared to a regular school weekday. A take-home packet (containing parent questionnaire and an activity monitor diary) was also provided to each participating student. Participants were provided with an activity monitor diary in the take-home packet to record the time the Actical was worn and to provide information about any physical activity performed while the accelerometer was not worn (e.g., swimming). Children were instructed to return the home packet along with the Actical to school four days after the measurement day.

## 2.3 Measures

The SHAPES (School Health Action, Planning and Evaluation System) physical activity module questionnaire was adapted to measure children's and parental perception of child physical activity (PA) and sedentary behaviour (Appendix E). This tool was designed to be used for multiple large-scale school-based data collections. The SHAPES physical activity module questionnaire was "designed to provide school stakeholders with the evidence they need for guiding and evaluating school-based physical activity interventions" (Wong, Leatherdale, & Manske, 2006, p. 1593). It also aimed to promote effective knowledge exchange and evaluate environmental influences on behaviour (Wong, et al., 2006). At present, SHAPES consists of two modules: the tobacco module and the physical activity module. Both modules consist of a machine-readable questionnaire designed to collect data regarding the specific health behaviour (tobacco use and physical activity) from grade 6-12 students. In addition, it also includes a computer generated feedback report for the participating schools and a school administrator questionnaire collecting data about school-based programs and policies related to these health-related behaviours (Wong, et al., 2006). Wong, Leatherdale and Manske (2006) assessed the reliability and validity of the physical activity module of the SHAPES questionnaire. There was moderate agreement (mean  $0.57 \pm 0.24$ ) for the 1 week test-retest physical activity questionnaire in 2812 students in grades 9-12. The study also examined criterion validity using seven days of self-reported MVPA vs. accelerometer-measured data (MTI accelerometer) for students in grades 6-12, finding a

significant correlation (Spearman  $r = .44$ ,  $p < .001$ ). These results were comparable with psychometric properties of similar self-report measures (Wong, et al., 2006).

The modified SHAPES Physical Activity questionnaire consisted of demographic questions (age & sex), and two items requesting daily recall of moderate (MPA) and vigorous (VPA) physical activity for four days, respectively. Children were required to fill out the questionnaire on Friday [i.e., previous day recall] and Monday morning (i.e., 3-day PAR). Since the study included weekend days, data collection was not possible during the weekend; thus, children were asked to recall activities conducted on Friday, Saturday and Sunday on Monday morning. To capture intensity, duration and frequency of activity, “responses were provided by indicating the number of hours (0-4h) along with 15-min increments (0-45min)” for each type of activity performed each day (4-day period) (Wong, et al., 2006, p. 1594). Similarly, two items were also included asking about time spent in screen-based (e.g., watching television, playing video games) and non-screen based sedentary activities (reading, homework etc.). The measure for parental supervision was drawn from previous work of Hedwig (2009) who employed these measures to study influence of parenting practices on physical inactivity. Children were asked to report on the following items: if the parent/caregiver was present most or all of time when he/she leaves for school in the morning, returns from school in the afternoon, and goes to sleep at night (Hedwig, 2009).

Although the use of an objective measure may serve to validate self-reported physical activity, the majority of the studies evaluating awareness of physical activity have employed subjective measures to assess awareness. To date, the study conducted by Corder et al. (2010) is the only study that used an accelerometer to assess awareness among parents and children. However, the scores obtained from the subjective measure capturing self-reported awareness were not directly comparable to what the accelerometer was measuring. The respondents were asked to report how physically active the children were on a scale ranging from “very active” to “not active” while the accelerometer measured time spent in MVPA. In the current study, self-reported time spent in physical activity and sedentary behaviour was directly compared against the time captured by the accelerometer to classify awareness among parents and children.



Parents/primary caregivers responded to the same PA survey questions as the target participant (their child) but they answered about the target participant (child) rather than their own PA (Appendix F). They were requested to report the amount of physical activity and sedentary behavior their child engaged in at the end of the day for 4 days. Parents also reported hours of work (35 hours/week labeled as full time work status).

## 2.4 Statistical Analyses

Quantitative data collected from the modified parent and child SHAPES physical activity questionnaire including the demographic information was entered into SPSS (version 19.0). Descriptive statistics including means, percentages, and standard deviations were calculated for all variables. Child body mass index (BMI) was calculated as weight (kg) divided by height (m) squared and converted to an age and gender specific standard BMI (BMI *z*-score) based on U.S. CDC 2000 growth charts. An online calculator from the U.S. Department of Agriculture/Agricultural Research Service Children's Nutrition Research Center (USDA/ARS Children's Nutrition Research Center, 2007) was used to calculate the BMI *z*-score (Mandich, 2012). Based on the abovementioned BMI calculation, children were categorized as normal (including both underweight and healthy weight), overweight, or obese (indicating the obesity status of the participants).

Self-reported (parent and child physical activity and sedentary behaviour questionnaire) average daily time spent performing MPA and VPA were calculated by summing the responses from each day from the respective questionnaire items and dividing by number of valid days (minimum two out of four days). The amount of MPA and VPA performed over the number of valid days were summed and divided by the total number of valid days to calculate average daily time spent performing MVPA (Wong, et al., 2006). The average daily time spent performing sedentary (screen and non-screen based) behaviour was calculated similarly. For average weekend day and weekday activity, scores for vigorous, moderate, MVPA, and sedentary activity on Saturday, Sunday and Thursday and Friday were summed separately and divided by two. Only children ( $n = 24$ ) with all 4 days of subjective data were included in the weekday vs. weekend data analysis.

With regards to the objective physical activity and sedentary data, data were collected via 15 second epochs. Accelerometers were programmed individually for each student based on their personal information (e.g., sex, age, height and weight). A custom software KineSoft version 3.3.62 (KineSoft, Saskatchewan, Canada) was utilized to analyze the raw accelerometer data. A series of standardized outcome variables were obtained based on the procedures followed by Gaston and Prapavessis (2012). Accelerometer data were only included in the statistical analyses provided the accelerometer was worn by the participating student for at least 10 hours/day (i.e., a valid day) (Colley et al., 2011). Participants with a minimum of two or more than two days of valid accelerometer data were included in the analyses. According to previous studies, 60 or more consecutive minutes of zero-counts were considered as the time that the accelerometer was not worn (non-wear time). Wear time was calculated by subtracting the non-wear time from 24 hours.

Similar to the procedures followed by Mandich (2012), the main variables extracted from the accelerometer data were total activity time (i.e., minutes spent in vigorous, moderate, and moderate-to-vigorous physical activity), and total inactivity time (i.e., sleep [monitor off/non-wear time] & sedentary hours) for each of the 4 days and separately for weekday and weekend days. Accelerometer variables used in the statistical analyses were calculated using previously established cut points and equations. The cut points and calibration equation developed by Puyau et al. (2004) for children and youth, was used to estimate Activity Energy Expenditure (AEE) values [ $AEE \text{ (kcal/kg/min)} = 0.0183 + 0.000010 \text{ (counts per minute)}$ ] and to classify activities as sedentary ( $<0.01 \text{ kcal/kg/min}$ ), moderate ( $\geq 0.04$  and  $<0.10 \text{ kcal/kg/min}$ ) and vigorous ( $\geq 0.10 \text{ kcal/kg/min}$ ) accordingly. To calculate the average daily time spent performing MPA, minutes spent performing MPA were summed and divided by the number of valid days. The average daily time spent performing sedentary, VPA and MVPA, respectively, were calculated similarly. The percentage of children who adhered to the guidelines (i.e., accumulating 60 minutes of MVPA/day) for each day of the 4-day period was also calculated. Children with four days of valid accelerometer data were included in the analyses to determine adherence.

To determine the difference between children's self-reported and objectively measured physical activity and sedentary behaviour, a paired *t*-test was used. With regards to examining differences between parent's self-report and objectively measured physical activity and sedentary behaviour, paired *t*-tests were employed. Differences in self-reported physical activity and sedentary behaviours levels reported by parent and child were examined using paired samples *t*-tests. Since there was a degree of overestimation expected among most children and parents, participants were also grouped into "gross" over or "gross" under-estimators based on their responses falling above or below 1 *SD* (Standard Deviation). This was done to further explore the characteristics of "gross" over- or under-estimators, i.e., if "gross" over- or under-estimation was associated with the child's obesity status and gender.

Finally, to examine the relationship between parent and child awareness levels of child physical activity (inactivity), age, BMI, and gender, Pearson's correlational analysis, independent samples *t*-tests and one-way ANOVAs were run. Pearson correlational analysis were run to examine any correlation between BMI, age and child physical activity/inactivity levels (both objectively measured and awareness variables). Independent samples *t*-tests were run to examine the difference between gender of the child and awareness of physical activity and sedentary behaviour (both parent and child). One-way ANOVA was run to examine differences among three levels of obesity for objectively assessed activity (inactivity) levels and parent/child awareness levels. One way ANOVA was also employed to examine differences among the four age groups (i.e. 10-, 11-, 12-, and 13-year olds) for objectively assessed physical activity and sedentary behaviour.

## Chapter 3

### 3 Results

Five schools in the Brampton Peel area were contacted. Two replied positively and were scheduled into the study. The data collection took place during June and July, 2012. School A included participants ( $n = 32$ ) from grades seven and eight. Seventy five percent (75%;  $n = 24$ ) of the participants in School A were South Asian by ethnicity and the rest of the participants belonged to other ethnic communities. School B included participants ( $n = 23$ ) from grades five to eight. All of the participants of School B were South Asian by ethnicity. Participant characteristics are summarized in Table 1. More than half of the study sample was comprised of boys ( $n = 29$ , 54.7%) and 45.3% ( $n = 24$ ) were girls. The mean age of the participants was 12 years ( $SD = 0.94$ ). In terms of body composition, the mean BMI score was 21 and mean BMI  $z$ -score was 0.6 ( $SD = 1.3$ ). With regards to the parent sample characteristics, out of the entire participants only 10% of the parent sample were fathers and the rest mothers. The average hours of work/day reported by the parents was 6 hours ( $SD = 3.8$ ).

#### 3.1 Children's Self-Reported Physical Activity Levels

**Subjective measurement.** A total of 29 boys and 24 girls completed the adapted version of the SHAPES questionnaire. The adapted SHAPES questionnaire asked for amount of time spent in vigorous and moderate activity separately. Participants were also asked to report on time spent in both screen and non-screen based sedentary behaviours. Overall, participants' mean activity (vigorous and moderate) scores were 87.7 minutes/day ( $SD = 52$ ) and 84.4 minutes/day ( $SD = 51.6$ ). The mean for moderate-to-vigorous physical activity (MVPA) was calculated as 172.2 minutes/day ( $SD = 89.6$ ). Participants' mean sedentary behaviour was reported as 220 minutes/day ( $SD = 105$ ). On average, boys self-reported as significantly more active than girls when it came to vigorous activity ( $M = 101.8$  min/day [ $SD = 49.4$ ] and 70.7 [ $SD = 51$ ] respectively;  $t(51) = 2.24$ ,  $p = 0.02$ ). On the other hand, girls self-reported engaging in moderate activity more as compared to boys ( $M = 87.6$  [ $SD = 50.32$ ] and 81.8 [ $SD = 53.5$ ]). The difference

**Table 1: Participant Characteristics**

	N	Minimum	Maximum	Mean	S.D
Age (years)	53	10	13	12.08	+0.95
Sex					
Male	29 (54.7%)				
Female	24 (45.3%)				
Grade					
5	9				
6	6				
7	16				
8	22				
Height (cm)	53	139.00	178.00	157.64	+7.56
Weight (kg)	53	26.0	72.0	52.3	+11.9
BMI <sup>a</sup>	53	12.0	30.9	21	+3.81
BMI z-score <sup>b</sup>	53	-5.02	2	0.6	+1.32
Obesity Status <sup>c</sup>					
Normal	28				
Overweight	10				
Obese	15				

Note. BMI = Body Mass Index; BMI-z = Standardized Body Mass Index score.

<sup>a</sup>BMI = weight/height<sup>2</sup>

<sup>b</sup>BMI z-score

<sup>c</sup>Obesity Status Definitions determined by BMI percentile for child's age: Obese- at or over 95<sup>th</sup> percentile; Overweight- between 85<sup>th</sup> and 95<sup>th</sup> percentile; Normal- under 85<sup>th</sup> percentile

however, was not significant. No significant gender differences were observed in self-reported sedentary behaviour.

## 3.2 Children's Objectively Measured (Actical) Physical Activity levels

Table 2 shows the data pertaining to objectively assessed physical activity and sedentary (inactivity) levels. Children wore Actical accelerometers for an average of 13 hours ( $n = 53$ ,  $SD = 0.9$ ) per valid day, defined as 10 hours or more of Actical wear time. In terms of weekday versus weekend physical activity and sedentary behaviour, only 24 participants had valid data. Weekday vs. Weekend Activity data are summarized in Table 3. Only one child (1.8%) out of the entire sample ( $n = 24$ ) accumulated 60 minutes of MVPA on each day of the 4-day period.

**Vigorous activity.** Children spent an average of 2.85 minutes ( $SD = 4.04$ ) per day engaged in vigorous activity. Boys spent 3.48 minutes per day ( $SD = 5.02$ ) engaged in vigorous activity whereas girls spent 2.07 minutes per day ( $SD = 2.23$ ); this difference was not significant ( $t(51) = 1.27$ ,  $p = 0.20$ ). With regards to weekday versus weekend day vigorous activity, children spent an average 2.34 ( $SD = 2.34$ ) minutes on a weekday and 1.41 ( $SD = 1.64$ ) minutes on the weekend; these differences proved to be significant ( $t(23) = 2.22$ ,  $p = 0.03$ ).

**Moderate activity.** Children spent an average of nearly one hour/day (52.69 minutes,  $SD = 24.77$ ) engaged in moderate activity. Boys spent slightly over an hour (63.82 minutes,  $SD = 26.72$ ) engaging in moderate intensity activity, whereas girls spent 39.24 minutes/day ( $SD = 13.14$ ); this difference was significant ( $t(42) = 4.35$ ,  $p = 0.001$ ). Levene's test indicated unequal variances ( $F = 6.81$ ,  $p = .012$ ), so degrees of freedom were adjusted from 42.3 to 42. Since Levene's test indicated unequal variances, the Mann Whitney U test was also run to examine significant gender differences. The results obtained from the Mann Whitney test concluded that there was a statistically significant difference between the moderate intensity activity accumulated by boys and girls ( $U = 137$ ,  $p = .001$ ). Boys engaged in more moderate activity compared to girls. In terms of weekday versus weekend moderate activity, children ( $n = 24$ ) spent an average of 55.04

**Table 2: Average daily minutes/hours of Physical activity and Inactivity measured by the Actical Accelerometers**

	N	Physical Activity					Inactivity		
		Average daily wear minutes	Average daily non-wear minutes	Vigorous minutes	Moderate minutes	Moderate-to-vigorous minutes	Sedentary minutes	Sedentary hours	Sleep hours
Day 1 (Thurs)	51	756 (78)	684 (77)	4 (6)	61 (33)	65 (34)	527 (86)	8.7 (1.4)	11.4 (1.3)
Day 2 (Fri)	53	839 (96)	601 (95)	2 (6)	56 (29)	58 (30)	580 (93)	9.6 (1.6)	10 (1.6)
Day 3 (Sat)	36	771 (103)	668 (102)	2 (3)	38 (24)	40 (24)	560 (91)	9.3 (1.5)	11.1 (1.7)
Day 4 (Sun)	28	740 (89)	700 (87)	1 (2)	34 (20)	35 (21)	541 (90)	9 (1.5)	11.7 (1.4)
Daily average	53	784 (57)	656 (57)	3 (4)	53 (25)	55 (26)	549 (63)	9.1 (1)	11 (0.9)
Weekday average	24	801 (56)	639 (56)	2 (2)	55 (25)	57 (25)	571 (60)	9.5 (1)	10.6 (0.9)
Weekend average	24	760 (66)	680 (66)	1 (1)	35 (18)	36 (18)	557 (72)	9.3 (1.2)	11.3 (1.1)

*Note.* Standard Deviations appear in the parentheses below means

**Table 3: *t* –test results comparing Objectively measured Weekday vs. Weekend Physical Activity and Sedentary Behaviour**

	Weekday vs. Weekend Activity		<i>t</i>	<i>df</i>
	Weekday	Weekend		
Vigorous	2.34 (2.34)	1.41 (1.64)	2.22*	23
Moderate	55 (25)	34.7 (18.4)	4.70**	23
MVPA	57.1 (25.3)	36.1 (18.4)	4.74**	23
Sedentary	571 (60.2)	557 (72)	.84	23

Note. \* =  $p \leq .05$  \*\* =  $p \leq .001$ . Standard Deviations appear in parentheses below means. Sample size of 24 participants.



minutes ( $SD = 25.07$ ) on a weekday compared to 34.73 minutes on a weekend day ( $SD = 18.36$ ) and this difference was significant ( $t(23) = 2.22, p = 0.001$ ).

**Moderate-to-vigorous physical activity.** Average daily time spent in MVPA was calculated by summing the average daily time spent in VPA and MPA. Children spent an average of nearly an hour (55.53 minutes,  $SD = 25.9$ ) per day engaged in MVPA. Boys spent 67.3 minutes ( $SD = 28$ ) engaged in MVPA whereas girls spent 41.32 minutes/day ( $SD = 13.4$ ). These differences were significant ( $t(43) = 4.15, p = 0.001$ ). Levene's test indicated unequal variances ( $F = 5.06, p = .029$ ), so degrees of freedom were adjusted from 42.9 to 43. The Mann Whitney U test was run to further examine gender differences in accumulation of MVPA. The results of the test concluded significant differences between boys and girls with regards to accumulation of MVPA ( $U = 131, p = .001$ ). Similar to moderate activity, boys engaged in more MVPA than girls ( $p = .001$ ). Also, significant differences ( $t(23) = 4.74, p = 0.001$ ) between the amounts of MVPA children engaged in on weekdays (57.12 minutes,  $SD = 25.32$ ) versus weekend days (36.15 minutes,  $SD = 18.44$ ) were observed.

