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SYSTEMATIC REVIEW

Correlates of Sedentary Behaviour in Children and Adolescents Aged 7-18: A Systematic Review

Cara Temmel[1] and Ryan Rhodes[1]

Abstract

Background and Purpose: Risks posed by sedentary behaviours, independent of physical activity, have become evident. This review includes the current literature on the correlates of sedentary behaviours among children and adolescents to inform future interventions for reducing sedentary behaviours. *Methods*: Search engine literature searches were conducted up to February 2012. Eligible papers were published in English in peer-reviewed journals, and examined correlates of sedentary behaviours in youth aged 7-18 yr. *Results*: A total of 188 samples were included. Sedentary behaviour was correlated to age, physical maturity, gender, ethnicity, socioeconomic status, location, week/weekend day, neighborhood satisfaction, access, emotional and physical health status, risk behaviors, family and social influences, physical activity, and nutrition. Significant differences by specific sedentary behaviors were present in the findings. *Conclusions*: Correlates differed by type of sedentary behaviour, suggesting this is a complex area of research that cannot be assessed simply as an absence of physical activity. Several factors seem to be reliably linked to sedentary behavior; however, evidence suggests that specific sedentary behaviours have opposing effects compared to sedentary behavior in general. Research focused on sedentary behaviour specific interventions appears necessary. **Health & Fitness Journal of Canada 2013;6(1):119-199.**

Keywords: Sedentary behaviour, Health, Systematic review

From the [1]Behavioural Medicine Laboratory, Faculty of Education, University of Victoria, PO Box 3010 STN CSC, Victoria BC, V8W 3N4 Canada. Email: bml@uvic.ca

Introduction

The evidence supporting the importance of physical activity for children has been widely researched and is well supported (Janssen and LeBlanc, 2010; O'Dea, 2003; Sothern et al., 1999). Regular physical activity is associated with decreased risk for cardiovascular illnesses and diabetes, as well as helping to control body weight and combat the obesity epidemic (Mokdad et al., 1999). The standard recommendations agreed upon by most nations regarding children's physical activity are to accumulate at least 60 minutes of moderate to vigorous physical activity each day (Salmonson et al., 1990a; Salmonson et al., 1990b; CDC, 2010).

Independent of physical activity there is a growing body of work that has begun to demonstrate that adverse health effects, such as cardiovascular risk factors, obesity, and negative psychosocial variables (Tremblay et al., 2011), may stem from prolonged time spent in sedentary behaviours. Recent literature has begun to examine specific sedentary behaviours (e.g., TV, computer, and video game use) with respect to demographic, social, and psychometric variables (Janssen and LeBlanc, 2010; Tremblay et al., 2011). For example, time spent on the computer may have a positive association with physical activity,

self-esteem, and academic achievement, while time spent watching television has an overall negative impact on these factors (Bagley et al., 2006; Barr-Anderson et al., 2010; Barr-Anderson et al., 2008; Biddle et al., 2009a). A recent outcome review conducted by Tremblay et al (2011) found that spending two or more hours a day watching television was positively associated with higher body weight, and lower fitness, self-esteem, and academic achievement (Tremblay et al., 2011).

In line with this emerging evidence, some narrative systematic reviews have begun to assess the correlates of sedentary behaviour in youth in order to create a platform for intervention. These have included reviews aiming their assessment of sedentary behaviours at children from birth to preschool (Cillero and Jago, 2010; Hinkley et al., 2010), reviews of selected studies (Dumith et al., 2010; Pan et al., 2008; Suter and Ruckstuhl, 2006), and populations (Clocksin et al., 2002; Dwyer et al., 2009; Sisson et al., 2010), or reviews focused on a single factor such as parental influences (Norton et al., 2003), nutrition(Pearson and Biddle, 2011) or a specific sedentary behaviour (Biddle et al., 2010; Marshall et al., 2004).

Objective

Although some reviews have assessed an aspect of sedentary behaviours in young people, there is still the need for a detailed overview of sedentary behaviour correlates in order to better prepare a template for targeted interventions. For example, in the adult sedentary literature, a recent systematic review showed that specific sedentary behaviours had select and often no correspondent correlates as well as highlighting where future research was needed due to a paucity of findings (Rhodes et al., 2012). To date, no reviews have assessed the variety of study designs, pan continental study samples, age group, or variety of correlates of sedentary behaviours assessed in this systematic review. Therefore, the purpose of this paper was to unite prior research on sedentary behaviour among youth aged seven to 18 years old. A socio-ecological framework (Brontenbrenner, 1979) was used as the organizing structure of the review based on demographic, behavioural personal/ psychological, interpersonal/ social, and environmental correlates of sedentary behaviours in order to create a cohesive platform on which to base future interventions.

Methods

Inclusion Criteria

Studies featuring a correlate or correlates of sedentary behaviours in children and adolescents aged 7-18 were included in this review. Papers had to be from peer-reviewed, English language journals.

Exclusion Criteria

Studies were excluded if they 1) examined children under age 7, adults over age 18, or clinical populations, 2) did not include at least one variable with respect to sedentary behaviour, defined as the complete absence of movement and light intensity physical activity (i.e., ≤1.5 METS) 3) did not include a measure of sedentary behaviour independent from physical activity, 4) were interventions, 5) were tests of reliability or validity of sedentary measurement tools, or 6) were tool development studies. Children under the age of seven were excluded from this review because several other reviews

have covered these age groups exhaustively (Cillero and Jago, 2010; Hinkley et al., 2010), as were studies of adults over the age of 18 (Rhodes et al., 2012). Clinical populations were not assessed both because other reviewers have completed comprehensive reviews of the topic (Dwyer et al., 2009), and because the results from a clinical population are difficult to disseminate over a healthy population. Further, nutrition with respect to sedentary behaviours was omitted from this review due to having been exhaustively covered in a review by Pearson & Biddle (2011)(Pearson and Biddle, 2011).