**Sedentary activity/Inactivity.** Children spent an average of approximately 9 hours (548.68 minutes/day,  $SD = 63.05$ ) engaged in "screen related behaviours" (including watching TV/movies, playing video/computer games, surfing the internet) and "non-screen related behaviours" (i.e., instant messaging talking on the phone, reading/homework, motorized transport etc.). Boys spent 8.7 hours (527.09 minutes,  $SD = 61.36$ ) per day engaged in the above mentioned sedentary behaviours whereas girls spent 9.57 hours (574.77 minutes,  $SD = 55.73$ ) engaging in sedentary behaviours. Hence, girls were more inactive/sedentary than boys and there was a significant difference ( $t(51) = -2.93, p = 0.005$ ). However, there was no significant difference between the amounts of sedentary activity children engaged in on weekdays versus weekend days ( $t(24) = 0.84, p = 0.40$ ).

### 3.3 Difference between Child Self-Report and Objective Data

To explore the difference between child self-reported and objectively measured (Actical) physical activity, a paired *t*-test was computed. Respondents were asked to answer questions about the kind of physical activity and sedentary behaviour they engaged in every day. On average, participants (children) reported a greater number of minutes of vigorous activity ( $M = 87.73$ ,  $SD = 52.09$ ) compared to objectively measured vigorous activity ( $M = 2.85$ ,  $SD = 0.55$ ,  $t(52) = 12.02$ ,  $p < .001$ ). Participants over reported minutes of moderate activity ( $M = 84.47$ ,  $SD = 51.7$ ) compared to objectively measured moderate activity ( $M = 52.7$ ,  $SD = 24.8$ ,  $t(52) = 4.30$ ,  $p < .001$ ). They also over reported minutes of MVPA ( $M = 172$ ,  $SD = 89.7$ ) to objectively measured MVPA ( $M = 55.5$ ,  $SD = 26$ ,  $t(52) = 10$ ,  $p < .001$ ). Finally, the participants under-reported minutes of sedentary activity ( $M = 220$ ,  $SD = 105$ ) to the Actical sedentary activity data ( $M = 549$ ,  $SD = 63$ ,  $t(52) = -19.22$ ,  $p < .001$ ). Data are summarized in Table 4.

#### 3.3.1 Child Over and Underestimation

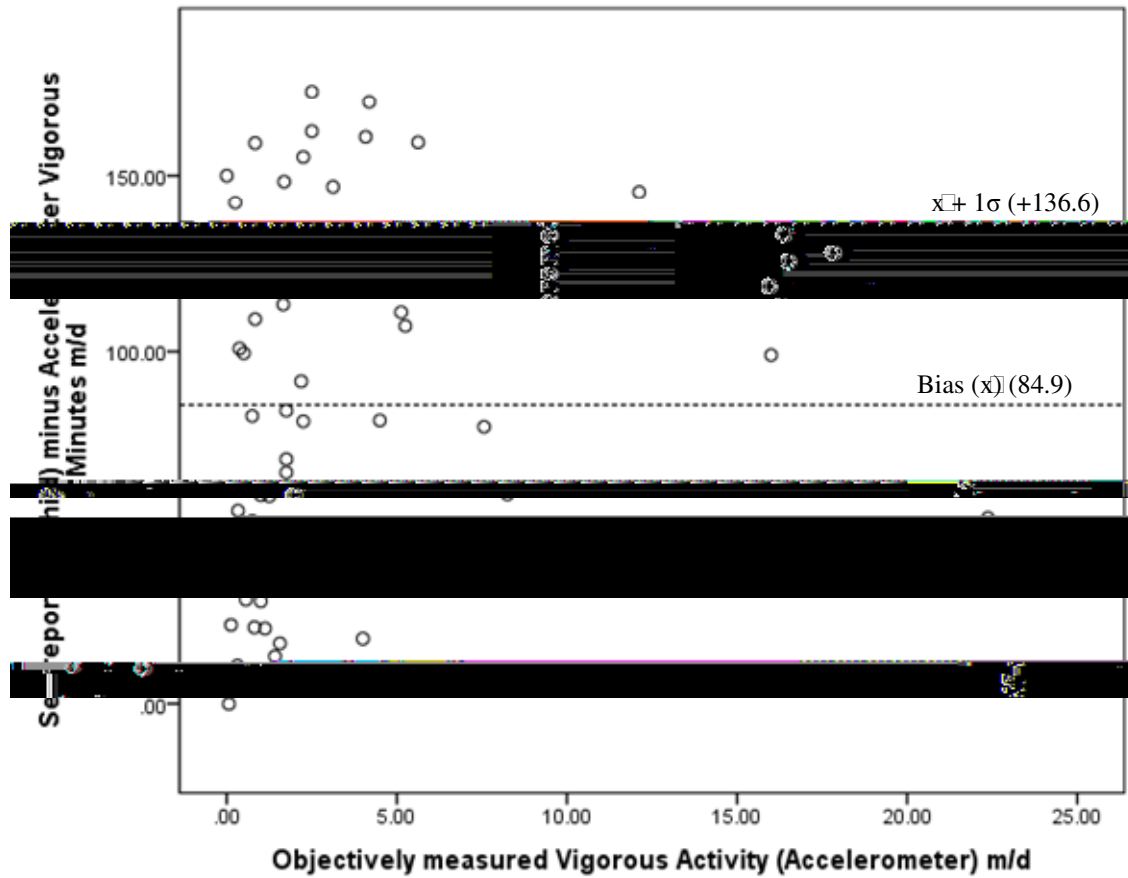
**Vigorous activity.** When comparing the subjectively reported data to the objective data directly, 98% ( $n = 52$ ) of the children overestimated their vigorous activity. The difference between the subjective and objective data was calculated to determine over and under estimation by the respondents. On average, the children overestimated (bias) daily vigorous activity by 84.9 minutes/day ( $SD = 51.4$ ). To further explore the characteristics of over- or under-estimators, participants were also grouped into “gross” over or “gross” under-estimators based on their responses falling above or below 1 *SD* (Figure 1). A graphical depiction of the data was generated by plotting awareness of vigorous physical activity (i.e., perceived vigorous activity – accelerometer data) against average vigorous activity recorded by the accelerometer. Out of the entire sample ( $n = 52$ , 98%) who overestimated vigorous activity to some extent, 11 children (21%)

**Table 4: *t* –test results comparing Child Self-reported and Objectively measured Physical Activity and Sedentary Behaviour**

	Self-report vs. Actical Data		<i>t</i>	<i>df</i>
	Child self-report (min/day)	Objective data (min/day)		
Vigorous	87.73 (52.09)	2.85 (4.04)	12.02**	52
Moderate	84.4 (51.7)	52.7 (24.8)	4.30**	52
MVPA	172 (89.7)	55.5 (26)	10.09**	52
Sedentary	220 (105)	549 (63)	-19.22**	52

Note. \*\* =  $p \leq .001$ . Standard Deviations appear in parentheses below means.

**Figure 1: Difference between Perceived Vigorous Activity (Child) versus Objectively measured Vigorous Activity**



Difference between vigorous activity as perceived by the child (i.e., self-report data minus accelerometer data) vs. average vigorous activity measured by accelerometer. Values above 0 on the y-axis indicate over estimation of vigorous activity by the child (i.e., self-reported values are higher than the accelerometer value). Dotted line, difference between the two methods (bias); dashed line, +1 and -1 *SD*.

overestimated below 1 *SD* (33.5 minutes/day). These children were somewhat accurate and did not overestimate vigorous activity by more than half an hour a day. Among these 11 children, eight were girls, thus, suggesting that girls provided a better estimate of vigorous activity compared to boys. In terms of “gross” over estimators, a similar percentage of children ( $n = 12$ , 22%) were seen to overestimate vigorous activity by at least 136.6 minutes. Interestingly, the majority of these “gross” over estimators were boys. Hence, boys perceived themselves engaging in more vigorous activity compared to girls. No clear trends in “gross” overestimation and obesity status of the child were observed. To further confirm the gender differences, an independent samples *t*-test was run. There was a significant difference between the degree of overestimation of vigorous activity among boys and girls. Boys over-estimated vigorous activity by 98.3 minutes as compared to 68.6 minutes/day of overestimation observed in girls ( $t(51) = 2.16$ ,  $p = 0.03$ ). A one-way ANOVA was used to test the differences in overestimation of vigorous activity among normal weight, overweight and obese children. There were no significant differences observed among the three groups,  $F(2, 50) = 0.26$ ,  $p = 0.77$ . Children overestimated vigorous activity irrespective of their obesity status.

**Moderate activity.** Across the participant sample, 66% overestimated the amount of moderate activity, while 34% of the children underreported these levels. Seventy nine percent of girls (19/24) and 55% of boys (16/29) overestimated, and conversely 21% of girls and 45% of boys underestimated. To examine gender differences, an independent samples *t*-test was run. There was a significant difference between the degree of overestimation of moderate activity among boys and girls. Girls overestimated moderate activity by 48.4 min/day compared to 18 min/day of overestimation observed among boys ( $t(51) = -2.11$ ,  $p = 0.03$ ). Most girls who overestimated were normal weight ( $n = 15$  out of 19), whereas among boys, 43% were overweight ( $n = 7$  out of 16) and 31% obese ( $n = 5$  out of 16). However, results of the one-way ANOVA found no significant differences in overestimation among the three weight groups for both sexes,  $F(2, 50) = 0.81$ ,  $p = 0.44$ .

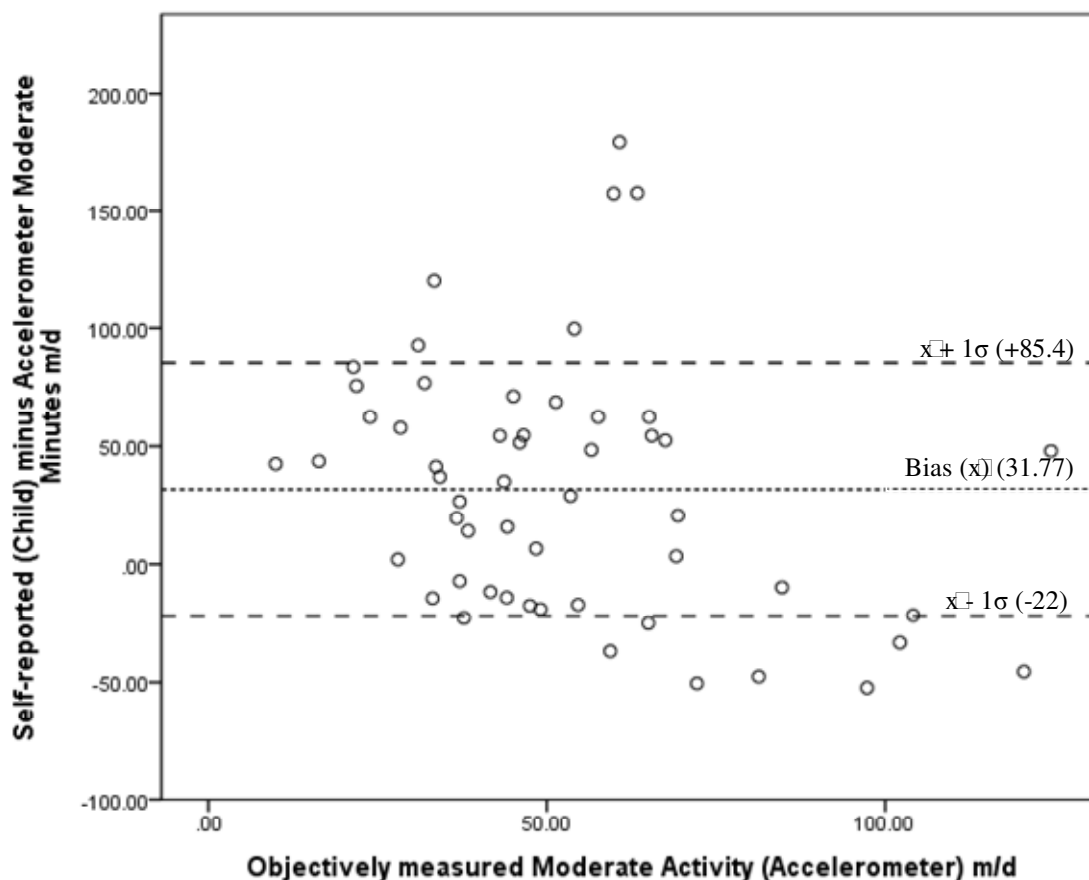
On average, children overestimated their moderate activity by 31.7 minutes/day ( $SD = 53.7$ ). To further explore the characteristics of over- or under-estimators,

participants were also grouped into “gross” over or “gross” under-estimators based on their responses falling above or below 1 *SD* (Figure 2). Many (22%) of the respondents were “gross” over-estimators, or those that overestimated their moderate activity by more than 85.4 minutes (more than one standard deviation from the overestimation mean of 31.7 minutes). Many (21%) of the respondents also grossly underestimated their moderate activity (-22 less than one standard deviation from the overestimation mean of 31.7 minutes). Among these “gross” under-estimators ( $n = 18$ ), 28% were girls and 72% were boys. This was further confirmed by a significant t-test between moderate activity reported by boys and girls. Girls overestimated minutes spent in moderate activity more compared to boys ( $t(51) = -2.11, p = 0.03$ ).

**Moderate-to-vigorous physical activity.** In terms of MVPA, a similar degree of over/under-estimation was observed. The mean difference (bias) between self-report and accelerometer was +116.6 min/day. Children were also grouped into “gross” over-or under estimators based on their responses falling above or below 1 *SD* (Figure 3). Nine children (17%) out of the entire sample ( $n = 53$ ) overestimated their MVPA above 1 *SD* (200.7 minutes) i.e. these children grossly overestimated their MVPA by at least 200 minutes. Majority ( $n = 6$ ) of these children were boys. On the other hand, some children ( $n = 9, 17%$ ) overestimated below 1 *SD* (32.5 minutes/day). These children were slightly more accurate and did not overestimate MVPA by more than half an hour a day. However, no significant gender differences were observed with regards to overestimation of MVPA ( $t(51) = -0.03, p = 0.97$ ). With regards to obesity status, a one-way ANOVA was run to examine the differences in overestimation of MVPA among the three groups. No significant differences in overestimation of MVPA were observed among the three weight groups,  $F(2, 50) = 0.50, p = 0.60$ .

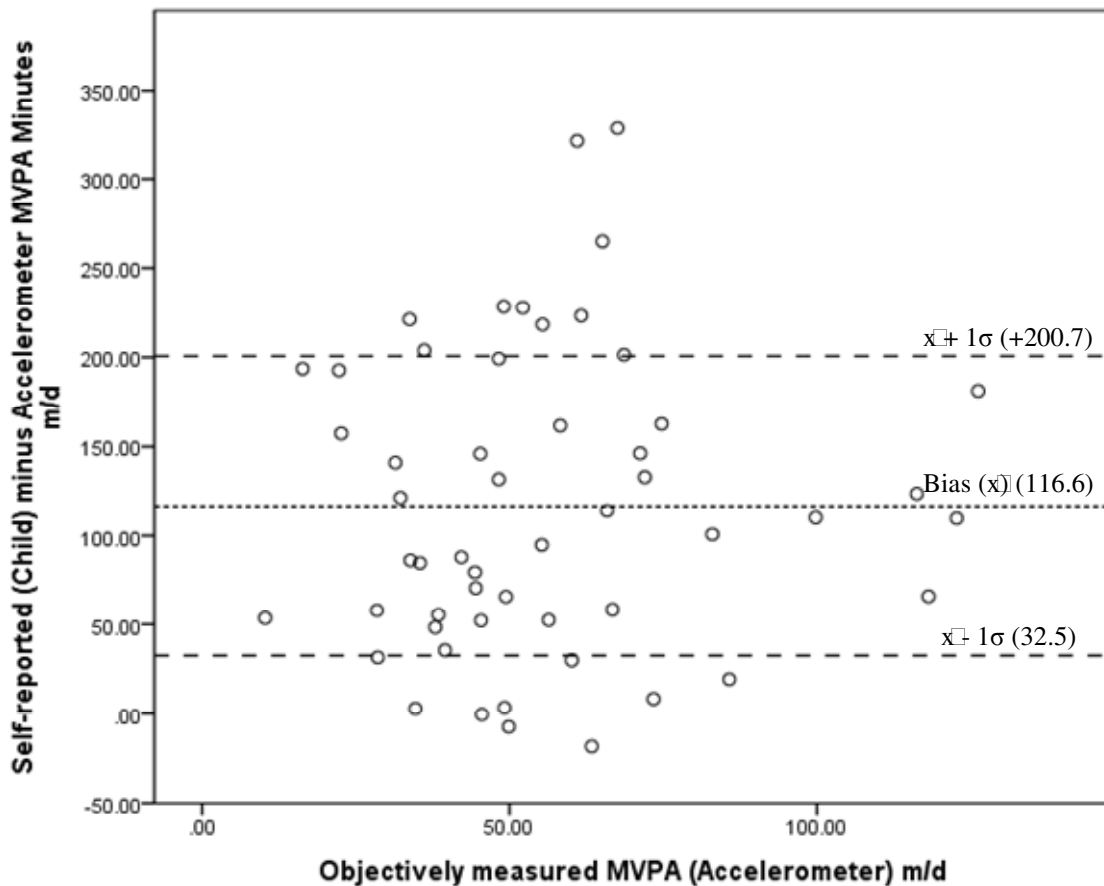
**Sedentary activity.** On average, all children underestimated sedentary activity by approximately 5 hours (-328.8.2 minutes,  $SD = 124.5$ ). Such a large degree of underestimation may be attributable to certain factors which will be explored in the discussion section. The values above and below 1 *SD* were calculated to further explore characteristics of children who tended to underestimate far less compared to others and children who grossly underestimated their sedentary activity (Figure 4). Nine

**Figure 2: Difference between Perceived Moderate Activity (Child) versus Objectively measured Moderate Activity**



Difference between moderate activity as perceived by the child (i.e., self-report data minus accelerometer data) vs. average moderate activity measured by accelerometer. Values above 0 on the y-axis indicates over estimation of moderate activity by child (i.e., self-reported values are higher than the accelerometer value). Dotted line, difference between the two methods (bias); dashed line, +1 and -1 *SD*.