Data Sources

Database searches were performed in from June 2011 to February 2012. The online databases used were PsycINFO, CINAHL with Full Text, Database of Abstracts of Reviews of Effects, Health Source - Consumer Edition, Health Source: Nursing/Academic Edition, Health Technology Assessments, MEDLINE with Full Text, PsycARTICLES, and SPORTDiscus. All EBSCO database searches were performed simultaneously to avoid a significant number of duplicates being obtained. All searches were performed by an author (CT). Combinations of keywords were used, which included sedentary behaviour, youth, children, inactivity, screen time, television, music, cell phone, internet, and video game. This search was not restricted by publication date or study design. Manual cross-referencing of the reference lists was completed in order to access the full scope of the literature (Appendix A).

Study Selection

All citations found from the cumulative literature search were screened using the pre-determined inclusion criteria. Studies were initially screened based on their title and abstract. Relevant articles were then shortlisted and selected to be read in full, to determine if they met the inclusion criteria and could be included in the review.

Study Quality Assessment

Study quality/risk of bias was assessed for all studies using a checklist tool developed by our team (Rhodes et al., 2012), based on the Cochrane Collaboration's instrument assessing risk of bias (Higgins and Green, 2008). The instrument included seven questions answered with a yes (1) or a no (0) (For example: Was an objective measure of sedentary behaviour used? Was the study a randomized control sample?). High quality and low risk of bias was given a score of 5-7, moderate quality and bias was given a score of 2-4, and high risk of bias and low quality was given with score of 0 or 1 (Appendix B).

Data Extraction

A nine-item data abstraction table was used that included authors, year of publication, research design, participants, correlated measured, sedentary behaviour measured, general findings, study quality and location of study. After final scans of the findings, themes were developed based on the available studies and within the sociological framework. Findings present in three or more independent studies were considered a theme, based on the previous review done by Rhodes and colleagues (2012). Themes were evaluated using criteria previously used by Sallis et al. (2000).

This means that significance was acknowledged if >59% of studies supported a positive or negative association, while an indeterminate assessment was given if 34-59% of studies showed an association, and the results were considered moot if fewer than 34% of studies showed any association (Sallis et al., 2000).

Evidence Synthesis

Literature search and screening process details can be found in Figure 1. Initial database searches and manual check resulted in 1320 individual articles. Of these, 778 were excluded throughout the screening process (Figure 1). Overall, 226 papers with 188 individual articles passed the eligibility criteria to be included in the review (Table 1).

Study Characteristics

Of the 226 studies in this review, 38 were considered to be low risk of bias and high quality, and 188 were considered to be of moderate quality and bias. No included studies were considered to be highly biased or low quality. Papers included in this study were published between 1984 and 2011. Overall, the 188 independent articles represented a total of 2,860,507 participants with sample sizes ranging from 60 to 1,987,524. The ages of the participants ranged from 0-21 yr, although each study had to have its mean population age falling within the 7-18 yr age cut off. The majority of samples were from North America (n = 87), followed by Australia and New Zealand (n = 29), Continental Europe (n = 27), United Kingdom (n = 18), Asia (n = 14), South America (n = 3), The Middle East (n = 5), and Africa (n = 2). There were also three international samples drawn from multiple continents. Of the 188 samples included, 146 were cross sectional, 32 were longitudinal, seven were cohort studies and three were prospective studies.

Results

Demographics

Age

A total of 64 samples included an age variable as a correlate of sedentary behaviour. For the purposes of this correlate, children aged seven to ten will be referred to as children, those aged eleven to thirteen will be referred to as adolescents, and those aged fourteen to seventeen will be referred to as youth. Samples relating sedentary behaviour to age were based in cross sectional studied (n = 51), longitudinal (n = 11), and cohort (n = 2). Samples were based on populations from North America, Australia, New Zealand, Asia, and Europe, as well as one study concerning an international subject base. Based on the age guidelines described, 11 of these samples supported the relationship between higher values of sedentary behaviour among adolescents (aged 11-13) compared to youth and children(Al-Hazzaa et al., 2011; Alamian and Paradis, 2009; Anderson et al., 2008; Atherson and Metcalf, 2005; Bagley et al., 2006; Berkey et al., 2003; Cooper et al., 2006; Devis-Devis et al., 2009; Eisenmann et al., 2002; Foltz et al., 2011; Hussey et al., 2007; Jansen et al., 2009; Olds et al., 2009; Olds et al., 2010; Pate et al., 1996; Scully et al., 2007; Springer et al., 2006a; Whitt-Glover et al., 2009). Twenty-three samples assessed sedentary behaviours with respect to ethnicity These were cross sectional (n = 16), and longitudinal (n = 7). Eighteen of these samples were based in the US, four from England, and one sample population was Australian.

Table 1: Relationships between correlates and measures of sedentary behaviours.

Authors	Year	Research Design	Participants (Number & Age)	Correlates	Measure of Sedentary Behaviour	General Findings	Study Quality /7	Location of Study
Cui et al. (2011)	2011	Cohort Study (China Health and Nutrition Survey CHNS)	6817 Children aged 6-18	1) Age 2) Gender 3) Change over time 4) TV in Bedroom 5) Parental TV Time 6) Parental Rules about TV Time	Self Report: SB: 1) TV/Video Time 2) Non-Screen Sedentary Behaviour	Younger children had higher screen time compared to older children, while older children spent more time in homework behaviours compared to younger children. Boys were more likely to exceed 2 hours/day of screen time than girls. Children with TV in their bedroom were significantly more likely to exceed the 2 hours/day compared to those without. Children who watched TV with their parents were also more likely to exceed 2 hours/day of TV time, as were those without parental rules controlling TV use, although this was not statistically significant.	5	China
Feldman et al. (2003)	2003	Cohort	743 Children mean age of 15.1	1) PA, 2) Weekend/Weekday	Self Report: Leisure vs. productive SB: 1) TV/Video Time, 2) Reading and Homework, 3) Computer 4) Videogame Time.	Productive SB was associated with increased PA, Leisure SB was not. These association were similar for both genders. Time spent using the computer was positively associated with PA, while TV and video games had no association with PA.	3	Canada
Mutz et al. (1993)	1993	Cohort	1894 Children grades 5-12	1) Change in Hobby time	Self Report: 1) TV Time	Increased TV time resulted in other activities being forced out of the children's lifestyle, but decreasing TV time did not result in those activities being added back in.	3	South Africa
Patnode et al. (2011)	2011	Cohort Comparison (Identifying Determinants of Eating and Activity in Adolescents (IDEA) & the Etiology of Childhood Obesity (ECHO))	720 Children grades 6-11	1) Gender	Accelerometer Measures SB Counts, Self Report: 1) TV Time, 2) Computer time, 3) Video Games, 4) Sedentary Socializing 5) Movies	On average, boys watched more TV, and played significantly more video games compared to girls. Girls were more inclined to watch DVDs or videos, and spent more time on the internet/computer and significantly more time on the phone.	5	U.S.A.
Roemmich et al. (2007)	2007	Cohort	88 Children aged 8-12	1) Neighbourhood environment, 2) Home environment (TV sets in home)	Accelerometer measured PA and SB counts, Self Report: 1) TV Time	TV time was significantly negatively associated with proximity to park in boys, and significantly positively associated with TV sets in the home in girls.	4	U.S.A.
Tudor-Locke et al. (2003)	2003	Cohort (China Health and Nutrition Survey	2675 Children aged 9-14	1) Age, 2) Gender	Self Report: 1) TV/Video Time, 2) Reading, Writing, Drawing,	Males demonstrated a higher prevalence of TV/video time compared to females. Reading/writing/drawing prevalence was comparable in males and females within the population. Boys demonstrated a higher prevalence of sitting games	4	China