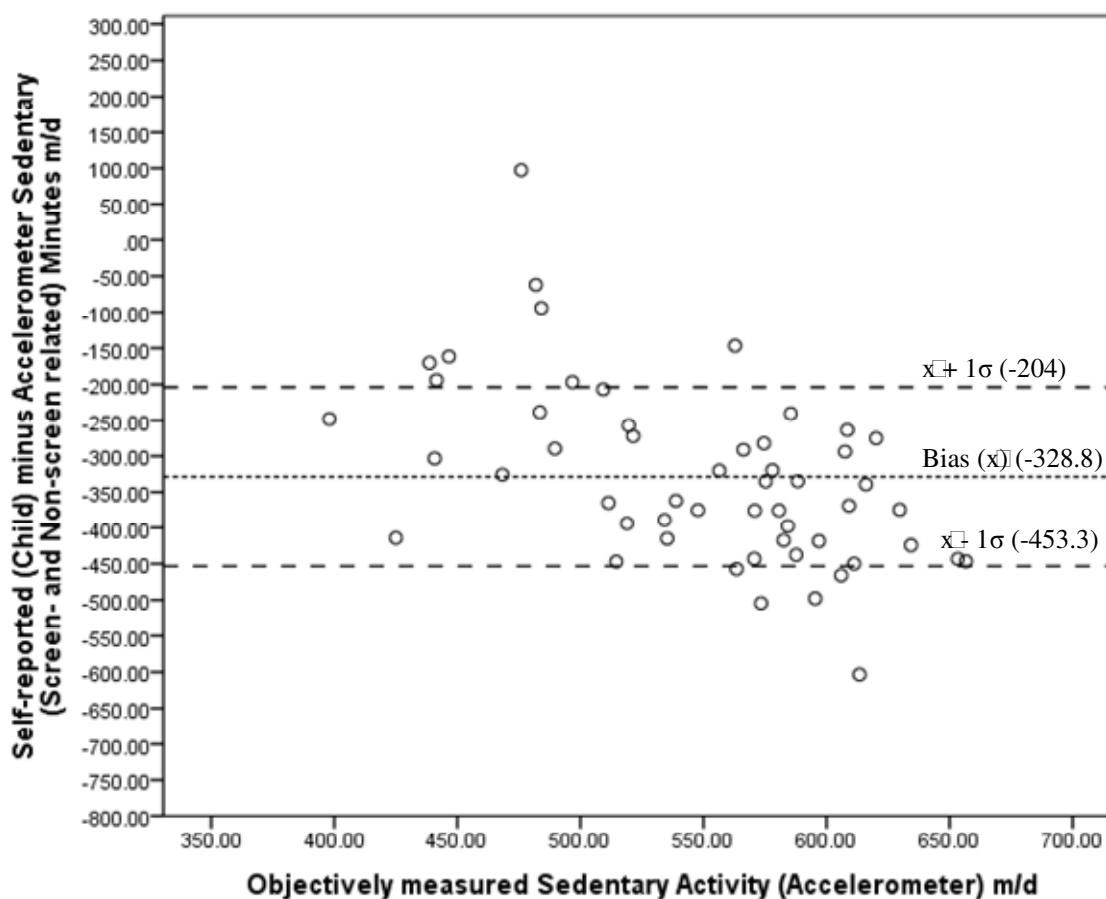
**Figure 3: Difference between Perceived MVPA (Child) versus Objectively measured MVPA**



Difference between MVPA as perceived by the child (i.e., self-report data minus accelerometer data) vs. average MVPA measured by accelerometer. Values above 0 on the y-axis indicates over estimation of MVPA by child (i.e., self-reported values are higher than the accelerometer value). Dotted line, difference between the two methods (bias); dashed line, +1 and -1 *SD*.



**Figure 4: Difference between Perceived Sedentary (both screen- and non-screen related sedentary behaviours) Activity (Child) versus Objectively measured Sedentary Activity**



Difference between sedentary (screen- and non-screen related sedentary behaviours) activity as perceived by the child (i.e., self-report data minus accelerometer data) vs. average sedentary activity measured by accelerometer. Values above 0 on the y-axis indicate over estimation of vigorous activity by the child (i.e., self-reported values are higher than the accelerometer value). Dotted line, difference between the two methods (bias); dashed line, +1 and -1 *SD*.

percent ( $n = 5$ ) of the entire sample ( $n = 53$ ) grossly underestimated below 1 *SD* (-453.3 min/day) i.e. these children underestimated their sedentary activity by at least seven hours. Out of these five children, three were boys. No clear pattern of “gross” underestimation was observed based on gender and obesity status. Also, 15% ( $n = 8$ ) of the entire sample, underestimated their sedentary activity above 1 *SD* (-204 min/day) i.e. these children were slightly more accurate than the rest and did not underestimate their sedentary activity beyond 3 hours/day. Among these eight children, six were boys, hence, indicating that boys may be slightly more aware of their sedentary activity compared to girls. No specific trend of overestimation based on obesity status was observed.

To further test the above assumptions an independent sample *t*-test was run to examine gender differences in reporting of sedentary behaviour. A significant difference in under estimation of screen-based sedentary behaviour was observed among boys and girls. Girls underestimated screen-related sedentary behaviour by 456 minutes compared to 351 minutes of underestimation observed among boys ( $t(51) = 4.35, p = 0.001$ ). However, no significant gender differences in underestimation of combined screen- and non-screen related sedentary behaviours were observed ( $t(51) = 1.83, p = 0.07$ ). A one-way ANOVA was also run to examine differences in underestimation of sedentary behaviours among normal weight, overweight and obese children. No significant differences in underestimation of sedentary behaviours were observed among the three groups,  $F(2, 50) = 1.22, p = 0.30$ .

### 3.4 Difference between Parent Report and Their Children’s Objective Physical Activity Data

To explore the difference between parent-reported physical activity of their respective children and their child’s objectively measured Actical data, paired *t*-tests were computed. Parents were asked to report the number of hours or minutes their child engaged in vigorous, moderate, and sedentary behaviour (which included screen related behaviours, chatting over the phone, instant messaging). On average, parents over reported their child’s minutes of vigorous physical activity ( $M = 90.6, SD = 54.2$ ) compared to objectively measured vigorous activity ( $M = 2.85, SD = 4.04, t(52) = 11.91, p < .001$ ). Parents also over reported their child’s minutes of moderate physical activity

( $M = 82.4$ ,  $SD = 50.4$ ) compared to the Actical measured moderate activity ( $M = 52.7$ ,  $SD = 24.8$ ,  $t(52) = 4.61$ ,  $p < .001$ ). Finally, parent respondents over reported minutes of MVPA ( $M = 173$ ,  $SD = 93.4$ ) compared to Actical MVPA data ( $M = 55.5$ ,  $SD = 26$ ,  $t(52) = 10$ ,  $p < .001$ ). On average, parents also under reported minutes of sedentary activity ( $M = 202.4$ ,  $SD = 94$ ) compared to objectively measured sedentary activity ( $M = 549$ ,  $SD = 63$ ,  $t(52) = -22.2$ ,  $p < .001$ ). The data are summarized in Table 5.

Overall, the parents significantly overestimated the time their children spent engaging in vigorous and moderate activity. On the other hand, they significantly underestimated their child's sedentary activity. These results parallel the results seen with the children's self-reporting against objectively measured data. However, unlike the children's data, no significant gender differences (of the children) were observed between parent self-reports and accelerometer data.

### 3.4.1 Parent Over and Underestimation

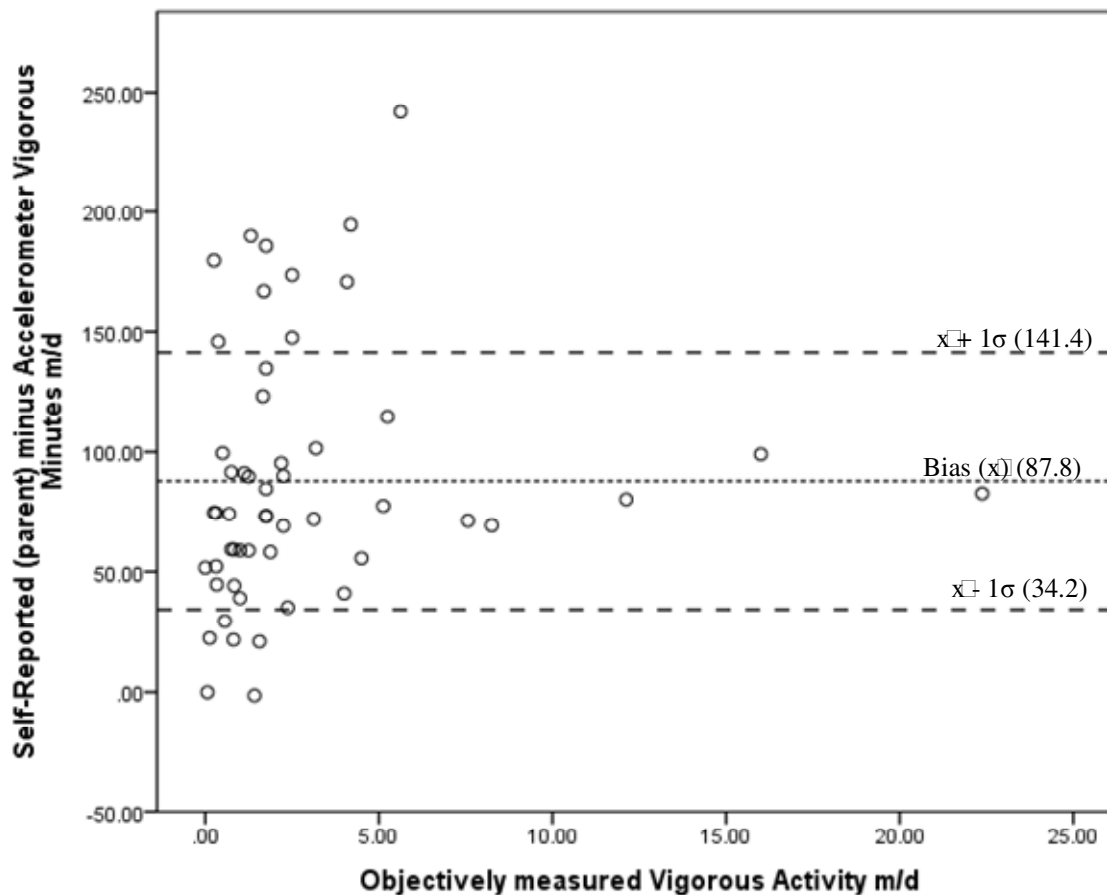
**Vigorous activity.** On average, all parents overestimated their child's vigorous activity levels. Almost all (96%) of the parent sample over reported their child's vigorous activity with a mean (bias) of 87.8 minutes/day ( $SD = 53.6$ ). To further explore the characteristics of over- or under-estimators, parents were also grouped into "gross" over or "gross" under-estimators based on their responses falling above or below 1  $SD$  (Figure 5). A graphical depiction of the data was generated by plotting parental awareness of vigorous physical activity (i.e., perceived vigorous activity – accelerometer data) against average vigorous activity recorded by the accelerometer. In the case of vigorous activity reported by parents, the majority of the parents overestimated vigorous activity to some extent. However, a few parents ( $n = 6$ , 11%) who overestimated below 1  $SD$  (34.2 min/day) were a little more accurate than the rest of the sample i.e. these parents did not overestimate beyond half an hour of vigorous activity. No clear pattern based on gender and the obesity status of the child was observed. On the other hand, some parents ( $n = 9$ , 19%) greatly overestimated their child's vigorous activity by more than 1  $SD$  (141.4 min/day). Out of these nine parents, five had boys. To explore any difference in overestimation of vigorous activity between parents who had girls or boys, an independent samples  $t$ -test was run. No significant differences were observed in

**Table 5: *t* –test results comparing Parent-reported and Objectively measured Child Physical Activity and Sedentary Behaviour**

	Self-report vs. Actical Data		<i>t</i>	<i>df</i>
	Parent self-report	Objective data		
	(min/day)	(min/day)		
Vigorous	90.6 (54.2)	2.85 (4.04)	11.91**	52
Moderate	82.4 (50.4)	52.7 (24.8)	4.61**	52
MVPA	173 (93.4)	55.5 (26)	10.06**	52
Sedentary	202.4 (94)	549 (63)	-22.24**	52

Note. \*\* =  $p \leq .001$ . Standard Deviations appear in parentheses below means.

**Figure 5: Difference between Perceived Vigorous Activity (Parent) versus Objectively measured Vigorous Activity**



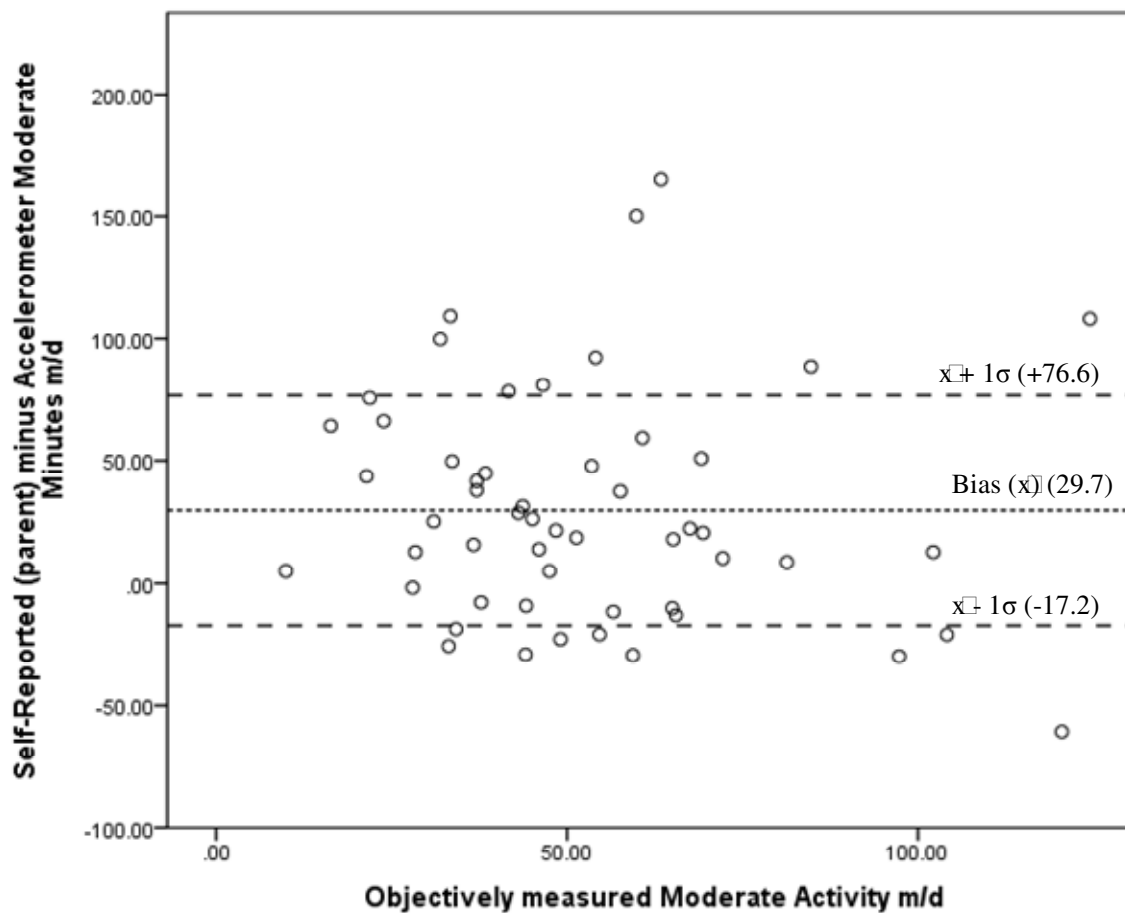
Difference between child vigorous activity as perceived by parent (i.e., self-report data minus accelerometer data) vs. average vigorous activity measured by the accelerometer. Values above 0 on the y-axis indicate over estimation of child vigorous activity by parent (i.e., self-reported values are higher than accelerometer values). Solid line, average difference between the two methods (Bias); dashed line, +1 and -1 *SD*.

overestimation of vigorous activity by the parent irrespective of the gender of the child ( $t(51) = 1.18, p = 0.24$ ). A one-way ANOVA was used to test the differences in overestimation of vigorous activity among parents of normal weight, overweight and obese children. There were no significant differences observed among the three groups,  $F(2, 50) = 0.74, p = 0.48$ . All parents overestimated vigorous activity to a similar extent irrespective of their child's obesity status.

**Moderate activity.** Out of 53 parents, 72% ( $n = 38$ ) of the sample overestimated their children's moderate activity levels. On average, parents overestimated with a mean (bias) of 29.7 minutes/day (Figure 6). The rest of the sample ( $n = 15$ ) underestimated their children's moderate activity levels. It was observed that 17% of the respondents were "gross" over-estimators, or those that overestimated their moderate activity by more than 76.7 minutes (more than one standard deviation from the overestimation mean of 29.7 minutes). In addition, 17% of the parent sample reported their child's moderate activity to be less than one standard deviation (-17.2 minutes) leading to underestimation of moderate activity (Figure 6). No pattern of inaccurate estimation based on gender (child) or obesity status emerged. To examine differences in over-reporting of moderate activity among parents based on gender of the child, an independent samples  $t$ -test was run. There was no significant (child) gender difference for the degree of overestimation of moderate activity reported by parents ( $t(51) = -0.33, p = 0.73$ ). A one-way ANOVA was run to examine differences in overestimation of moderate activity among parents with normal weight, overweight or obese children. No significant differences in overestimation were observed among the three groups,  $F(2, 50) = 0.14, p = 0.87$ .

**Moderate-to-vigorous physical activity.** In terms of MVPA, the mean difference (bias) between self-report and accelerometer data was +117.5 min/day. No significant gender differences were observed between over- or under-reporting of MVPA. With regards to MVPA overestimation beyond 1  $SD$ , 17% ( $n = 9$ ) of the parents overestimated their child's MVPA by more than 202.5 minutes/day. On the other hand, 13% ( $n = 7$ ) of parents overestimated their child's MVPA below 1  $SD$  (32.5 minutes/day). These parents were more accurate than the rest of the parents, since they did not overestimate their

**Figure 6: Difference between Perceived Moderate Activity (Parent) versus Objectively measured Moderate Activity**



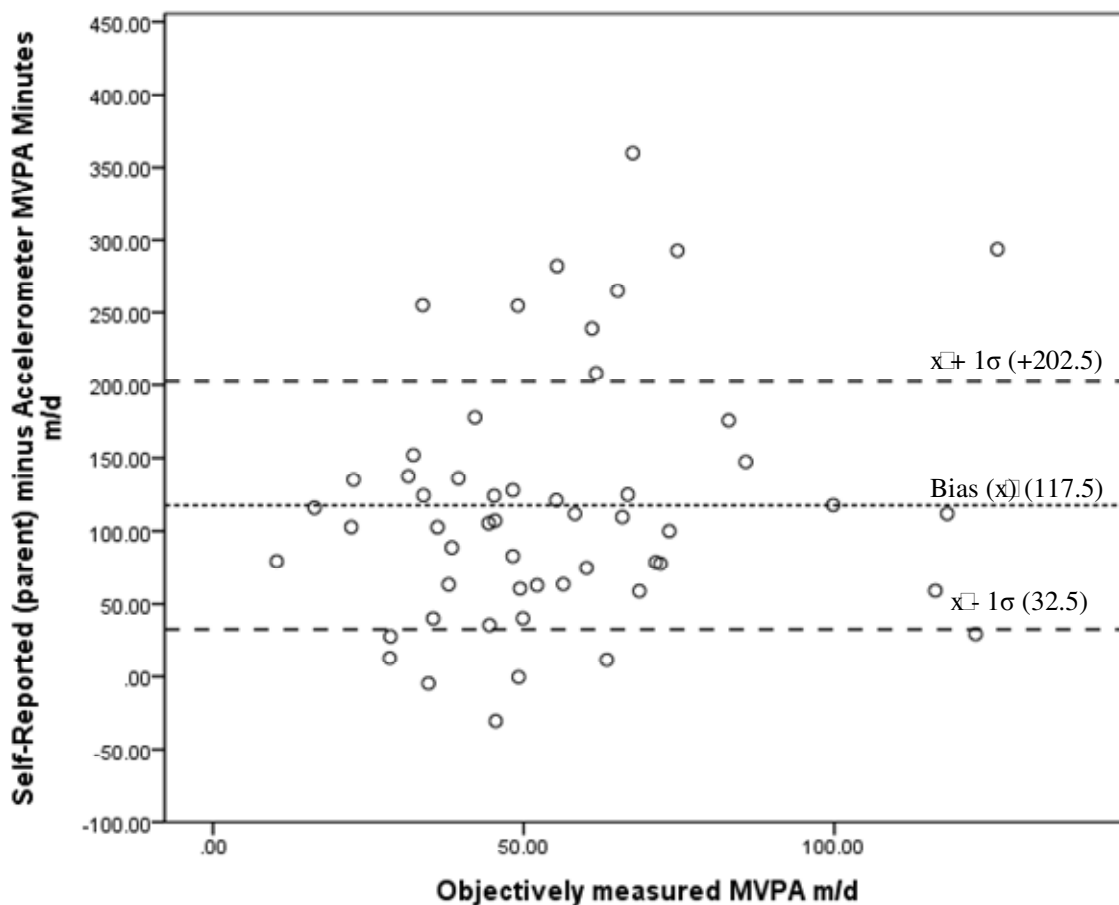
Difference between the child's moderate activity as perceived by the parent (i.e., self-report data minus accelerometer data) vs. average moderate activity measured by the accelerometer. Values above 0 on the y-axis indicate over estimation of child moderate activity by parent (i.e., self-reported values are higher than accelerometer values). Solid line, average difference between the two methods (Bias); dashed line, +1 and -1 *SD*.

child's MVPA beyond half an hour (32.5 minutes/day) (Figure 7). No pattern based on gender or obesity status of the child was observed when parents' responses were grouped above or below 1 *SD*. To further explore any difference in overestimation of MVPA between parents who had girls or boys, an independent samples *t*-test was run. No significant (child) gender differences were observed in overestimation of MVPA by the parent ( $t(51) = 0.55, p = 0.58$ ). A one-way ANOVA was run to examine differences in overestimation of MVPA among parents of normal weight, overweight or obese children. No significant differences in overestimation were observed among the three groups,  $F(2, 50) = 0.55, p = 0.57$ .

**Sedentary activity.** Overall, the parent sample underestimated their child's sedentary activity. The mean difference between self-report and accelerometer was approximately 5.76 hours/day. Similar to previous analyses, parents reporting sedentary activity were also categorized as "gross" under estimators or somewhat accurate estimators based on their responses falling above and below 1 *SD* (Figure 8). Out of the entire sample 13% of the parents ( $n = 7$ ) underestimated their child's sedentary activity above 1 *SD* (232.9 min/day) i.e. these parents were somewhat more accurate than the entire sample and did not underestimate their children's sedentary activity beyond 3.4 hours. On the other hand, 17% ( $n = 9$ ) of the entire parent sample ( $n = 53$ ) grossly underestimated their child's sedentary activity below 1 *SD* (453.3 min/day). These parents underestimated their children's physical activity by at least seven hours (approximately). Among these parents who grossly underestimated their child's sedentary behaviour, seven parents had girls. Thus, parents of girls tended to underestimate their child's sedentary activity more compared to parents of boys. To test these assumptions, an independent samples *t*-test was run to explore any difference in underestimation of child sedentary behaviour between parents who had girls or boys. With regards to only screen-related sedentary behaviour, parents of girls underestimated by 454 minutes/day compared to 374 minutes/day of underestimation reported by parents of boys ( $t(51) = 3.28, p = 0.002$ ). However, no significant differences in underestimation of combined screen- and non-screen related sedentary behaviours were observed among parents of both girls and boys ( $t(51) = 1.74, p = 0.08$ ). A one-way ANOVA was also run to examine

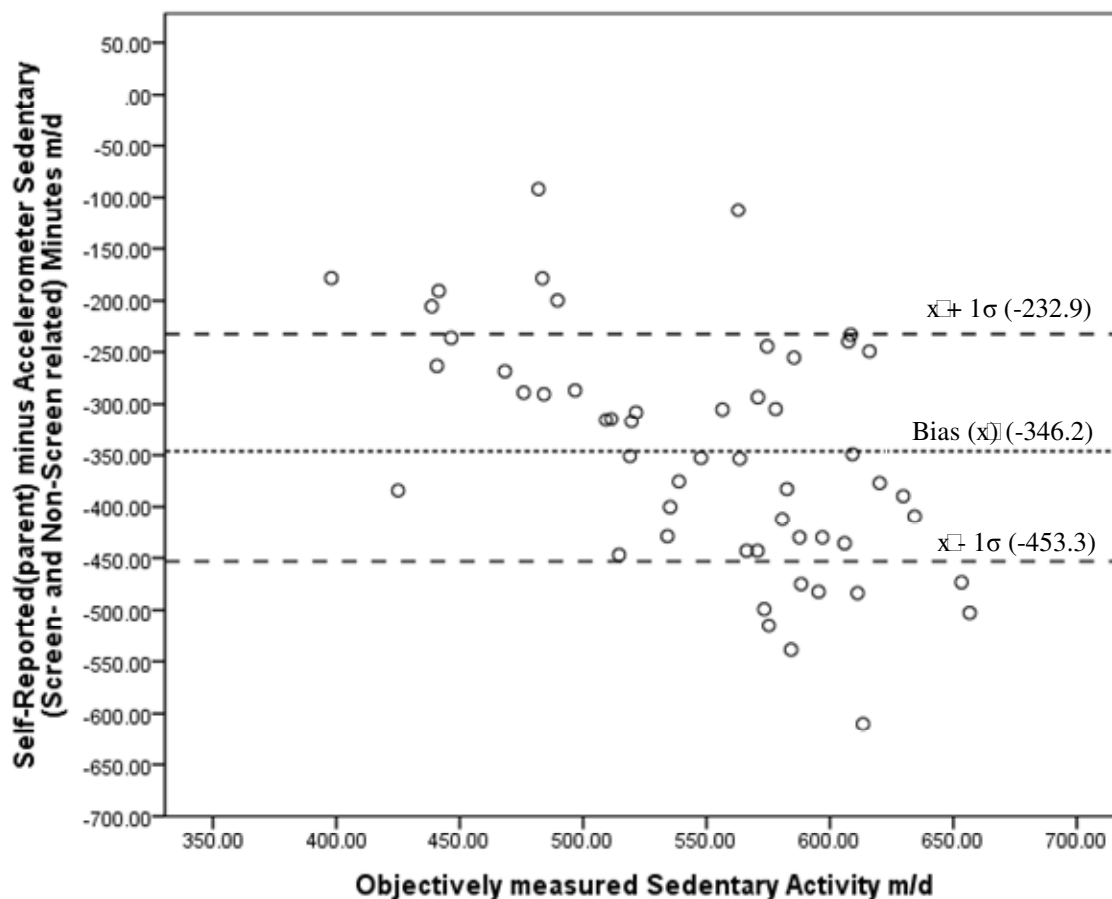


**Figure 7: Difference between Perceived MVPA (parent) versus Objectively measured MVPA**



Difference between child MVPA as perceived by parent (i.e., self-report data minus accelerometer data) vs. average MVPA measured by the accelerometer. Values above 0 on the y-axis indicate over estimation of child MVPA by parent (i.e., self-reported values are higher than accelerometer values). Solid line, average difference between the two methods (Bias); dashed line, +1 and -1 SD.

**Figure 8: Difference between Perceived Sedentary Activity (both screen- and non-screen related health behaviour) (Parent) versus Objectively measured Sedentary Activity**



Difference between sedentary (screen- and non-screen related sedentary behaviours) activity as perceived by parent (i.e., self-report data minus accelerometer data) vs. average sedentary activity measured by accelerometer. Values above 0 on the y-axis indicates over estimation of vigorous activity by parent (i.e., self-reported values are higher than the accelerometer value). Dotted line, difference between the two methods (bias); dashed line, +1 and -1 *SD*.

differences in underestimation of sedentary behaviours among parents of normal weight, overweight and obese children. No significant differences in underestimation of sedentary behaviours were observed among the three groups,  $F(2, 50) = 0.99, p = 0.37$ . All parents underestimated their child's sedentary behaviours to a similar degree irrespective of the child's weight status.

### 3.5 Difference between Parent and Child Self-Reported Physical Activity

To analyze the difference between the subjective reporting by both parent and child, a series of paired  $t$ -test were run. Respondents were asked to “mark how many minutes of HARD physical activity you did yesterday. This includes physical activity during physical education class, after school, evenings and spare time”. The mean for the parents was 87.8 minutes/day compared to 84.9 minutes/day reported by the children. There were no significant differences in the self-report by children and parents for vigorous activity ( $t(52) = -.51, p = .60$ ). The question concerning moderate activity asked, “mark how many minutes of MODERATE physical activity you did yesterday. This includes physical activity during physical education class, after school, evenings and spare time”. On average, children reported 31.7 minutes compared to 29.7 minutes of moderate activity reported by the parents. This difference was not statistically significant ( $t(52) = .36, p > 0.05$ ). Similarly, while both child ( $M = 118, SD = 84.8$ ) and respective parent ( $M = 119, SD = 84.7$ ) overestimated MVPA, the differences were not significant ( $t(52) = -.10, p > 0.05$ ). In terms of sedentary activity, children underreported by approximately 5.48 hours (-328.8 minutes,  $SD = 124.5$ ) while parents also underreported by approximately 5.76 hours (-346.2 minutes,  $SD = 113.2$ ). These differences were not significant ( $t(52) = 1.32, p > 0.05$ ). These data are summarized in Table 6. It appears that while both children and parents over report physical activity, the level of over-/underreporting between the two groups does not differ.

**Table 6: *t* –test results comparing Child Self-reported and Parent-reported Child Physical Activity and Sedentary Behaviour**

	Child subjective vs. Parent subjective		<i>t</i>	<i>df</i>
	Child self-report (min/day)	Parent self-report (min/day)		
Vigorous	84.9 (51.4)	87.8 (53.6)	-.52	52
Moderate	31.7 (53.7)	29.7 (46.9)	.36	52
MVPA	116.6 (84.1)	117.5 (85)	-.10	52
Sedentary	-328.8 (124.5)	-346.2 (113.2)	1.47	52

Standard Deviations appear in parentheses below means.

### 3.6 Correlation between BMI, Age, and Physical Activity Levels

Pearson correlation analyses were run to analyze any relationship between variables such as BMI, age, weight and awareness of physical activity levels among parents and children. Pearson correlations between BMI and child physical activity levels were insignificant. There was no significant correlation between BMI and self-reported (both parent and child) vigorous, moderate, MVPA and sedentary activity. Additionally, no correlation was found between weight of the child and objectively measured or self-reported (both parent and child) physical activity and sedentary levels.

With regard to correlations between age and physical activity levels in children, several significant correlations were observed. There was a negative correlation between age and objectively measured moderate activity,  $r = -.35, n = 53, p = .009$ . Similar to moderate activity, there was a negative correlation between age and objectively measured MVPA,  $r = -.33, n = 53, p = .01$ . In contrast, there was a positive correlation between age and objectively measured sedentary activity,  $r = .45, n = 53, p = .001$ . Thus, as age advanced, physical activity decreased and sedentary activity increased. In terms of the correlation between age and self-reported physical activity levels (by both parent and child), only child self-reported moderate and sedentary activity were correlated with age. A positive correlation was found between age and self-reported moderate activity,  $r = .30, n = 53, p = .02$ . In addition, a negative correlation was found between age and self-reported sedentary activity by children,  $r = -.30, n = 53, p = .02$ .

In conclusion, BMI proved to be a non-significant factor in determining levels of awareness in children and parents, however, the age of the child was correlated with awareness of moderate and sedentary activity among children.

## Chapter 4

### 4 Discussion

The purpose of this study was to assess awareness of physical activity and sedentary levels among parents and their children. Both subjective and objective measures were compared to examine the level of awareness among the participants. A secondary purpose was to examine the difference between parent perception of their children's physical activity and sedentary behaviour and their children's self-report. A total of 53 parent-child dyads participated in the study.

Results were organized into four categories: child awareness of physical activity and sedentary behaviour; parents' awareness of their child's physical activity and sedentary behaviour; concordance between children's and parents' awareness of the child's physical activity and sedentary behaviour; and the relationship between gender, BMI, age and awareness (both child and parent).

The objective data on levels of physical activity and sedentary behaviour were found to be similar to other studies (Colley et al., 2011; Troiano, Berrigan, Dodd, Masse, Tilert, & McDowell, 2007; Colley et al., 2011). Overall, boys were more active than girls, and as age advanced, physical activity decreased and sedentary behaviour increased. With regards to adherence to the current physical activity guidelines, only 1.8% of the children in the present study met the guidelines (i.e. only one child in the entire sample engaged in 60 minutes of MVPA/day on all four days of Actical wear time). In contrast, the 2007-2009 Canadian Health Measures Survey reported 7% of the children adhering to these guidelines. Thus, children in the current sample were far less active compared to the nationally representative data. Also, consistent with prior research, children engaged in more physical activity on the weekdays compared to the weekend (Garriguet & Colley, 2012; Trost et al., 2001).

The amount of time spent by children engaged in sedentary behaviours also requires attention. Children spent an average of approximately 9 hours/day engaged in sedentary pursuits. This finding was slightly more than the levels of sedentary time (8.6

hours) reported in the CHMS 2007-2009 survey (Colley et al., 2011). The objective data then suggested that the present sample of children seemed consistent with other Canadian data, showing far less than recommended levels of physical activity for children in this age range. Also, the results of the present study are consistent with the previous studies exploring physical activity levels of South Asians in Canada and United Kingdom (Bryan, Tremblay, Perez, Ardern, & Katzmarzyk, 2006; Owen et al., 2009). One question then might be whether children are actually aware of their activity levels.