		(CHNS))			3) Sitting Games	compared to girls.		
Wells et al. (2008)	2008	Cohort	4452 Children aged 10-12	1) Sleep Duration, 2) BP	Self Report: 1) TV Time	High TV time was associated with short sleep duration and increased BMI and BP. Changes in BP were mediated by body fat level.	4	Brazil
Aires et al. (2011)	2011	Cross Sectional	1708 Children grades 3-5	1)Cardio respiratory fitness	Self Report: 1) TV Time 2) Computer Use	Cardio respiratory fitness was negatively associated with television time, but was not significantly associated with computer use.	4	Portugal
Anderson et al. (2011)	2008, 2009, 2011	Cross-Sectional	7378 Children aged 4-19	1) Age 2) Gender 3) SES 4) Ethnicity 5) PA	Accelerometer measured PA and SB counts. Parental and Self Report: 1) TV Time 2) Computer Time	Adolescence, being male, and being Black were all positively associated with sedentary behaviour. Being a child, and physical activity were negatively associated with sedentary behaviour. SES and BMI had no significant impact on sedentary behaviours measured.	5, 4, 4	U.S.A.
Al-Hazzaa et al. (2011)	2011	Cross Sectional	2908 Children, aged 14-19	1) Age 2) Gender 3) Nutritional Intake 4) PA	Self Report: Screen Time: 1)TV Time 2) Computer Use	Female children spend significantly more hours/day in screen time compared to males at all ages. Adolescents spent more time using the computer than Youth, while youth spent more time watching TV compared to younger children. In females, screen time was significantly negatively correlated to breakfast, fruit and vegetable intake, milk and dairy products, and PA, and positively correlated to fast food and desserts. No significant effect was found between Screen time and energy drink consumption in females. In males, Screen time was not significantly correlated to standard food group intake or physical activity, but was positively correlated to fast food, dessert and energy drink consumption. No significant correlation between screen time and BMI was found in males or females.	4	Saudi Arabia
Attenwell et al. (2003)	2003	Cross Sectional	1680 Children, Aged 4-13	1) Self Esteem, 2) PA 3) Reading	Parent and Teacher reported: 1) Home and social computer use.	Children spent little of their computer time supervised by an adult, and the majority of their computer time was spent playing games, with only half an hour per week spent in educational pursuits. Watching TV and playing outside reduced the amount of reading a child did. However, children who used computers in the home less than 8 hours per week spent significantly more time reading at home than did children without computers. Heavy computer use did not affect the time spent reading or watching television, but it did reduce the amount of time spent outside and playing sports. Children who used computers less than 8 hours a week had significantly higher scores on cognitive understanding tests and self esteem. Heavy computer users (over 8 hours/week) had significantly higher BMI than other children.	4	U.S.A.

Alamian et al. (2009)	2009	Cross Sectional (National Longitudinal Survey of Children and Youth)	1 987 524 Children, aged 10-17	1) Age, 2) Gender, 3) SES, 4) Parental education, 5) prevalence of risk factors	Self Report: 1) TV/Video Time,	Sedentary behaviour was the second most common risk factor. Prevalence of SB decreased with higher education. TV time was highest among children aged 12-13, both males and females. Lower SES was associated with higher SB.	4	Canada
Andersen et al. (2001)	1998 2001	Cross Sectional (Third National Health and Nutrition Examination Survey NHANES II & III)	4083 Children aged 8-14 4069 Children aged 8-16	1) Age, 2) Gender, 3) Ethnicity	Self Report: 1) TV Time	Age, being male, being Black, and BMI were all significantly positively associated with TV time.	4, 4	U.S.A.
Atherson, & Metcalf (2005) Eisenmann et al. (2002) Pate et al. (1996) Springer et al. (2006)	2005 2002 1996 2006	Cross Sectional (Youth Risk Behavioural Survey)	30428 Children grades 9-12	1) Age, 2) Gender, 3) Ethnicity, 4) PA 5) Urban, Suburban, Rural,	Self Report: Screen Time: 1) TV/Video Time, 2) Computer/video game	Adolescents, being male, being Black, BMI, and living in an urban area were all positively associated with screen time. Children and physical activity were negatively associated with screen time. Males tended to spend more time using computers and video games compared to their female peers.	4, 4, 4, 4,	U.S.A.
Atkin et al. (2008) Gorely et al. (2009) Biddle et al. (2009) Biddle et al. (2009)	2008 2009 2009 2009	Cross Sectional Ecological Momentary Assessment (Sedentary Teenagers and Inactive Lifestyle)	1546 Children aged 13-16	1) Age 2)Gender, 3) Weekend/ Weekday 4) PA,	Self Report: 1) TV Time, 2) Computer use, 3) Video Games, 4) Homework, 5) Reading, 6) Hobbies, 7) Sedentary Socializing	Weekend days and being male were significantly associated with sedentary behaviour. Physical activity was negatively associated with SB, and age was not significantly associated with SB. TV time was more prevalent on weekend days, while computer and homework time was more prevalent on weekdays.	4, 3, 4, 4	United Kingdom
Biddle et al. (2009)	2009	Cross Sectional (Ecological Momentary Assessment)	623 Children aged 13-18	1) Gender, 2) Weekend/Weekday	Self Report: 1) Screen Time: 2) Sedentary Socializing	Boys spent more time in Technological SB than girls, while girls spent more time in Socializing SB than boys. Both girls and boys, and youth in all three countries showed increase SB on weekend days compared to weekdays.	4	Hungary, Slovania, Romania
Biddle et al. (2009)	2009	Cross Sectional (Ecological Momentary Assessment)	991 Children aged 12-16	1) Gender, 2) Weekend/ Weekday	Self Report: 1) TV Time, 2) Computer Time, 3) Computer/video Games, 4) Sedentary socializing, 5) Listening to Music, 6) Homework, 7) Reading, 8) Sitting doing nothing,	The majority of boys watches less than two hours of TV on weekdays, only a small minority (5.8%) watched more than 4 hours/day. On weekends, boys watched significantly more TV, with only 32.1% watching less than 2 hours/day, and 25.9% watching over 4 hours/day. SB which were also prominent in boys were homework, playing computer/video games, and motorized transport. The majority of girls also watched less than 2 hours of TV/day on weekdays, with the minority (6.1%) watching over 4 hours/day. On weekends, 45.6% still watched less than 2 hours/day, but 23.5% watched over 4 hours/day. SB which were also prominent in girls were homework, motorized transport, and sedentary	4	Scotland