#### 4.1 Child Awareness of Physical Activity and Sedentary Behaviour

As hypothesized, there was a significant difference between child self-reported and objectively measured physical activity and sedentary levels. Overall, children greatly overestimated their levels of both vigorous and moderate activity and underestimated their sedentary activity. These findings are consistent with the large body of evidence that has been recently synthesized in a systematic review (Adamo et al., 2009). Children in the present study seemed to be completely unaware of their level of vigorous activity, as 98% of the children overestimated their vigorous activity by an average of 84.9 minutes/day (compared to the objective data). Boys self-reported significantly more vigorous activity than girls (i.e., boys tended to overestimate their vigorous activity compared to girls). Several factors can help explain such large differences in reported physical activity and accelerometer data. These factors may include participant misinterpretation of type of activity and perceived level of exertion, problems with recall, intensity of activity (e.g. vigorous) asked to report on, and social desirability bias (Adamo et al., 2009; LeBlanc & Janssen, 2010). A recent systematic review by Adamo et al. (2009) highlighted the discrepancies between self-reported and objective measures of physical activity within the pediatric population. The authors observed percent mean differences for data categorized as vigorous to be very high and ranging from 216% to 13,025%. Higher mean percent differences were particularly reported among studies that categorized physical activity by intensity, with greater differences between self-report and direct measures found when respondents were asked to report on higher levels of intensity (e.g., vigorous activity). Elementary school children have also been seen to

have consistent difficulties in estimating intensity of physical activity (McKenna, Foster, & Page, 2004). A qualitative study exploring recall of physical activity in children aged 8-16 years addressed how children tended to perceive and report daily physical activity. The authors highlighted the difficulty that children faced while assessing intensity as well as with recall of duration and frequency of physical activity. On prompting, participants described moderate and vigorous activities based on individual symptoms. This outcome may have an effect on reporting intensity of physical activity due to differences among people in symptom reporting. It was seen that young people/children frequently used words such as really, not really, a lot, or not a lot to describe intensity, thus implying that “individuals often understand intensity through a single, relatively undifferentiated concept” (McKenna, et al., 2004, p. 9).

Compared to vigorous activity, there was less but still a significant degree of overestimation for moderate activity, as 66% of the children overestimated their level of moderate activity by 31.7 minutes on average. There was a higher and significant degree of overestimation among girls (79% out of the entire female sample) compared to boys (55% of the entire male sample) regarding moderate activity. These results are consistent with a study conducted on 54 middle school students using 24-hr recall and TriTrac accelerometers (Cradock et al., 2003). The results revealed similar gender differences in reporting of physical activity i.e., girls were more likely to overestimate moderate activity than boys. Another recent study assessing the disagreement in physical activity assessed by accelerometer and self-reports produced similar findings based on gender (Slootmaker, Schuit, Chinapaw, Seidall, & Mechelen, 2009). Hence, public health agencies need to address the lack of awareness among girls and boys regarding moderate activity. Interestingly, there was also some degree of underreporting when it came to moderate activity, as 34% of the total participants underreported moderate activity with boys (45%) underreporting significantly more than girls (21%). Previous studies reporting underestimation of self-reported physical activity compared to direct measures have generally been with regards to moderate or light physical activity, whereas vigorous physical activity has generally been substantially overestimated (Adamo et al., 2009; Cradock et al., 2004). Since children can have an exaggerated perception of time and



exertion, misclassification of moderate activity as vigorous is thus, not an uncommon phenomenon (Adamo et al., 2009).

In addition, analyzing how children and young adolescents acquire their physical activity over the course of the day can help explain the lack of awareness or discrepancies between self-reported and accelerometer data. Research has consistently documented that children and young adolescent activity patterns are characterized by shorter more explosive bouts of activity, and recalling/estimating the duration of these short bouts of activity may lead to poor estimation (Adamo et al., 2009; LeBlanc & Janssen, 2010). For example, children may recall a 40-minute session as one long bout of activity (e.g. hour of school gym or soccer game) when those 40 minutes, in addition to activity, may typically constitute listening to the instructor/coach, waiting for a turn to use a particular gym item, watching others play, etc. Hence, some of the largest overestimates of exercise duration have been reported to come from school gymnasias (Shephard, 2003). Since the questionnaire employed in the present study described soccer as vigorous activity, children may have assumed one gym session of soccer as 40 minutes of vigorous activity. Some excerpts from the qualitative study exploring recall in children provided similar insights. When asked to report on duration of physical activity during a karate class, one participant initially reported 3-4 hours of activity and vaguely described the session to be ages long. But on further prompting, the child explained the session lasted for 2 hours and claimed to be continuously active for those two hours. When further asked if he/she was active the whole time or sometimes had to wait and see demonstrations, the participant reported sometimes sitting down and watching others as well as waiting for a long time for his/her turn to come (McKenna, et al., 2004). Hence, children may overestimate their time being physically active by assuming many short bouts of activity as one longer bout (LeBlanc & Janssen, 2010). Thus, short bursts of activity are difficult to report in questionnaires. Direct measures (such as accelerometers or heart rate monitors) are able to accurately assess sporadic bouts of activity (Adamo et al., 2009). Finally, social desirability bias may also overshadow the awareness of physical activity in children. Children may over-report physical activity because of the natural inclination of people to respond in a way that they perceive to be socially acceptable and desirable (LeBlanc & Janssen, 2010). Klesges et al. (2007) found that children scoring high on a

social desirability measure over-reported their physical activity to a larger degree (LeBlanc & Janssen, 2010).

Thus, the aforementioned factors mean that a large degree of overestimation by children should be expected with regards to total physical activity (moderate-to-vigorous activity). In this study, the mean percent difference between self-report and accelerometer data for MVPA was 210%. These findings are consistent with previous studies comparing self-report measures of MVPA to accelerometer data (Adamo et al., 2009; LeBlanc & Janssen, 2010).

As expected, the level of sedentary activity by children in the present study was greatly underestimated by both boys and girls. A similar study by Affuso and colleagues (2011), investigated agreement between self-reported sedentary behaviours and an objective measure (i.e. accelerometer) on a larger sample ( $n = 201$ ) across six states in the United States. Children were asked to report on time spent in sedentary activities which included time spent watching TV/videos, using computers, playing video/computer games, and talking on the phone. The results were consistent with the findings of the present study, adolescents (irrespective of gender) underestimated minutes of sedentary behaviour compared to the accelerometry data. Several explanations could be provided for the large degree of underestimation of sedentary behaviour observed in the present study. Although the present study addressed both screen-based and two items of non-screen based sedentary behaviours (i.e., homework and reading), other sedentary pursuits such as time spent in motorized transport, at school, self-care were not taken into account. Olds et al. (2010) conducted a study to examine non screen sedentary time (NSST) in 9-16 year olds in Australia. Forty two percent of the total NSST comprised of school activities, socializing 19%, self-care 16%, and passive transport 15%. Thus, the present study may not have fully captured a complete picture of the sedentary time in the children's and parents' self-report measure. However, since the data were collected over a period of four days that included two weekend days, the potential effects of un-captured sedentary school time should be mitigated. Interestingly, a similar degree of underestimation of sedentary behaviour was observed during the weekends. Lastly, social desirability and difficulty to recall has also been associated with underreporting of

sedentary behaviours in adolescent boys and girls (Jago, Baranowski, Baranowski, Cullen, & Thompson, 2007; Klesges et al., 2004). In conclusion, children in the present study greatly overestimated vigorous and moderate physical activity and underestimated sedentary behaviour. Several factors such as inability to understand intensity, recall duration and social desirability bias may have attributed to lack of awareness of physical activity and sedentary behaviour among children.

## 4.2 Parent Awareness of Child Physical Activity and Sedentary Behaviour

Overall, parents also overestimated their children's vigorous and moderate physical activity and grossly underestimated sedentary behaviour. These findings are consistent with previous studies examining parent reports of their children's activity levels in comparison to objective measures. Results of a study investigating parental awareness of child physical activity among parents of 7-10 year old children revealed that most parents (80%) lacked awareness and tended to overestimate their children's physical activity on more than one measurement day (Corder, et al., 2012). Statistics Canada also reported overestimation of child physical activity by their parents in a nationally representative sample. Parent reported data was compared to child accelerometer data. On average, parents thought their child to be more active than the actual accelerometer data by 40 min/day (Colley et al., 2012). However, in the present study the bias between the parent-report of child activity levels compared to accelerometer was found to be more than 40 minutes. The parents overestimated total activity (MVPA) by almost 120 minutes in the current study. In another study examining parent perceptions of children's weight, nutrition, and activity levels similar results were found. Findings indicated parents greatly overestimated the child's physical activity level and the consumption of a healthy diet and underestimated the child's weight status (Jaballas, Clark-Ott, Clasen, Stolfi, & Urban, 2011). Although, the overestimation of physical activity was also seen in the present study, no relationship between degree of overestimation and weight or BMI was found.

Several reasons can be provided to explain the lack of parental awareness of child physical activity and sedentary behaviour. Firstly, parents may have been unable to

distinguish between different intensities of child physical activity. In the qualitative study by Mckenna, et al. (2004), neither parents nor teachers could provide the details of frequency, intensity and time with regards to child physical activity, thus questioning the ability of parents to perceive child physical activity accurately. Parents in the current study were not provided with hands-on training to be able to distinguish between varying intensities. Although the questions explained the different intensities of physical activity, they may not have been adequate. Bender, Brownson, Elliot, and Haire-Joshu (2005) also noted that parents tended to perceive and place any type of activity in their child among higher levels (moderate to hard), despite the fact that the child was engaged in light physical activity as reported by the accelerometer. Secondly, parents may not have been with their school-aged child throughout the day and therefore may be unaware of their child's activities (both physical and sedentary) during the day. Parents reportedly spend more time on weekends with their children than on weekdays (The best start: supporting, happy childhoods, 2010). Therefore, parents may be more aware of the activities of their children on weekends compared to weekdays. In an attempt to rule out this possibility, parental awareness levels were compared on weekdays and weekends. However, parents still demonstrated a similar degree of overestimation, thus, displaying lack of awareness of their child's physical activity and sedentary pursuits.

As mentioned earlier, large overestimation of physical activity duration may result from parents' assumptions that their child is fully active for a 40 min session of school gymnasium or another organized sport/activity, when the major part of the 30- or 40-minute gym session may have been spent listening to instructors or coaches, watching others play, awaiting turn to play or awaiting turn to use a particular gym item. Furthermore, the sporadic and short bouts of activity that constitute young children's physical activity may be difficult to predict and recall. Parents may have also filled out the questionnaires several days after the time that the activity occurred, in order to complete the assignment quickly. In conclusion, parents in the present study greatly overestimated their child's vigorous and moderate activity while underestimating sedentary behaviour. Several factors such as difficulty in recall of duration and estimating child physical activity intensity could have contributed to the lack of awareness of child physical activity and sedentary behaviour.

### 4.3 Discordance between Child and Parents' Awareness of Child's Physical Activity and Sedentary Behaviour

In the present study, no significant differences were observed between the child's and parent's awareness of child physical activity and sedentary behaviour. There was agreement between the parents' and child's reports of the child's physical activity and sedentary behaviours. A study published in Statistics Canada also compared the child reports of their physical activity and sedentary behaviour with those of their parents in reference to weight of the child. The kappa scores indicated low to fair agreement between the parent-child reports. Overweight or obese children reported more participation in organized and leisure sports and less time engaged in sedentary activities compared to their parents and normal weight counterparts. On the other hand, parent reports were considered to be more accurate since significant associations were found between parental report of child's activities and child body weight (Sithole & Veugelers, 2008). However, in the present study, no significant difference was found between the parent and child reports. Although both parent and child were inaccurate in estimating the child's physical activity and sedentary behaviours when compared to the accelerometer data, the degree of over and under reporting amongst the parent and child dyad was not significantly different. Also, no such association between weight and activity levels reporting was found in the present sample. This could be attributed to the methodological and sample population differences amongst the two studies. There is also a chance that children filled out their parents' questionnaire for the parent reporting. To control for the above mentioned possibility sealed envelopes (containing the parent questionnaire) were handed out and children were instructed to only allow their parents to open them. Also, parents were instructed to return the questionnaires sealed in the envelopes provided without sharing the answers with their children. To overcome this potential issue, a future study might require reporting over the phone on a daily basis with both children and parents separately. Further research needs to be done to examine and establish differences between parent and child reports and to develop means of comparing parent and child reports more efficiently.

## 4.4 Association between Gender, BMI, Age and Awareness (both Child and Parent)

### 4.4.1 Gender Differences

The results showed that boys engaged in more vigorous and moderate activity than girls, whereas girls engaged in more sedentary behaviours than boys. These findings are consistent with previous studies investigating gender differences in accumulation of physical and sedentary activity in young children. A study on daily patterns of physical activity among Canadians observed similar differences in accumulation of physical activity among all age groups. Regardless of age group, boys were found to be more active than girls (Garriguet & Colley, 2012). Several other studies have also identified similar gender disparities in accumulation of physical activity (Colley, et al., 2011; Hussey, Bell, Bennett, O'Dwyer, & Gormley, 2006; Sallis, Prochaska, & Taylor, 2000; Troiana, et al., 2008).

In the current study, there were gender differences in levels of awareness of physical activity and sedentary behaviour; boys were found to overestimate vigorous activity more than girls, whereas girls tended to overestimate moderate and underestimate sedentary behaviour more than boys. These findings were consistent with a study investigating the agreement between the TriTrac-R3D monitors (TTM) and youth recall of different intensities of physical activity (Cradock et al. 2003). No such association was found among parents of both girls and boys in terms of gender differences in over or under estimation of physical activity. The gender differences observed in over and under reporting of physical activity and sedentary behaviour have important implications. Health promotion efforts should be gender specific, perhaps separating female and male students in health education classes so that female awareness and participation in physical activity can be increased. Also, inclusion of physical activities that may be more appealing to girls (e.g., dancing classes, gymnastics) may lead to increased participation. Furthermore, parents should be made aware of the differences in female and male physical activity reporting and activity levels. If parents are aware that females are less active than the child believes, then parents can focus more on ensuring their female children are more active and less sedentary when at home.

#### 4.4.2 Age

Significant correlations were found between the child's physical activity levels and age. Sedentary behaviour was also seen to increase as age increased. A positive correlation ( $r = .30$ ) was found between overestimation of moderate activity and age. Similarly, the older the child, the more likely he/she was to underestimate sedentary activity ( $r = -.30$ ). However, the current study was conducted on a narrow age range (10 to 13 years old). It is recommended that a broader age distribution be used in order to fully understand the implications of age on child physical activity awareness.

#### 4.4.3 BMI

In the present study, no significant association was found between degree of over or under estimation and BMI. Corder et al. (2010) also examined the association between biological factors such as fat mass index and awareness of physical activity in children and their parents. The authors found no significant association between BMI and degree of over or underestimation among children. However, parents of children with a low fat mass index were more likely to overestimate child physical activity in the study by Corder et al. (2010). In the present study, no such association between BMI and parental awareness of their child's physical activity and sedentary behaviour was observed. Hence, the child's BMI was not associated with levels of awareness among parents and children. Parents and children lacked awareness irrespective of child's BMI and obesity status.

## Chapter 5

### 5 Conclusion

Assessment of awareness of physical activity was considered important since misperception of one's physical activity may act as a barrier to behaviour change interventions: it may lead to people not seeing the need to change and having a low intention to change. In addition, individuals who perceive themselves to be sufficiently active, may be "overlooked or neglected in health promotion efforts as these commonly target self-rated inactive populations" (van Sluijs, et al., 2007, p. 2). When considering awareness of child physical activity, parents are observed as the central agents of change in promotion of healthy behaviours, thus, lack of awareness among parents may act as a barrier to such behaviour change (Corder et al., 2010).

The primary objective of this study was to assess awareness of physical activity and sedentary behaviour among children and their parents by comparing subjective (i.e., self-report) and objective (i.e., accelerometer) measures. A secondary objective was to compare differences among parent and child levels of awareness and examine biological factors (i.e., gender, age, BMI) associated with levels of awareness in the study population. In terms of the primary objective, the majority of the children and their parents overestimated the child's physical activity and therefore both lacked awareness of the child's daily physical activity. On the other hand, sedentary activity was greatly underestimated by both parents and their children. Although children demonstrated similar misperceptions of their activity levels and sedentary behavior, the lack of awareness among parents is alarming since parents are viewed as the central agents of change in health promotion efforts. Parents usually serve as a safety net for child health related behaviours, such as determining what to eat, and encouraging physical activity. However, if parents fail to recognize their child's unhealthy behaviour as a problem, it is highly unlikely that the parent will proactively attempt to change that behaviour. Accurate parental perceptions and acknowledgment of unhealthy behaviour in children (such as lack of physical activity, excessive sedentary lifestyle) serve as important factors in determining the success of pediatric obesity interventions (Rhee, DeLago, Arcscott-



Mills, Mehta, & Davis, 2005). Parents who incorrectly perceive their child to be healthy and sufficiently active are likely to believe that obesity interventions or health promotion interventions are targeted towards other audiences. Thus, lack of awareness among both parents and their children may serve as a hindrance to health promotion strategies.

## 5.1 Limitations of the Study

Because this study aimed to include weekend activity, self-reporting had to be recalled for the previous day and then, after three days of physical activity (i.e. previous day recall for physical activity and sedentary behaviour on Friday, and 3-day physical activity recall [for Friday, Saturday and Sunday] on Monday). A delay of more than 24 hours in recall duration may provide less accurate results (Sallis, et al., 1993). Thus, a method to incorporate weekend activity while guaranteeing that reporting is done daily would further enhance the results of this study. Similarly, the fact that activity was first reported on Friday and then on Monday adds a degree of inconsistency in reporting which may have skewed results (i.e. results on Friday may be more accurate than results on Monday). However, this potential bias was ruled out since significant differences were not observed between awareness levels reported on Friday morning compared to Monday morning by both parents and children. Similar lack of awareness was observed between Friday morning and Monday morning.