					9) Hobbies	socializing. The majority of girls did not play computer/video games.		
Barr-Anderson et al. (2010)	2010	Cross sectional (Ready Set. ACTION!)	73 parent-child dyads, Children in grades 4-6.	1) Perceived family support for limiting TV use	Self Report: 1) TV Time	Child perception of support as more strongly associated with child physical activity, but neither parental perceived support nor child perceived support for limiting TV use were found to be associated with child TV time.	3	U.S.A.
Barr-Anderson et al. (2007) Utter, Neumark-Sztainer et al. (2003)	2007 2003	Cross Sectional (Project Eating Among Teens (EAT)-II)	4745 Children in grades 7-12	1) Gender, 2) Caloric Consumption 3) TV in Bedroom, 4) PA	Self report: 1) TV/Video Time, 2) Computer Time, 3) Homework 4) Reading,	BMI, being male, poor nutrient intake, having a TV in the bedroom were all associated with screen based sedentary behaviours. Physical activity and nutritional intake were both positively associated with homework and reading time.	4, 4	U.S.A.
Beets, & Foley, (2010)	2010	Cross Sectional (Oregon Healthy Teens)	6603 Children aged 12-18	1) Ethnicity	Self Report: Screen Time: 1) TV time, 2) Videogame/Computer Time 3) Internet Time	Excessive TV viewing was associated with being overweight and being a younger Hispanic boy.	4	U.S.A.
Brodersen et al. (2005)	2005	Cross Sectional (Health and Behavior in Teenagers Study)	4320 Children aged 11 and 12	1) Age, 2) Gender, 3) Ethnicity, 4) SES, 5) Health and Development Factors, 6) Psychological Factors.	Self Report: SB: 1) TV Time, 2) Computer/Video Games	SB was greater in ethnic minority groups, and in students from deprived backgrounds (low SES). More developmentally advanced girls, and those reporting emotional symptoms also reported higher SB. SB increased over time. Boys reported higher hours of SB compared to girls. Asian American children were more sedentary compared to white children.	3	England
Bellisle et al. (2007)	2000	Cross Sectional	100 Children aged 9-11	1) PA, 2) SES, 3) Parental Education.	Parent and Child Report: 1) TV Time	Children who watched TV for more than 2 hours a day were likely to spend less time in sports activities. Executive or professional SES were associated with less than 1 hour of TV viewing being reported. Low parental education was also associated with higher TV time.	4	France
Burke et al. (2006)	2006	Cross Sectional	602 Children aged 12	1) Gender,	Self Report: 1) TV Time, 2) Computer Use, 3) Video Games	TV viewing predicted increased risk for obesity in boys, and decreased risk for girls. Computer use, video games and other SB were not associated with increased risk of Obesity.	2	Australia
Bathrellou et al. (2007)	2007	Cross Sectional	1140 Children mean age 10.7	1) Urban/Rural, 2) Weekend/Weekday	Parent and Child Report: Screen Time: 1) TV/Video/DVD Time, 2) Computer/Video Game	Rural children were more active outdoors after school than urban children. Screen time did not differ between urban and rural children, nor did time spent doing homework. Urban children did spend more time in private lessons after school (eg. Piano, language) compared to rural children.	3	Cyprus
Bagley et al. (2006)	2006	Cross Sectional	1215 parent child dyads, children aged 5&6,	1) Age, 2) Gender, 3) Parental status (one or two	Self Report: 1) TV Time	Boys without siblings spent more time watching TV than those with siblings, and the more siblings they had, the less TV they watched. Girls from single parent families watched more TV than those from two parent families.	5	Australia

			and 11-12.	parents), 4) Siblings.				
Carson et al. (2009)	2009	Cross Section & Longitudinal (Health Behaviour in School Aged Children HBSC)	8215 Children grades 6-10 cross sectional, 1424 longitudinal.	1) Risk Behaviours	Self Report: 1) TV Time, 2) Computer Time, 3) Video Games	High computer use was associated with a 50% increased engagement in multiple risk behaviours in both the cross sectional and longitudinal samples.	4	Canada
Coon et al. (2001)	2001	Cross Sectional	91 Parent Child Dyads	1) Nutrition (Caloric consumption)	Parent and Child Report: 1) TV Time	Children from high TV use families had approximately 6% more of their caloric intake from protein, 5% from snack/junk food, and 5% less of their nutrients from fruits and vegetables, compared to families with low TV use.	3	U.S.A.
Cooper et al. (2006)	2006	Cross Sectional	90 Girls, aged, 7-12	1) Age, 2) Resting Metabolic Rate	Self Report: 1) TV Time	There was no significant differences in metabolic rate across activity conditions and weight groups. Resting energy expenditure decreased significantly as TV time increased. Children in later adolescence were more likely to watch more TV.	2	U.S.A.
Collins et al. (2007)	2007	Cross Sectional	1758 Children aged 12-15	1) SES	Self Report: Screen Time: 1) TV Time, 2) Computer use, 3) Video Game Time	There were significant differences in BMI in high computer and play station use compared to low computer and play station use. Prevalence of TV, computer, and play station use was lower in low-income families compared to high-income families.	4	Indonesia
Cummings, & Vandewaater, (2007)	2007	Cross Sectional	1491 Children aged 10-19	1) Gender, 2) Family Time, 3) Time spent with friends	Self Report: 1) Video Games	36% of adolescents (80% of males, 20% of females) played video games. On average, gamers played for one hour on weekday days, and 1.5 hours on weekend days. Compared to non-gamers, gamers sent 34% less time doing homework. Time spent playing video games was negatively related to time spent with parents and friends, or time spent doing other activities.	4	U.S.A.
Cao et al. (2011)	2011	Cross Sectional	5003 Children grades 6-8	1) Gender 2) Depression 3) Family Status 4) SES 5) Nutrient Intake	Self Report: Screen Time:	Boys, children not living in a two parent home, Low SES, High BMI, and poor nutrient intake were all associated with high screen time (more than 2 hours/day). Depression was also positively associated with higher screen time.	4	China
Casey et al. (2001)	2001	Cross Sectional (Continuing Survey of Food Intake)	5669 Children, aged 0-17	1) SES, 2) Sufficient Food	Self Report: 1) TV Time	Children in food insufficient, low income circumstances watched on average 3.1 hrs TV/day, compared to food sufficient low income (2.8 hrs/day) and food sufficient higher income (2.4 hrs/day)	3	U.S.A.
Cameron et al. (2011)	2011	Cross Sectional Clustering (the Resilience for Eating and Activity Despite Inequality study)	549 parents, 352 children, and 304 parent child dyads, low SES	1) Nutrient Intake, 2) PA.	Parental report: SB: 1) TV Time, 2) Computer/Video Games	Less than 40% of the sample met the national guidelines for SB (less than 4 hours/day). Only some of those subjects meeting the guidelines also met the nutrition (fruits and vegetables) guidelines. Clustering of SB was consistent between mothers and their children.	3	Australia

Carson et al. (2009) Iannotti et al. (2009) Iannotti et al. (2009) Mark et al. (2006) Samdal et al. (2006) Vereecken et al. (2006) Torsheim et al. (2010) Melkevik et al. (2010)	2009 2009 2009 2006 2006 2006 2010 2010	Cross Sectional (Health Behaviour in School Aged Children HBSC)	22084 Children from grades 6-10	1) Age, 2) Gender, 3) SES, 4) PA, 5) Nutritional intake 6) Urban/Rural, 7) Parent Support, 8) Peer Support, 9) Physical Health Complaints 10) Self Image, 11) QOL, 12) Risk behaviours (smoking, drinking, drunk)	Self Report: Screen Time, 1) Computer Time 2) Video Games	Age, being male, living in a rural location, and risk behaviours were positively associated with screen time. Physical activity, SES, nutrient intake, parental and peer support, physical health complaints, self image, and quality of life were all negatively associated with screen time.	4, 4, 4, 4, 4, 4, 4, 4,	Internatio nal
Carson et al. (2011) Mark & Janssen, (2008)	2011 2008	Cross Sectional (National Health and Nutrition Examination Surveys NHANES)	2527 Children aged 12-19	1) Metabolic Syndrome	Self Report: 1)TV Time 2) Computer Use	Risk of metabolic syndrome increased almost linearly with increased screen time, and was not found to be mitigated by PA. Computer use was not found to affect metabolic syndrome.	4, 4	Canada
Chaput et al. (2006)	2006	Cross Sectional (Quebec en forme)	422 Children, aged 5-10	1) Gender	Parental Report: Screen Time: 1) TV Time, 2) Video Games, 3) Computer Use.	Long hours of TV watching, and of playing computer and video games were significantly associated with obesity in both male and female children.	3	Canada
Carson et al. (2010)	2010	Cross sectional (REAL Kids Alberta)	3421 Children in grade 5	Parental neighborhood of Neighborhood Aesthetics: 1) Satisfaction with services, 2) Safety, 3) Sidewalks/parks in the neighborhood. 4) Parental education.	Survey: Screen time	Children living in neighborhoods with high perceived satisfaction/services were significantly less likely to watch more than 2 hours of television each day. They are also more likely to be physically active and engage in active transport compared with children from low perceived neighborhood status.	4	Canada
Dietz & Gortmaker, (1985)	1985	Cross Sectional (National Health Examination Survey (NHES))	13636 Children aged 6-17	1) Age	Self Report: 1) TV Time	BMI was found to be directly related to the amount of TV time each day. In children aged 12-17, the prevalence of obesity increased by 2% for each additional hour of TV viewed/day. This trend was not as evident in children aged 6-11, but the prevalence of obesity did increase as children watched more than 2hours/day.	4	U.S.A.