Another limitation is that the results cannot be generalized since the study sample was comprised of mainly Canadian born South Asian children and immigrant parents ( $n = 47$ , 88%). The results of the present study reflect on the physical activity and awareness levels of Canadian born South Asian children and their parents, whereas, a study on more diverse ethnic samples may reveal different results. It is a possibility that Canadian children and parents of south Asian descent may lack awareness of child physical activity and sedentary behaviour to a larger extent compared to study samples of other ethnicities. For example, studies conducted on physical activity levels among different groups (including South Asians) in UK and Canada have consistently demonstrated lower PA levels among South Asians compared to the general population (Bryan, Tremblay, Perez, Ardern, & Katzmarzyk, 2006; Owen et al., 2009). Past research on awareness levels has been conducted primarily on white/Caucasian children and parents. Parents and children

in the current study lacked awareness to a larger extent compared to these previous studies (Corder et al., 2010; Kremers et al., 2008; Ronda et al., 2001; van Sluijs et al., 2007). Since Canada is largely recognized as a multiethnic country, further research exploring the effects of ethnicity and culture is required to effectively promote and implement health-related programs (Kobayashi, Prus, & Lin, 2008). Strategies to promote and increase physical activity should consider the effect of ethnicity and culture on physical activity levels and related perceptions (Bryan, Tremblay, Perez, Ardern, & Katzmarzyk, 2006; Owen et al., 2006; Tremblay, Bryan, Perez, Ardern & Katzmarzyk, 2006).

Lastly, time spent in light activity was not taken into account in the present study. Children may have misclassified light activity as either moderate or vigorous activity. A future study involving light activity may determine whether inclusion of light activity may demonstrate increased levels of awareness among children and parents.

## 5.2 Implications

Several suggestions can be made to increase awareness of physical activity and sedentary behaviour among children and their parents. With regards to improving PA awareness, Bentley and colleagues (2012) advocate to incorporate knowledge and use of tools to monitor PA in interventions. This may facilitate realistic perceptions among parents and children, and thus promote awareness. Self-monitoring and personalized feedback have been suggested as effective tools to increase levels of awareness (Bentley et al., 2012). If children can be provided with constant feedback on their behaviour, such as, employing an objective measure (e.g., pedometer), it may influence behaviour and consequently, increase awareness (van Sluijs et al., 2007). Pedometers are reported to alter behaviour and increase PA levels and hence, may also be an effective strategy to increase awareness (van Sluijs et al., 2007).

In addition, several factors such as recall of duration and intensity need to be kept in mind as these may hinder accurate reporting of a child's physical activity. Recall of duration of physical activity has shown to be enhanced by segmenting the day, allowing activities to be reported in the context within which they have been performed (Ridley,

Olds, & Hill, 2008). This refers to the use of daily landmarks (i.e. school break for weekdays, meal times for non-school days, play, and TV programs) which have been shown to improve recall of physical activity among children (Ridley, et al., 2008; McKenna, et al., 2004). Since children have also demonstrated consistent difficulty in estimating intensity of their physical activity, the use of videos (e.g., videos of children engaged in activities of varying intensities) has been reported to be effective in helping children understand the concept of intensity (Ridley, et al., 2008). The use of a computerized self-report questionnaire such as the Multimedia activity recall for children and adolescents (MARCA) may assist children with improving recall and understanding intensity, thus leading to increased awareness of their physical activity. In addition, the use of heart rate monitors by children during gym sessions, after school physical activity programs and active play may also provide children with a picture of the intensity at which physical activity was performed.

In terms of improving parental awareness, parental education and involvement may serve to increase awareness of child physical activity and sedentary behaviours. Educating parents about the varying types and intensities of physical activity accumulated by children should form an important component in a parenting PA intervention. One way to achieve this could be by increasing parental self-participation in child PA leading to increased awareness of the child's physical activity accumulation. For example, parents and children attending a gym session together could be instructed to perform activities at varying intensities. If they are unable to differentiate among the various intensities of physical activity, they should be educated regarding the different intensities. The use of heart rate monitors may aid parents and children in identifying activities performed at different intensities throughout the day. Heart rate monitors are low-cost and have the ability to indirectly assess intensity, frequency and duration of physical activity (Loprinzi & Cardinal, 2011). Thus, children can be encouraged to wear heart rate monitors as part of the intervention to promote awareness among parents and children. Heart rate monitors can provide parents and children with real time data at the end of the day and therefore, improve overall awareness. This may also encourage both parent and child to achieve recommended levels and more awareness of their physical activity and sedentary behaviour. Also, as mentioned earlier, incorporating knowledge

(e.g. differentiating between types and intensities of physical activity accumulated by children etc.) and tools to monitor PA may facilitate realistic perceptions among parents and ultimately improve awareness (Bentley et al., 2012). Use of pedometers or an objective measure providing feedback may also help parents quantify their child's physical activity and may prove to be an effective strategy to improve parental awareness of their child's physical activity and sedentary behaviour.

Lastly, more work needs to be done to promote awareness of excessive sedentary behaviours among children and parents. Health promotion messages targeting child physical activity should also incorporate information emphasizing the deleterious effects of excessive sedentary behaviour on child health, distinct from the lack of MVPA. Increased awareness of the deleterious effects of excessive sedentary behaviour among parents and children may encourage them to adopt measures to reduce the time spent being sedentary. Even if children attain the 60 minutes of MVPA/day, they are still left with the rest of their "waking hours" to engage in other activities such as self-care, homework, and leisure activities/free time. It is essential to target this "free time" and ensure children do not partake in sedentary activity for prolonged periods of time. However, to initiate such behaviour change, parents and children first need to be aware of their child's engagement in sedentary behaviour. Thus, public health promotion efforts should also focus on promoting awareness of child sedentary behaviour among parents and children.

Despite the cross-sectional findings and limitations of the present study, the results offer new insights for future intervention research. To my knowledge, no previous study has simultaneously assessed children's awareness of their physical activity along with their sedentary behaviour and parents' awareness of their child's physical activity level and sedentary behaviour using directly comparable subjective and objective data. Corder et al. (2010) assessed awareness of physical activity levels in a sample of British school children and their parents. However, the subjective and the objective data were not directly comparable and awareness of sedentary behaviour was not taken into account. The present study highlighted the inability of parents and children to classify and report activities based on intensities, and thus questioning how physical activity promotion

strategies may be perceived by both parents and children. For instance, a parent-oriented TV commercial highlighting the current physical activity guidelines for children (i.e., accumulation of at least 60 minutes of MVPA each day, constituting vigorous intensity activity at least 3 days per week) may not be accurately perceived since the results of this study demonstrated that parents were unable to differentiate between intensities. In the present study, parents greatly overestimated the accumulation of vigorous and moderate intensity physical activity by their children and assumed their children to be more active than they actually were. Also, parents drastically underestimated their children's engagement in sedentary behaviours. Parents demonstrated a consistent lack of awareness of their child's physical activity levels and sedentary behaviour irrespective of child obesity status. Future research should focus on how to effectively measure (both physical activity and sedentary behaviour) and increase awareness levels among parents and children. Future work should assess the effect of feedback, parental participation and education on awareness and behaviour and whether these are effective strategies to raise awareness among parents and children. Further work also needs to be done to examine the potential factors that may affect and improve levels of awareness.

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## Appendices

### **Appendix A: Invitation Letter**

#### **Awareness of child physical activity levels and sedentary behaviour among parents and children**

Your school is being invited to participate in a research study conducted by Master's Student Tripat Grewal from the School of Kinesiology at the Western University. If you have any questions or concerns about the research, please feel free to contact Dr. Alan Salmoni or Tripat Grewal.

#### **Purpose of the study**

The purpose of the study is to:

- \* assess awareness of child physical activity levels and sedentary behaviour (e.g., watching TV/movies, playing video/computer games, surfing the internet, reading and homework etc.) among parents and their children aged 10-13 years.
- \* investigate any difference between parent and child reports of child's physical activity levels and sedentary behaviour.

#### **Procedures**

Participation in this study involves a questionnaire to be filled by both the parents and grades 6-7 students (10-13 years) enrolled in your school. Involvement also requests a physiological measure and physical activity measure of the student.

#### **Questionnaire**

The questionnaire for the child will take place via 2 sessions conducted in the classroom at times when the administration decides are convenient and will take approximately 15-20 minutes. The investigator will be available at all times to answer any questions that the students may have pertaining to the questionnaires. Students will also be provided with a take-home packet (containing Actical accelerometer, parent questionnaire and activity monitor diary) during the first visit by the investigator.

**Physiological Measure**

This will take approximately 5-10 minutes to complete and will be taken on the first day of data collection at the school. This involves a non-invasive Body Mass Index (BMI) calculation, which is based on the height and weight of the student. The measurements will be taken in a private location in the school away from the sight of other students.

**Physical Activity**

To obtain a physical activity and energy expenditure measures, an Actical® (a small, lightweight, water resistant accelerometer worn on the right hip) will be worn by the students included in the study for a period of 4 days (i.e., for a minimum of ten hours per day). The student will be asked to keep an activity monitor diary at home (provided by the researcher) whereby the type of activity child engaged in should be recorded.

**Feedback from the study**

You may request the general findings of this research after the study is complete. If you have any concerns, please feel free to contact the researchers above.

**Potential risks and discomforts**

There are no known or anticipated risks associated with participation in this study.

**Benefits**

Potential benefits of participating in this study are increased awareness regarding physical activity among children aged 10-13 years of age and may also provide an insight into the health culture of your school.

**Compensation for participation**

There is no compensation for participating in this study.

**Confidentiality**

All information that is obtained in connection with this study will remain confidential. All information obtained will be kept in a locked cabinet in the investigator's office and will be destroyed once the study is completed.

**Participation and withdrawal**

Participation in this study is voluntary. The students may refuse to answer any questions they do not want to answer or can withdraw from the study at any time.

*If you would like your school to be participate in this study, please contact the researchers above. We would like to arrange a meeting to further explain the nature of the study.*

## **Appendix B: Information Leaflet (Class Teacher)**

### **Awareness of child physical activity levels and sedentary behaviour among parents and children**

Your school has agreed to participate in a research study conducted by Master's Student Tripat Grewal from the School of Kinesiology at the Western University. If you have any questions or concerns about the research, please feel free to contact Dr. Alan Salmoni or Tripat Grewal.

#### **Purpose of the study**

The purpose of the study is to:

- \* assess awareness of child physical activity levels and sedentary behaviour (e.g., watching TV/movies, playing video/computer games, surfing the internet, reading and homework etc.) among parents and their children aged 10-13 years.
- \* investigate any difference between parent and child reports of child's physical activity levels and sedentary behaviour.

#### **Procedures**

Participation in this study involves a questionnaire to be filled by both the parents and grades 6/7 students (10-13 years) enrolled in your class. Involvement also requests a physiological measure and physical activity measure of the student. A week before the data collection, the researcher will provide the students of your class a take-home pack containing a leaflet for themselves and their parent/guardians, and a consent form. A few days prior to the data collection, you are requested to reinforce the message to your students that they will not be able to participate without completed consent.

#### **Questionnaire**

The questionnaire for the child will take place via 2 sessions conducted in the classroom at times when the administration decides are convenient and will take approximately 15-20 minutes. The researcher will be available at all times to answer any questions that the students may have pertaining to the questionnaires. Students will also be provided with a

take-home packet (containing Actical accelerometer, parent questionnaire and activity monitor diary) during the first visit by the researcher.

### **Physiological Measure**

This will take approximately 5-10 minutes to complete and will be taken on the first day of data collection at the school. This involves a non-invasive Body Mass Index (BMI) calculation, which is based on the height and weight of the student. The measurements will be taken in a private location in the school away from the sight of other students.

### **Physical Activity**

To obtain a physical activity and energy expenditure measures, an Actical® (a small, lightweight, water resistant accelerometer worn on the right hip) will be worn by the students included in the study for a period of 4 days (i.e., for a minimum of ten hours per day). The student will be asked to keep an activity monitor diary at home (provided by the researcher) whereby the time when the accelerometer was worn and taken off should be recorded.

### **Feedback from the study**

The school administration may request the general findings of this research after the study is complete. If you have any concerns, please feel free to contact the researchers above.

### **Potential risks and discomforts**

There are no known or anticipated risks associated with participation in this study.

### **Benefits**

Potential benefits of participating in this study are increased awareness regarding physical activity among children aged 10-13 years of age and may also provide an insight into the health culture of your school.

### **Compensation for participation**

There is no compensation for participating in this study.

**Confidentiality**

All information that is obtained in connection with this study will remain confidential. All information obtained will be kept in a locked cabinet in the researcher's office and will be destroyed once the study is completed.

**Participation and withdrawal**

Participation in this study is voluntary. The students may refuse to answer any questions they do not want to answer or can withdraw from the study at any time.

*Thank you for your time and consideration!*

## **Appendix C: Parent/Guardian Letter of Information**

### **Awareness of child physical activity levels and sedentary behaviour among parents and children**

My colleagues and I, at the Western University, are writing to request permission for your child's participation in a research study that we are conducting on the awareness of child physical activity levels and sedentary behaviour among parents and children.

#### **Purpose of the study**

The purpose of the study is to:

- \* assess awareness of child physical activity levels and sedentary behaviour (e.g., watching TV/movies, playing video/computer games, surfing the internet, reading and homework etc.) among parents and their children aged 10-13 years.
- \* investigate any difference between parent and child reports of child's physical activity levels and sedentary behaviour.

#### **Procedures**

Participation in this study involves a questionnaire by both the parent and child. Involvement also requests a physiological measure and physical activity measure of the child.

#### **Questionnaire**

The questionnaire for the child will take place via 2 sessions conducted in the classroom at times your child's teacher decides are convenient and will take approximately 15-20 minutes. The investigator will be available at all times to answer any questions that your child may have pertaining to the questionnaires. You will be asked to complete your version of the questionnaire on Thursday and Sunday night regarding the child's activities on Thursday and collectively for Friday, Saturday and Sunday. The questionnaire will request that you and your child each report on the physical activities and inactivity of the child. We will also ask your child to report on parental supervision.



**Physiological Measure**

This will take approximately 5-10 minutes to complete and will be taken on the first day of data collection at the school. This involves a non-invasive Body Mass Index (BMI) calculation, which is based on the height and weight of the student. The measurements will be taken in a private location in the school away from the sight of other students.

**Physical Activity**

To obtain a physical activity and energy expenditure measures for your child, an Actical® (a small, lightweight, water resistant accelerometer worn on the right hip) will be worn by your child for a period of 4 days (i.e., for a minimum of ten hours per day). You may also be contacted via the telephone routinely for physical activity measurements (i.e., to ask your child to wear the Actical®) for a period of 4 days. Your child will be asked to keep an activity monitor diary at home (provided by the researcher) whereby the type of activity your child engaged in should be recorded by the child. These logs will take approximately 2-3 minutes to complete each day. This log will be utilized for validating the collected physical activity data and the child will be requested to return the log at the last day of data collection.

**Feedback from the study**

You may request the general findings of this research after the study is complete. If you have any concerns, please feel free to contact the researchers above.

**Potential risks and discomforts**

There are no known or anticipated risks associated with participation in this study.

**Benefits**

Potential benefits of participating in this study are increased awareness regarding physical activity among children aged 10-13 years of age.

**Compensation for participation**

There is no compensation for participating in this study.

**Confidentiality**

All information that is obtained in connection with this study will remain confidential. All information obtained will be kept in a locked cabinet in the investigator's office and will be destroyed once the study is completed. Representatives of The University of Western Ontario Health Sciences Research Ethics Board may contact you or require access to your study-related records to monitor the conduct of the research.

**Participation and withdrawal**

Participation in this study is voluntary. You and your child may refuse to answer any questions you or they do not want to answer or withdraw from the study at any time.

**Rights of subjects**

If you have any questions or concerns about the research, please feel free to contact Dr. Alan Salmoni or Tripat Grewal.

If you have questions regarding your rights as a research subject, contact the Office of Research Ethics at Western University.

Thank you for your consideration. Please fill out the attached form and have your son or daughter return it to his or her teacher.