Devis-Devis et al. (2009)	2009	Cross Sectional	323 Children aged 12-16	1) Age, 2) Gender, 3) School Type (public vs. private)	Self Report: Screen Time: 1) TV Time, 2) Computer Time, 3) Mobile Device Use.	Children spent an average of 2.52 hours/day in screen time, with 1.73 hours/day being devoted to TV use, 0.27 hours in computer use, and .52 hours/day in mobile use. Type of school was associated with all the kinds of screen time, with private schoolchildren using media less than public school students. Older adolescents (14-16) were more likely to use computer/video games and mobile devices compared to younger students. Boys spent significantly more time using mobile devices than girls Finally, adolescents showed more media use on weekends than weekdays.	3	U.S.A.
Dumith et al. (2010)	2010	Cross Sectional	4431 Children	1) Gender, 2) SES, 3) Upbringing, 4) Neighborhood Satisfaction, 5) PA, 6) Emotional Well-being.	Self Report: Screen Time: 1) TV Time, 2) Computer Time, 3) Video Game Time	98.2% of the sample watched TV, 43.9% Played video games, and 22.4% used the computer. Watching more TV was associated with higher income, being raised to be indoors more, liking their environment, and obesity. Playing video games was associated with being male, white, higher household income, PA, and obesity. Computer use was most frequent among white, upper class, overweight or obese boys with intermediate well-being scores. While girls watched more TV, boys spent more time playing video games and using the computer. When total screen time was considered, kids spent an average of 4 hours/day using TV, Computer and video games.	4	Brazil
Ekelund et al. (2004)	2004	Cross Sectional	1292 Children aged 9-10	1) Gender	Accelerometer measured PA and SB counts.	Girls spent significantly more time in SB than boys. Non-obese children were significantly more likely to be active than their obese counterparts.	5	Denmark, Estonia, Norway, Portugal
Evenson et al. (2007)	2007	Cross Sectional	1554 girls in grade 6	1) Safety on neighborhood, 2) Aesthetics of neighborhood.	Accelerometer Measured SB and PA Counts	No significant correlations were found between non school SB and neighborhood safety and aesthetics.	5	U.S.A.
Eisenmann et al. (2008)	2008	Cross Sectional (YRBS)	13 600 Children grades 9-12	1) Gender, 2) PA	Self Report: 1) TV Time	On average, girls watched less TV than boys. BMI was directly associated with TV time, as children watched more TV, they were at increased risk for being overweight. This risk became even more significant if the youth also had low levels of PA.	4	U.S.A.
Ekelund et al. (2006)	2006	Cross Sectional (the European Heart Study)	1 921 Children aged 9-16	1) Age, 2) Gender	Self Report: 1) TV Time	At age 9, boys watched more TV than girls. At age 15, boys and girls watched the same amount of TV. TV viewing was significantly associated with adiposity, while PA was not. However, after adjustment for PA, gender, age group, study location and sexual maturity, smoking status, parental SES and birth weight, the association of TV with metabolic risk was no longer significant.	4	United Kingdom
Fazah et al. (2010)	2010	Cross Sectional	1000 Children aged 14-18	1) Gender,	Self Report: Screen Time: 1) TV Time, 2) Computer Time, 3) Video Game Time	Boys reported greater total screen time than girls. On average, overweight and obese boys and girls watched more TV than their normal weight counterparts. Overweight boys used the computer more than their normal weight counterparts, while overweight girls used the computer less than their normal weight counterparts. Total screen time	3	Lebanon

						was higher in obese and overweight groups compared to normal weight adolescents of both genders.		
Fairclough et al. (2009)	2009	Cross Sectional	6 337 Children aged 9-10	1) Gender, 2) SES, 3) PA	Self Report: Screen Time: 1) TV Time, 2) Computer use, 3) Video Games	Boys were significantly more likely to watch 1 hour or more of TV or playing video games each day, week or weekend day, compared to girls. Boys were also more likely to be involved in sports. TV Viewing and video gaming for 1 hour or more each day were inversely associated with SES. Overweight girls were more likely than normal weight girls to use the internet for 1 hour or more each weekend day. Weight status was not consistently associated with SB.	4	England
Gorely et al. (2009)	2009	Cross sectional	1171 Children, mean age 14.8	1) Gender, 2) PA, 3) SES.	Self Report: SB: 1) TV Time, 2) Computer Time, 3) Sedentary socializing	Girls from low SES reported greater weekend TV viewing, and higher total weekday SB. Both girls and boys from lower SES neighbourhood reported lower participation in PA compared to those living in higher SES neighbourhoods. Boys tended to watch more television and use the computer more than girls, and have greater total time spent in SB, both on weekdays and weekends. Girls spent more time in sedentary socializing than boys, on weekends and weekdays.	4	England.
Granich et al. (2011)	2011	Cross Sectional	298 Children aged 11-12	1) Gender 2)Week/weekend day 3) PA 4) SES	Self Report: Screen Time: 1)TV/Video Time 2) Computer Use (Fun/homework) 3) Computer/Video Game	Lower SES was associated with heavy screen time, while high SES was found to be associated with light screen time. PA was negatively associated with screen time, and boys were more likely to be heavy screen time users compared to girls, but the results were not statistically significant. Screen time tended to be higher on weekend days compared to weekdays, except when used for homework.	4	Australia
Hussey et al. (2007)	2007	Cross Sectional	224 Children aged 7-10	1) Age, 2) Gender, 3) Waist circumference	Accelerometer measured PA and SB counts.	Total counts of girls of all ages compared to boys showed that overall girls had fewer SB counts. Time spent in SB was significantly correlated to waist circumference in boys, but not in girls. SB measured by accelerometer increased with age in both girls and boys. BMI and SB were positively associated.	4	Ireland
Hagar (2006)	2006	Cross Sectional	80 Children, aged 9-12	1) Gender, 2) PA	Accelerometer measured PA and SB counts. Self Report: 1) TV Time	Boys who watched no TV were significantly more active than those who watched large amounts of TV. While controlling for gender and BMI, there was not significant relationship between PA and SB.	4	U.S.A.
Hussey et al. (2001)	2001	Cross Sectional	786 Children aged 7-9	1) Gender	Parent and child report: Screen Time; 1) TV Time, 2) Computer/Video Time	78% of the children were spending 1-3 hours/day in screen time. Girls watched slightly more TV than boys, but there were no significant differences between the genders.	4	Ireland
Ho & Lee (2001)	2001	Cross Sectional	2110 Children aged 13-16	1) Gender, 2) PA	Self Report: 1) Computer Time	Boys who used computers for homework, internet, and communication engaged in more social/physical activities than others. If they used the computers more for gaming, they tended to be socially and behaviourally inactive. Girl's computer use was not found to be related to their lifestyle.	4	China