### Parent/Guardian Letter of Information (Punjabi Translation)

ਵੈਸਟਰਨ ਯੂਨੀਵਰਸਿਟੀ ਤੋਂ ਮੈਂ ਅਤੇ ਮੇਰੇ ਸਾਥੀ ਤੁਹਾਡੇ ਕੋਲੋਂ ਆਗਿਆ ਲੈਣ ਲਈ ਲਿਖ ਰਹੇ ਹਾਂ ਕਿ ਤੁਹਾਡਾ ਬਚਾ ਸਾਡੀ ਖੋਜ ਵਿਚ ਸ਼ਾਮਿਲ ਹੋਵੇ। ਸਾਡੀ ਖੋਜ ਦਾ ਵਿਸ਼ਾ ਬਚੇ ਅਤੇ ਮਾਪਿਆਂ ਦੀ, ਬਚਿਆਂ ਦੀ ਸਰੀਰਕ ਗਤੀਵਿਧੀ ਅਤੇ ਬੈਠਣ ਦੇ ਸੁਭਾਅ ਪ੍ਰਤੀ ਜਾਗਰੂਕਤਾ ਦੇ ਨਾਲ ਸੰਬੰਧਿਤ ਹੈ।

ਖੋਜ ਦੇ ਉਦੇਸ਼:

- ਬਚੇ ਦੀ ਸਰੀਰਕ ਗਤੀਵਿਧੀ ਅਤੇ ਬੈਠਣ ਦੇ ਸੁਭਾਅ {ਜਿਵੇਂ ਕਿ ਬੈਠ ਕੇ ਟੀਵੀ ਵੇਖਣਾ, ਕੰਪਿਊਟਰ ਤੇ ਬੈਠਣਾ, ਵੀਡੀਓ ਗੇਮਸ, ਇੰਟਰਨੈਟ ਤੇ ਬੈਠਣਾ, ਪੜ੍ਹਣਾ, ਹੋਮਵਰਕ ਆਦਿ} ਦੇ ਪਧਰ ਬਾਰੇ ਮਾਪਿਆਂ ਅਤੇ 10-13 ਸਾਲ ਦੇ ਬਚਿਆਂ ਦੇ ਵਿਚ ਜਾਗਰੂਕਤਾ ਦਾ ਅੰਦਾਜ਼ਾ ਲਗਾਉਣਾ

- ਮਾਪਿਆਂ ਅਤੇ ਬਚਿਆਂ ਦੀ ਬਚੇ ਦੀ ਸਰੀਰਕ ਗਤੀਵਿਧੀ ਦੇ ਪਧਰ ਅਤੇ ਬੈਠਣ ਦੇ ਸੁਭਾਅ ਦੀ ਰਿਪੋਰਟ ਵਿਚ ਫਰਕ ਦੀ ਜਾਂਚ

ਖੋਜ ਦੇ ਤਰੀਕੇ:

ਇਸ ਜਾਂਚ ਦੀ ਹਿਸੇਦਾਰੀ ਵਿਚ ਮਾਪਿਆਂ ਅਤੇ ਬਚਿਆਂ ਲਈ ਕੁਛ ਸਵਾਲਾਂ ਦੇ ਜਵਾਬ ਦੇਣੇ ਸ਼ਾਮਿਲ ਹੈ। ਇਸ ਤੋਂ ਇਲਾਵਾ ਇਸ ਵਿਚ ਸਰੀਰਕ ਮਿਣਤੀ ਅਤੇ ਸਰੀਰਕ ਗਤੀਵਿਧੀ ਦੀ ਮਿਣਤੀ ਵੀ ਸ਼ਾਮਿਲ ਹੈ।

ਪ੍ਰਸ਼ਨਾਵਲੀ:

ਬਚੇ ਦੇ ਸੰਬੰਧਿਤ ਪ੍ਰਸ਼ਨਾਵਲੀ ਉਸ ਦੇ ਕਲਾਸਰੂਮ ਵਿਚ ਬਚੇ ਅਤੇ ਅਧਿਆਪਕ ਦੀ ਸਹੂਲਤ ਨੂੰ ਮੁਖ ਰਖਦੇ ਹੋਏ ਦੇ ਬੈਠਕਾਂ ਵਿਚ ਪੂਰੀ ਹੋਵੇਗੀ। ਇਸ ਨੂੰ ਲਗਭਗ 15-20 ਮਿੰਟ ਦਾ ਸਮਾਂ ਲਗੇਗਾ। ਬਚੇ ਦੀ ਪ੍ਰਸ਼ਨਾਵਲੀ ਸੰਬੰਧਿਤ ਕੋਈ ਵੀ ਪੁਛਗਿਛ ਲਈ ਹਰ ਵਕਤ ਖੋਜ ਕਰਤਾ {ਤ੍ਰਿਪਤ ਸਿਮਰਨ ਕੋਰ} ਹਾਜ਼ਰ ਹੋਵਾਂਗੀ। ਮਾਪਿਆਂ ਨੇ ਸਵਾਲਾਂ ਦੇ ਜਵਾਬ ਸ਼ਨੀਵਾਰ ਅਤੇ ਐਤਵਾਰ ਦੀ ਰਾਤ ਨੂੰ ਦੇਣੇ ਹਨ। ਪ੍ਰਸ਼ਨਾਵਲੀ ਵਿਚ ਤੁਹਾਡੇ ਬਚੇ ਦੀ ਹਰ ਰੋਜ਼ ਦੀ ਸਰੀਰਕ ਗਤੀਵਿਧੀ ਅਤੇ ਬੈਠਣ ਦੇ ਸੁਭਾਅ {ਜਿਵੇਂ ਕਿ ਬੈਠ ਕੇ ਟੀਵੀ ਵੇਖਣਾ, ਕੰਪਿਊਟਰ ਤੇ ਬੈਠਣਾ, ਵੀਡੀਓ ਗੇਮਸ, ਇੰਟਰਨੈਟ ਤੇ ਬੈਠਣਾ, ਪੜ੍ਹਣਾ, ਹੋਮਵਰਕ ਆਦਿ} ਬਾਰੇ ਪ੍ਰਸ਼ਨ ਕੀਤੇ ਜਾਣਗੇ।

ਸਰੀਰਕ ਮਿਣਤੀ:

ਇਸ ਵਿਚ ਬਚੇ ਦਾ ਸਰੀਰਕ ਮਾਪ ਤੋਲ { ਲੰਬਾਈ, ਭਾਰ} ਮਿਣਿਆ ਜਾਵੇਗਾ ਜੋ ਕਿ ਸਕੂਲ ਦੇ ਇਕ ਅਲਗ ਕਮਰੇ ਵਿਚ ਕੀਤਾ ਜਾਵੇਗਾ। ਇਸ ਨੂੰ ਲਗਭਗ 5-10 ਮਿੰਟ ਦਾ ਸਮਾਂ ਲਗੇਗਾ ਅਤੇ ਇਹ ਆਂਕੜੇ ਖੋਜ ਦੇ ਪਹਿਲੇ ਦਿਨ ਹੀ ਸਕੂਲ ਵਿਚ ਪ੍ਰਾਪਤ ਕੀਤੇ ਜਾਣਗੇ।

ਸਰੀਰਕ ਗਤੀਵਿਧੀ:

ਬਚੇ ਦੀ ਸਰੀਰਕ ਗਤੀਵਿਧੀ ਅਤੇ ਉਸ ਨਾਲ ਸੰਬੰਧਿਤ ਕਿਨੀ ਊਰਜਾ, ਸ਼ਕਤੀ ਖਰਚ ਹੋਈ ਦੀ ਮਿਣਤੀ ਕਰਨ ਲਈ ਇਕ ਯੰਤਰ Actical {ਬਹੁਤ ਹੀ ਛੋਟਾ, ਨਾ ਮਾਤਰ ਭਾਰ ਦਾ ਅਭਿਜ ਯੰਤਰ} ਚਾਰ ਦਿਨਾਂ ਲਈ ਬਚੇ ਦੇ ਲਕ ਦੇ ਸਜੇ ਪਾਸੇ ਬੈਲਟ ਨਾਲ ਲਗਾਇਆ ਜਾਵੇਗਾ {ਜੇ ਕਿ ਘਟ ਤੋਂ ਘਟ ਦਸ ਘੰਟੇ ਲਈ ਪਹਿਨਣਾ ਜ਼ਰੂਰੀ ਹੈ}। ਬਚੇ ਦੇ ਮਾਪੇ ਇਸ ਯੰਤਰ ਯਾ ਕਿਸੀ ਵੀ ਪ੍ਰਸ਼ਨ ਦੇ ਸੰਬੰਧੀ ਮੇਰੇ ਨਾਲ ਟੈਲੀਫੋਨ ਤੇ ਸੰਪਰਕ ਕਰ ਸਕਦੇ ਹਨ। ਬਚਿਆਂ ਨੂੰ ਇਸ ਦੌਰਾਨ ਇਕ ਗਤੀਵਿਧੀ ਡਾਇਰੀ ਵੀ ਦਿਤੀ ਜਾਵੇਗੀ ਜਿਸ ਵਿਚ ਉਹ ਆਪਣੀ ਰੋਜ਼ਾਨਾ ਦੀ ਭਿੰਨ ਭਿੰਨ ਤਰਹ ਦੀ ਸਰੀਰਕ ਗਤੀਵਿਧੀ ਦੇ ਬਾਰੇ ਰਿਪੋਰਟ ਕਰਨਗੇ। ਇਸ ਨੂੰ ਲਗਭਗ 2-3 ਮਿੰਟ ਦਾ ਸਮਾਂ ਲਗੇਗਾ। ਇਸ ਡਾਇਰੀ ਦੀ ਵਰਤੋਂ ਇਕਤਰ ਕੀਤੇ ਗਏ ਅੰਕੜਿਆਂ ਦੀ ਭਰੋਸੇਯੋਗਤਾ ਦਾ ਵੇਰਵਾ ਕਰਨ ਲਈ ਕੀਤੀ ਜਾਵੇਗੀ। ਅੰਕੜਿਆਂ ਦੀ ਇਕਤਰਤਾ ਦੇ ਆਖਰੀ ਦਿਨ ਬਚਾ ਇਸ ਡਾਇਰੀ ਨੂੰ ਵਾਪਸ ਕਰੇਗਾ।

ਅਧਿਐਨ ਦੀ ਜਾਣਕਾਰੀ:

ਇਸ ਖੋਜ ਨਾਲ ਸੰਬੰਧਿਤ ਨਤੀਜਿਆਂ ਦੀ ਜਾਣਕਾਰੀ ਬਚੇ ਅਤੇ ਮਾਪੇ ਖੋਜ ਦੇ ਮੇਕੰਮਲ ਹੋਣ ਉਪਰੰਤ, ਉਪਰ ਲਿਖੇ ਖੋਜ ਕਰਤਾ {ਤ੍ਰਿਪਤ ਸਿਮਰਨ ਕੌਰ} ਤੋਂ ਲੈ ਸਕਦੇ ਹਨ। ਇਸ ਖੋਜ ਸੰਬੰਧਿਤ ਕਿਸੇ ਵੀ ਚਿੰਤਾ ਨੂੰ ਲੈ ਕੇ, ਖੋਜ ਕਰਤਾ ਨੂੰ ਬੇਝਿਜਕ ਸੰਪਰਕ ਕੀਤਾ ਜਾ ਸਕਦਾ ਹੈ।

ਸੰਬੰਧਿਤ ਖਤਰੇ ਅਤੇ ਬੇਅਰਾਮੀਆਂ:

ਅਜ ਦੀ ਤਰੀਕ ਵਿਚ ਜਾਂ ਭਵਿਖ ਵਿਚ ਇਸ ਖੋਜ ਨਾਲ ਸੰਬੰਧਿਤ ਕੋਈ ਵੀ ਖਤਰਾ ਨਹੀਂ ਪਾਇਆ ਗਇਆ ਹੈ ਅਤੇ ਨਾ ਹੀ ਉਮੀਦ ਕੀਤੀ ਜਾਂਦੀ ਹੈ।

ਫਾਇਦੇ:

ਇਸ ਅਧਿਐਨ ਵਿਚ ਭਾਗ ਲੈਣ ਵਾਲੇ 10-13 ਸਾਲ ਦੇ ਵਰਗ ਦੇ ਬਚਿਆਂ ਵਿਚ ਸਰੀਰਕ ਗਤੀਵਿਧੀ ਪ੍ਰਤੀ ਜਾਗਰੂਕਤਾ ਚ ਵਾਧਾ ਹੋਵੇਗਾ ਜੋ ਕਿ ਭਵਿਖ ਵਿਚ ਚੰਗੀ ਸਿਹਤ ਲਈ ਜ਼ਰੂਰੀ ਹੈ।

ਭਾਗ ਲੈਣ ਲਈ ਮੁਆਵਜ਼ਾ:

ਇਸ ਅਧਿਐਨ ਵਿਚ ਭਾਗ ਲੈਣ ਲਈ ਕੋਈ ਮੁਆਵਜ਼ਾ ਨਹੀਂ ਹੈ।

ਗੁਪਤ ਭੇਦ:

ਇਸ ਅਧਿਐਨ ਸੰਬੰਧਿਤ ਸਾਰੀ ਜਾਣਕਾਰੀ ਗੁਪਤ ਰਖੀ ਜਾਵੇਗੀ। ਇਹ ਸਾਰੀ ਜਾਣਕਾਰੀ ਖੋਜ ਕਰਤਾ ਦੇ ਕਮਰੇ ਵਿਚ ਬੰਦ ਹੋਵੇਗੀ ਅਤੇ ਅਧਿਐਨ ਮੁਕੰਮਲ ਹੋਣ ਉਪਰੰਤ ਖਤਮ ਕਰ ਦਿਤੀ ਜਾਵੇਗੀ। ਵੈਸਟਰਨ ਯੂਨੀਵਰਸਿਟੀ ਦੇ ਸਿਹਤ ਵਿਭਾਗ ਦੇ ਪ੍ਰਤੀਨਿਧ ਤੁਹਾਨੂੰ ਇਸ ਅਧਿਐਨ ਸੰਬੰਧਿਤ ਰਿਕੋਰਡ ਪ੍ਰਤੀ, ਇਸ ਖੋਜ ਨੂੰ ਸੁਚਾਰੂ ਤਰੀਕੇ ਨਾਲ ਚਲਾਉਣ ਲਈ, ਸੰਪਰਕ ਕਰ ਸਕਦੇ ਹਨ।

ਭਾਗੇਦਾਰੀ ਅਤੇ ਪਿਛੇ ਹਟਣਾ:

ਇਸ ਅਧਿਐਨ ਵਿਚ ਹਿਸਾ ਲੈਣ ਲਈ ਤੁਹਾਡੀ ਮਰਜ਼ੀ ਤੇ ਨਿਰਭਰ ਹੈ। ਤੁਸੀਂ ਅਤੇ ਤੁਹਾਡਾ ਬਚਾ ਕਿਸੇ ਵੀ ਸਵਾਲ ਦਾ ਜਵਾਬ, ਜੇ ਤੁਸੀਂ ਨਹੀਂ ਦੇਣਾ ਚਾਹੁਦੇ, ਦੇਣ ਤੋਂ ਇਨਕਾਰ ਕਰ ਸਕਦੇ ਹੋ।

ਹਿਸਾ ਲੈਣ ਵਾਲਿਆਂ ਦੇ ਅਧਿਕਾਰ:

ਜੇ ਤੁਹਾਨੂੰ ਇਸ ਖੋਜ ਸੰਬੰਧੀ ਕਿਸੇ ਵੀ ਤਰ੍ਹਾਂ ਦੇ ਪ੍ਰਸ਼ਨ ਯਾ ਚਿੰਤਾ ਹੈ, ਤਾਂ ਕਿਰਪਾ ਕਰਕੇ Dr. Alan Salmoni or Tripat Grewal ਨੂੰ ਸੰਪਰਕ ਕੀਤਾ ਜਾ ਸਕਦਾ ਹੈ।

ਜੇ ਤੁਹਾਨੂੰ ਇਸ ਖੋਜ ਸੰਬੰਧੀ ਆਪਣੇ ਅਧਿਕਾਰਾਂ ਬਾਰੇ ਕੋਈ ਵੀ ਸਵਾਲ ਹੋਵੇ ਤਾਂ ਕਿਰਪਾ ਕਰਕੇ Office of Research Ethics at Western University ਨਾਲ ਸੰਪਰਕ ਕਰ ਸਕਦੇ ਹੋ।

ਧੰਨਵਾਦ

## **Appendix D: Child Assent Form**

### **Awareness of child physical activity levels and sedentary behaviour among parents and children**

#### **Purpose of the Study**

We would like to invite you to participate in a study in which you will tell us the time you spend in physical activities and being inactive during the day.

#### **What will happen once you sign up for this study?**

- I will measure your weight and height.
- You will be asked to wear an Actical® which is a way for researchers to see how much energy your body uses each day. You will need to wear the Actical® (which is a small, light, and waterproof) on your right hip for at least ten hours a day (for 4 days straight).
- You will also be asked to fill out a questionnaire on two weekdays (Friday and Monday morning) asking you about your physical activity and inactivity on Thursday and collectively on Friday, Saturday and Sunday. You will also be asked about when your parent is home. This will take about 5-10 minutes to complete.

#### **Confidentiality**

I want you to know that I will not be telling your parents or any other kids what you answer. I will keep your answers private and not tell anyone.

#### **Participation**

You can ask questions at any time, now or later. Your mom and/or dad have said it is okay for you to wear the Actical® and tell me about your physical activities. Do you think you want to do this? You won't get into trouble if you say "no". If you don't want to be in the study, just say so, and even if you say yes now, you can still change your mind later. You don't have to answer any questions that you do not want to answer. It is entirely up to you. Would you like to be a part of this study?

Yes                       No  (If no, please do not sign below)

I understand what I am being asked to do to be in this study, and I agree to be in this study.

\_\_\_\_\_  
Signature Date

\_\_\_\_\_  
Person obtaining consent (Signature) Name Date



## Appendix E: Modified SHAPES Questionnaire for Children

### CHILD QUESTIONNAIRE

We are interested to know what you do on a regular day. There are no right or wrong answers-**this is not a test**. Please answer all the questions as honestly and accurately as you can-this is very important.

1. NAME \_\_\_\_\_
2. What grade are you in? \_\_\_\_\_
3. How old are you? \_\_\_\_\_
4. Are you a Girl or a Boy? \_\_\_\_\_

#### DAY 1 (to be filled out in class on Friday):

PLEASE FILL OUT THE QUESTIONS BELOW:

- ❖ **Mark how many minutes of HARD physical activity you did yesterday (THURSDAY). This includes physical activity during physical education class, after school, evenings and spare time.**

**HARD** physical activities are running, team sports (like hockey, football), fast dancing, jump rope and any other physical activities that increase your heart rate and make you breathe hard or sweat.

For example: if you did 45 minutes of hard activity yesterday, you will need to fill in the 0 hour circle and the 45 minute circle, as shown below:

<b>Hours</b>				
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
0	1	2	3	4

<b>Minutes</b>			
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
0	15	30	45

THURSDAY

<b>Hours</b>				
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
0	1	2	3	4

<b>Minutes</b>			
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
0	15	30	45

- ❖ Mark how many minutes of **MODERATE** physical activity you did yesterday (THURSDAY). This includes physical activity during physical education class, after school, evenings and spare time.

**MODERATE** physical activities are lower intensity activities such as walking, leisure biking, and recreational swimming.

For example: if you did 1 hour and 15 minutes of moderate activity yesterday, you will need to fill in the 1 hour circle and the 15 minute circle, as shown below:

	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> <div style="text-align: center;">Hours</div> <div style="display: flex; justify-content: space-around;"> <input type="radio"/> 0           <input checked="" type="radio"/> 1           <input type="radio"/> 2           <input type="radio"/> 3           <input type="radio"/> 4         </div> </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> <div style="text-align: center;">Minutes</div> <div style="display: flex; justify-content: space-around;"> <input type="radio"/> 0           <input checked="" type="radio"/> 15           <input type="radio"/> 30           <input type="radio"/> 45         </div> </div>
THURSDAY	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> <div style="text-align: center;">Hours</div> <div style="display: flex; justify-content: space-around;"> <input type="radio"/> 0           <input type="radio"/> 1           <input type="radio"/> 2           <input type="radio"/> 3           <input type="radio"/> 4         </div> </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> <div style="text-align: center;">Minutes</div> <div style="display: flex; justify-content: space-around;"> <input type="radio"/> 0           <input type="radio"/> 15           <input type="radio"/> 30           <input type="radio"/> 45         </div> </div>

- ❖ Mark how much time you spent watching TV/movies, playing video/computer games, surfing the internet, instant messaging or talking on the phone yesterday (THURSDAY).

For example: if you spent 3 hours doing these activities yesterday, you would need to fill in the 3 hour circle, as shown below:

	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> <div style="display: flex; justify-content: space-around;"> <input type="radio"/> 0           <input type="radio"/> 1           <input type="radio"/> 2           <input checked="" type="radio"/> 3           <input type="radio"/> 4           <input type="radio"/> 5           <input type="radio"/> 6           <input type="radio"/> 7           <input type="radio"/> 8           <input type="radio"/> 9         </div> </div>
THURSDAY	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> <div style="display: flex; justify-content: space-around;"> <input type="radio"/> 0           <input type="radio"/> 1           <input type="radio"/> 2           <input type="radio"/> 3           <input type="radio"/> 4           <input type="radio"/> 5           <input type="radio"/> 6           <input type="radio"/> 7           <input type="radio"/> 8           <input type="radio"/> 9         </div> </div>

- ❖ How much time did you spend doing homework and reading (including reading books, magazines and newspapers) yesterday?

\_\_\_\_\_

- ❖ Which parent is present with you most of the time during the day?

❖ **Is that parent/guardian present most or all of the time when you:**

Leave for school                      Yes  No

Return from school in the afternoon                      Yes  No

Go to sleep at night                      Yes  No

**DAY 2 (TO BE FILLED OUT ON MONDAY MORNING):**

❖ **Mark how many minutes of HARD physical activity you did in the past 3 days i.e. FRIDAY, SATURDAY & SUNDAY. This includes physical activity during physical education class, after school, evenings and spare time.**

**HARD** physical activities are running, team sports (like hockey, football), fast dancing, jump rope and any other physical activities that increase your heart rate and make you breathe hard or sweat.

For example: if you did 45 minutes of hard activity yesterday, you will need to fill in the 0 hour circle and the 45 minute circle, as shown below:

**Hours**

0     1     2     3     4

**Minutes**

0     15     30     45

FRIDAY

**Hours**

0     1     2     3     4

**Minutes**

0     15     30     45

SATURDAY

**Hours**

0     1     2     3     4

**Minutes**

0     15     30     45

SUNDAY

**Hours**

0     1     2     3     4

**Minutes**

0     15     30     45

❖ Mark how many minutes of **MODERATE** physical activity you did in the past 3 days i.e. FRIDAY, SATURDAY & SUNDAY. This includes physical activity during physical education class, after school, evenings and spare time.

**MODERATE** physical activities are lower intensity activities such as walking, leisure biking, and recreational swimming.

For example: if you did 1 hour and 15 minutes of moderate activity yesterday, you will need to fill in the 1 hour circle and the 15 minute circle, as shown below:

	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">○ 0</div> <div style="text-align: center;">● 1</div> <div style="text-align: center;">○ 2</div> <div style="text-align: center;">○ 3</div> <div style="text-align: center;">○ 4</div> </div> <p style="margin-top: 5px; text-align: center;"><b>Hours</b></p>	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">○ 0</div> <div style="text-align: center;">● 15</div> <div style="text-align: center;">○ 30</div> <div style="text-align: center;">○ 45</div> </div> <p style="margin-top: 5px; text-align: center;"><b>Minutes</b></p>
FRIDAY	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">○ 0</div> <div style="text-align: center;">○ 1</div> <div style="text-align: center;">○ 2</div> <div style="text-align: center;">○ 3</div> <div style="text-align: center;">○ 4</div> </div> <p style="margin-top: 5px; text-align: center;"><b>Hours</b></p>	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">○ 0</div> <div style="text-align: center;">○ 15</div> <div style="text-align: center;">○ 30</div> <div style="text-align: center;">○ 45</div> </div> <p style="margin-top: 5px; text-align: center;"><b>Minutes</b></p>
SATURDAY	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">○ 0</div> <div style="text-align: center;">○ 1</div> <div style="text-align: center;">○ 2</div> <div style="text-align: center;">○ 3</div> <div style="text-align: center;">○ 4</div> </div> <p style="margin-top: 5px; text-align: center;"><b>Hours</b></p>	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">○ 0</div> <div style="text-align: center;">○ 15</div> <div style="text-align: center;">○ 30</div> <div style="text-align: center;">○ 45</div> </div> <p style="margin-top: 5px; text-align: center;"><b>Minutes</b></p>
SUNDAY	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">○ 0</div> <div style="text-align: center;">○ 1</div> <div style="text-align: center;">○ 2</div> <div style="text-align: center;">○ 3</div> <div style="text-align: center;">○ 4</div> </div> <p style="margin-top: 5px; text-align: center;"><b>Hours</b></p>	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">○ 0</div> <div style="text-align: center;">○ 15</div> <div style="text-align: center;">○ 30</div> <div style="text-align: center;">○ 45</div> </div> <p style="margin-top: 5px; text-align: center;"><b>Minutes</b></p>

❖ Mark how much time you spent watching TV/movies, playing video/computer games, surfing the internet, instant messaging or talking on the phone in the past 3 days i.e. FRIDAY, SATURDAY & SUNDAY.

For example: if you spent 3 hours doing these activities yesterday, you would need to fill in the 3 hour circle, as shown below:

○  
0

○  
1

○  
2

●  
3

○  
4

○  
5

○  
6

○  
7

○  
8

○  
9

FRIDAY

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
0	1	2	3	4	5	6	7	8	9

SATURDAY

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
0	1	2	3	4	5	6	7	8	9

SUNDAY

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
0	1	2	3	4	5	6	7	8	9

- ❖ How much time did you spend doing homework and reading (including reading books, magazines and newspapers) in the past 3 days i.e. FRIDAY, SATURDAY & SUNDAY?

---

Thank you very much for your participation 😊

## Appendix F: Modified SHAPES Questionnaire for Parents

**(IF YOU HAVE ANY CONCERNS/QUESTIONS IN REGARDS TO COMPLETING THE QUESTIONNAIRE, PLEASE DO NOT HESITATE TO CONTACT ME (TRIPAT) )**

1. GENDER \_\_\_\_\_
2. HOURS OF WORK \_\_\_\_\_

### DAY 1 (TO BE FILLED OUT ON THURSDAY NIGHT)

PLEASE FILL OUT THE QUESTIONS BELOW AT THE **END OF THURSDAY**:

- ❖ Mark how many minutes of **HARD** physical activity your child did today. This includes physical activity during physical education class, after school, evenings and spare time.

**HARD** physical activities are running, team sports (like hockey, football), fast dancing, jump rope and any other physical activities that increase your child's heart rate and make him/her breathe hard or sweat

For example: if your child did 45 minutes of hard activity on the 1<sup>st</sup> day, you will need to fill in the 0 hour circle and the 45 minute circle, as shown below:

<b>Hours</b>				
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
0	1	2	3	4

<b>Minutes</b>			
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
0	15	30	45

THURSDAY

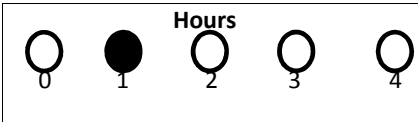
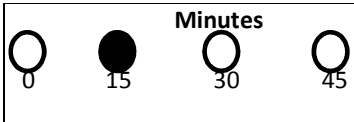

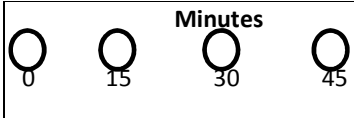
<b>Hours</b>				
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
0	1	2	3	4

<b>Minutes</b>			
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
0	15	30	45

- ❖ Mark how many minutes of **MODERATE** physical activity your child did today. This includes physical activity during physical education class, after school, evenings and spare time.

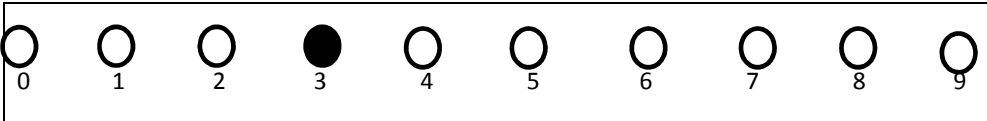
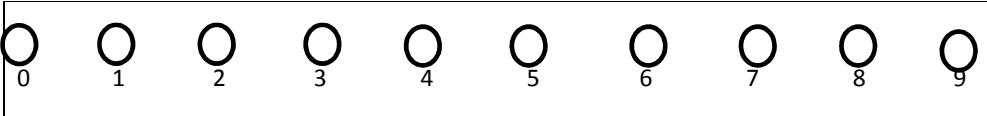
**MODERATE** physical activities are lower intensity activities such as walking, leisure biking, and recreational swimming.

For example: if your child did 1 hour and 15 minutes of hard activity on the 1<sup>st</sup> day, you will need to fill in the 1 hour circle and the 15 minute circle, as shown below:

		
THURSDAY		

❖ **Mark how much time your child spent watching TV/movies, playing video/computer games, surfing the internet, instant messaging or talking on the phone today.**

For example: if your child spent 3 hours doing these activities on the 1<sup>st</sup> day (i.e., Thursday), you would need to fill in the 3 hour circle, as shown below:

	
THURSDAY	

**How much time did your child spend doing homework and reading (including reading books, magazines and newspapers) today?** \_\_\_\_\_

## DAY 2 (TO BE FILLED OUT ON SUNDAY NIGHT)

- ❖ Mark how many minutes of **HARD** physical activity your child did in the past 3 days i.e. FRIDAY, SATURDAY, & SUNDAY. This includes physical activity during physical education class, after school, evenings and spare time.

**HARD** physical activities are running, team sports (like hockey, football), fast dancing, jump rope and any other physical activities that increase your child's heart rate and make him/her breathe hard or sweat

For example: if your child did 45 minutes of hard activity on the yesterday, you will need to fill in the 0 hour circle and the 45 minute circle, as shown below:

Hours				
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
0	1	2	3	4

Minutes			
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
0	15	30	45

FRIDAY	Hours				
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	0	1	2	3	4

FRIDAY	Minutes			
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	0	15	30	45

SATURDAY	Hours				
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	0	1	2	3	4

SATURDAY	Minutes			
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	0	15	30	45

SUNDAY	Hours				
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	0	1	2	3	4

SUNDAY	Minutes			
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	0	15	30	45

- ❖ Mark how many minutes of **MODERATE** physical activity your child did in the past 3 days i.e., FRIDAY, SATURDAY & SUNDAY. This includes physical activity during physical education class, after school, evenings and spare time.

**MODERATE** physical activities are lower intensity activities such as walking, leisure biking, and recreational swimming.



For example: if your child did 1 hour and 15 minutes of hard activity on the yesterday, you will need to fill in the 1 hour circle and the 15 minute circle, as shown below:

	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>Hours</p> <input type="radio"/> 0             <input checked="" type="radio"/> 1             <input type="radio"/> 2             <input type="radio"/> 3             <input type="radio"/> 4           </div> <div style="text-align: center;"> <p>Minutes</p> <input type="radio"/> 0             <input checked="" type="radio"/> 15             <input type="radio"/> 30             <input type="radio"/> 45           </div> </div>
FRIDAY	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>Hours</p> <input type="radio"/> 0             <input type="radio"/> 1             <input type="radio"/> 2             <input type="radio"/> 3             <input type="radio"/> 4           </div> <div style="text-align: center;"> <p>Minutes</p> <input type="radio"/> 0             <input type="radio"/> 15             <input type="radio"/> 30             <input type="radio"/> 45           </div> </div>
SATURDAY	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>Hours</p> <input type="radio"/> 0             <input type="radio"/> 1             <input type="radio"/> 2             <input type="radio"/> 3             <input type="radio"/> 4           </div> <div style="text-align: center;"> <p>Minutes</p> <input type="radio"/> 0             <input type="radio"/> 15             <input type="radio"/> 30             <input type="radio"/> 45           </div> </div>
SUNDAY	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>Hours</p> <input type="radio"/> 0             <input type="radio"/> 1             <input type="radio"/> 2             <input type="radio"/> 3             <input type="radio"/> 4           </div> <div style="text-align: center;"> <p>Minutes</p> <input type="radio"/> 0             <input type="radio"/> 15             <input type="radio"/> 30             <input type="radio"/> 45           </div> </div>

❖ **Mark how much time your child spent watching TV/movies, playing video/computer games, surfing the internet, instant messaging or talking on the phone in the past three day i.e. FRIDAY, SATURDAY & SUNDAY.**

For example: if your child spent 3 hours doing these activities on the yesterday, you would need to fill in the 3 hour circle, as shown below:

	<div style="display: flex; justify-content: space-around; align-items: center;"> <input type="radio"/> 0         <input type="radio"/> 1         <input type="radio"/> 2         <input checked="" type="radio"/> 3         <input type="radio"/> 4         <input type="radio"/> 5         <input type="radio"/> 6         <input type="radio"/> 7         <input type="radio"/> 8         <input type="radio"/> 9       </div>
FRIDAY	<div style="display: flex; justify-content: space-around; align-items: center;"> <input type="radio"/> 0         <input type="radio"/> 1         <input type="radio"/> 2         <input type="radio"/> 3         <input type="radio"/> 4         <input type="radio"/> 5         <input type="radio"/> 6         <input type="radio"/> 7         <input type="radio"/> 8         <input type="radio"/> 9       </div>
SATURDAY	<div style="display: flex; justify-content: space-around; align-items: center;"> <input type="radio"/> 0         <input type="radio"/> 1         <input type="radio"/> 2         <input type="radio"/> 3         <input type="radio"/> 4         <input type="radio"/> 5         <input type="radio"/> 6         <input type="radio"/> 7         <input type="radio"/> 8         <input type="radio"/> 9       </div>

SUNDAY

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
0	1	2	3	4	5	6	7	8	9

- ❖ How much time did your child spend doing homework and reading (including reading books, magazines and newspapers) in the past 3 days i.e., FRIDAY, SATURDAY & SUNDAY?

---

- ❖ Did you have trouble with English while completing this questionnaire? If yes, what was the trouble you face?

---

{IF YOU HAVE ANY CONCERNS/QUESTIONS IN REGARDS TO COMPLETING THE QUESTIONNAIRE, PLEASE DO NOT HESITATE TO CONTACT ME (TRIPAT) ,

.....}

Thank you very much for your participation 😊

## Appendix G: Ethics Form



### Use of Human Participants - Ethics Approval Notice

**Principal Investigator:** Dr. Alan Salmoni  
**File Number:**102453  
**Review Level:**Delegated  
**Approved Local Adult Participants:**0  
**Approved Local Minor Participants:**62  
**Protocol Title:**Awareness of physical activity levels and sedentary behavior among parents and children -19984E  
**Department & Institutions:**Health Sciences/Kinesiology, Western University  
**Sponsor:**  
**Ethics Approval Date:**April 25, 2012 **Expiry Date:**December 31, 2012  
**Documents Reviewed & Approved & Documents Received for Information:**

Document Name	Comments	Version Date
Western University Protocol		
Letter of Information & Consent	Parent/Guardian	2012/04/12
Assent		2012/04/12
Other	Invitation Letter	2012/04/12
Other	Information leaflet (Class teacher)	

This is to notify you that The University of Western Ontario Research Ethics Board for Health Sciences Research Involving Human Subjects (HSREB) which is organized and operates according to the Tri-Council Policy Statement A, Ethical Conduct of Research Involving Humans and the Health Canada/ICH Good Clinical Practice Practitioner Consolidated Guidelines; and the applicable laws and regulations of Ontario has reviewed and granted approval to the above referenced revision(s) or amendment(s) on the approval date noted above. The membership of this REB also complies with the membership requirements for REB's as defined in Division 5 of the Food and Drug Regulations.

The ethics approval for this study shall remain valid until the expiry date noted above assuming timely and acceptable responses to the HSREB's periodic requests for surveillance and monitoring information. If you require an updated approval notice prior to that time you must request it using the University of Western Ontario Updated Approval Request Form.

Members of the HSREB who are named as investigators in research studies, or declare a conflict of interest, do not participate in discussion related to, nor vote on, such studies when they are presented to the HSREB.

The Chair of the HSREB is Dr. Joseph Giber. The HSREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB4 0000940.

Sign

✓

Ethics Officer to Contact for Further Information

This is an official document. Please retain the original in your files.

The University of Western Ontario  
Office of Research Ethics

Support Services Building, Room E-50 • London, Ontario • CANADA - N6G 1G9  
P: 519-661-3036 • F: 519-850-2466 • ethics@uwo.ca • www.uwo.ca/research/ethics

## Curriculum Vitae

**Name:** Tripat Simran Grewal

**Post-secondary Education and Degrees:** Lyallpur Khalsa College  
Affiliated to Guru Nanak Dev University  
Amritsar, Punjab, India  
2005-2010 B.P.T

**Honours and Awards:** Western Graduate Research Scholarship (WGRS)  
2011-2012

**Related Work Experience**

Teaching Assistant  
The University of Western Ontario  
2011-2012

Research Assistant  
Kids Can-Bike Course Evaluation  
2011-2012

Summer Internship  
'NSTEP Eat, Walk, Live with Nutrition! Ignition!  
2011-2012