Hohepa et al. (2009)	2009	Cross sectional	3471 Children grades 9-12s	1) Gender, 2) PA, 3) Parental encouragement, 4) Parental TV Rules	Self Report: 1) Screen Time	Over half the sampled population watched TV at least 4 school days/5. 64% of the participants watched at least 2 hours/day. Youth who watched more than 1hr/day were less likely to be active after school. Low TV use active youth were most likely to have parents who both encouraged them to be physically active, and who set limits on the amount of television use.	3	Australia, New Zealand, Fiji, Tonga.
Huang et al. (2011)	2011	Cross Sectional	30C children aged 9-14	1) Gender 2) Familial support for PA, 3) Parental PA	Self Report: 1) Screen Time	There was no significant difference between screen viewing behaviours between girls and boys. Children's SB was associated with parental support for PA, and with parental role modeling of PA behaviours.	3	China
He et al. (2010)	2010	Cross sectional	515 parent/child Dyads, grades 5&6 (10.7 = average age +/- .63 years)	1) Gender, 2) Perceived parental rules, 3) Parents influences on screen time, 4) Parental attitudes towards SB	Self Report: Screen Time 1) TV Time, 2)Video Games, 3) Computer Time	Children spent on average 3.3 (+/- .15) hours/day in screen related activities. Parents of high screen users has less of a negative attitude towards screen based SB, and had fewer rules about the use of TV, and were more likely to be sedentary themselves.	2	Canada
Hume et al. (2009)	2009	Cross Sectional	580 Children aged 12-13	1) Gender,	Self Report: SB:	45.9% of boys spent over 4 hours/day in SB, while 33.7% of girls spent over 4 hours/day in SB. There was no significant relationship between SB and BMI in boys. However, girls who spent more than 3 hours/day in SB were more often classified as overweight/obese.	3	Australia
Hardy et al. (2006)	2006	Cross Sectional	343 parent child dyads	1) Parental rules for TV time 2) Siblings in the home	Parental and Child Report: 1) TV/Video Time	2/3 of adolescents watched 2 or more hours of TV/day, Factors associated with this level of TV watching are having siblings, access to pay television, eating snacks while watching TV, co-viewing with parents, and mothers who watched more than 2 hours of TV/day.	3	Australia
Hernandez et al. (1999)	1999	Cross Sectional	712 Children aged 9-16	1) Gender, 2) SES	Self Report: Screen Time 1) TV/Video Time 2) Computer/video games	Boys had higher screen time than girls overall. Middle income had higher screen time compared to low income participants. Boys were more likely to play video games than girls, and higher income children played more than lower income children.	4	Mexico
Hesketh et al. (2006)	2006	Cross Sectional (Children's Leisure Activity Study & the 2002/2003 Health, Eating and Play Study)	2458 Children, aged 5-12	1) Age, 2) Parental Education, 3) Maternal and Paternal employment	Accelerometer measured PA and SB counts. Parent and Child Report: 1) TV Time	Parental education and employment were inversely associated with television viewing. Maternal education was positively associated with MVPA for younger children. Age and gender were not significantly associated with SB	5	Australia
Hoelscher et al. (2009)	2009	Cross Sectional (School Physical Activity and	15 164 Children grades, 4, 8 & 11	1) Age, 2) Gender, 3) Ethnicity,	Self Report: 1) TV Time, 2) Computer Time, 3) Video Game Time	Across all grades, African American children watched the greatest amount of TV. There were no significant differences in TV habits between male and female subjects. Boys were significantly more likely to play video games compared to	4	U.S.A.

		Nutrition Survey (SPAN))				girls, with African American children having the highest rates in grade 4, and white/other children having the highest rates in grades 8 and 11.		
Hardy et al. (2006) Hardy et al. (2009)	2006 2009	Cross Sectional (Schools Physical Activity and Nutrition Survey)	2 750 Children aged 11-15	1) Age, 2) Gender, 3) Urban/Rural, 4) Ethnicity 5) Cardio respiratory fitness	Self Report: SB: 1) Screen Time, 2) Schoolwork 3) Passive Transport	Age, being female, BMI, living in an urban area, and being of Asian descent were all associated with general sedentary behaviours. Cardio respiratory fitness was negatively associated with sedentary behaviour.	4, 4	Australia
Hesketh et al. (2007)	2007	Cross Sectional (Health, Eating, and Play study)	1484 Children aged 5-11	1) Age, 2) SES, 3) Parental Education, 4) Weekend/Weekday 5) Caloric Consumption	Self Report: 1) TV Time	The majority of children watched over three hours of television each day, with older children watching more television than younger children. Maternal education was inversely associated with children's daily TV viewing. Obesity was most prevalent among children who had the highest scores for TV and video game use. However, only TV programs were significantly associated with increased risk of obesity. Unable to determine significant effects of snacking while viewing TV.	4	Australia
Islam-Zwart & Cawston, (2008)	2008	Cross Sectional (Epidemiological)	1404 Children, 796 of aboriginal status	1) Parental diabetes status.	Self Report: 1) TV Time	Children who watched more than 2 hours/day and had a parent with diabetes were found to average in the 82nd percentile of BMI. Children who had one diabetic parent, but watched less than 2 hours/day of TV were found to be in the 87th percentile Children who watched TV for less than 2 hours/day were found to be in the 74th percentile, and children who watched TV for over 2 hours/day, and whose parents were not diabetic were found to be in the 76th percentile. This suggests that parental health status may be more important than SB as a risk factor.	3	U.S.A.
Jago et al. (2007)	2007	Cross sectional	447 boys aged 10-14	1) Preferred Activity, 2) Self Efficacy, 3) PA,	Accelerometer measured PA and SB counts. Self Report: SB	Accelerometer reported SB was higher than self reported SB. Sedentary minutes were negatively associated with social desirability, PA preference, self-efficacy, PA. BMI and SB were positively associated.	4	U.S.A.
Jackson et al. (2010)	2010	Cross Sectional	482 Children aged 11-13	1) Gender, 2) Self Esteem, 3) SES	Self Report: 1) Internet Technology Use, 2) Video Games, 3) Cell Phone use	Females, and children who used the internet more showed better reading skills, compared to children using the internet less and boys. Children who played more video games had significantly lower global self-esteem, while those who used cell phones more had higher average self-esteem. Children from more affluent households used the internet more than those from lower SES households.	3	U.S.A.
Jansen et al. (2010)	2010	Cross sectional	1095 Children aged 9-12	1) Age, 2) Gender, 3) SES	Self Report: Screen Time: 1) TV Time, 2) Computer Time	78% of children watched up to 2hrs TV/day, 85.8% played up to 2 hrs/day of computer, and 61.6% had up to 2 hours total screen time (previous day report). Girls were more likely to adhere to SB guidelines than boys were. Non-Dutch ethnic groups were less likely to report below 2hr/day TV use. Older children were less likely to express positive intentions towards reducing TV and computer use. No significance was found between SES.	4	Denmark

Jago et al. (2008)	2008	Cross Sectional	2670 Children	1) TV in bedroom, 2) Number of televisions in the household, 3) Child autonomy (Bedtime on school days, Eating habits)	Self Report: 1) TV Time	As child autonomy increased by 9%, so did the risk of watching more than 2 hours of television each day after school. A 19% increase resulted in a one hour increase in daily television watching, 31% increase led to 2 hours more per day. Greater autonomy leads to children deciding to participate in more TV time.	4	Denmark, Portugal, Estonia, Norway
Jackson et al. (2008)	2008	Cross Sectional	1562 parent -child dyads, aged for grades 1,5 & 6	1) Gender 2) Parental Status (One or two) 3) Parental Education, 4) SES, 5) PA, 6) Parental Support for PA	Self Report: 1) Screen Time	Parents of older children were more likely to report concern about their child's PA and BMI. These parents were less likely to be physically active themselves. Parents with younger children were more likely to do PA with their child, as well as restricting the time the child spent watching TV. Parents of older children were more likely to provide other sport training for their children. Parents of girls were more likely to report restricting computer time, although boys had significantly more sedentary time reported.	4	Australia
Kang et al. (2010)	2010	Cross Sectional (Korean National Health and Nutrition Examination Surveys (KBHANES))	845 Children aged 10-18	1) Metabolic Syndrome	Self Report: Screen time: 1) TV time, 2) Computer time	Children with more than 35 hours/week of screen time were 2.23 times more likely to present with metabolic syndrome than children with 16 hours or less of accumulated screen time each week.	4	Korea
Koezuka et al. (2006)	2006	Cross Sectional (Canadian Community Health Survey (CCHS))	7982 Children aged 12-19	1) Gender, 2) PA	Self Report: 1) TV Time, 2) Computer Time, 3) Reading,	50.3% of males, 67.8% of females were considered inactive. TV Viewing was significantly associated with inactivity in both males and females regardless of weight status. Computer usage was associated with PA in males, and reading was associated with PA in females.	4	Canada
Katon et al. (2010)	2010	Cross sectional (Adolescent Health Study (ASC)	444 Children aged 13-17	1) Depression	Self Report: 1) Computer Time	Participants who expressed depressive symptoms were likely to spend a significant amount of time on the computer.	3	U.S.A.
Khunti et al. (2007)	2007	Cross Sectional	3601 Children grades 7-10	1) Gender, 2) PA.	Self Report: SB: 1) TV Time, 2) Computer and Video Time	46% of respondents spent four or more hours per day watching TV, playing video games, or computer games. Low activity during school breaks was higher in girls than in boys.	4	United Kingdom
Kremers et al. (2007)	2007	Cross Sectional	383 Children grades 1 and 2	1) Sugar Beverage Consumption, 2) Parental norms with respect to screen viewing.	Self Report: Screen time: 1) TV time, 2) Computer time	Screen viewing is positively associated with the consumption of sugar-sweetened beverages. This was in part explained by parental norms regarding screen-viewing behaviours.	2	Netherlands
Kerner et al. (2007)	2007	Cross Sectional	129 Children aged13-15	1) PA, 2) Nutrient Intake	Self Report: Screen Time: 1) TV Time, 2) Internet Time, 3) Sedentary Time	TV time was positively associated with internet time. Internet time was positively associated with Sedentary time and TV time. Sedentary time was positively associated with internet and TV time. The sedentary behaviours were not significantly associated to the other variables.	2	U.S.A.

Karaca et al. (2011)	2011	Cross sectional	916 Children aged 14-15	1) Gender, 2) Weekday/Weekend, 3) Public/Private School.	Self Report: 1) TV Time	Male students had higher average screen time than female students, and all adolescents watched greater amounts of TV on weekends compared to weekdays. Students attending private schools were also more likely to watch higher amounts of TV each day.	4	Turkey
Katzmarzyk et al. (1998)	1998	Cross sectional	784 Children aged 9-18	1) PA, 2) Energy Expenditure	Self Report: 1) TV Time	Correlations between TV time, PA, and energy expenditure were low and not significant.	4	Canada
Loucaides et al. (2011)	2011	Cross Sectional	1966 Children aged 12-19	1)Gender	Self Report: Screen time: 1)TV Time 2) Video/DVD Time 3) Computer/Video Games	Overall, Boys spent significantly more time in screen based sedentary behaviours than girls, while girls spent more time in non-screen sedentary behaviours.	4	Greece
Li et al. (2007)	2007	Cross Sectional	19299 Children aged 5-11	1) Age, 2) Bedtime 3) Wake Time 4) Sleep duration 5) TV/Computer in bedroom, 6) Weekend/Weekday	Self Report: Screen Time: 1) TV Time, 2) Computer use.	The prevalence of having a TV or computer in the bedroom was positively associated with the child's age, with TV in bedroom decreasing as with age, and computer in bedroom increasing with age. On weekdays, 59.3% of children watched TV for less than 1 hour/day. On weekends, 40% watched 1-2 hours, and 24.4 watched 2-3 hours each day. Older children were significantly more likely to watch greater amounts of TV each day. This trend was also true for computer use. Children watching more TV during the day were likely to have later bedtimes and waking times, and shorter overall sleep duration. This was also true of computer use. Having TV in the bedroom resulted in significantly later bedtimes and sleeping in longer, as well as overall shorter sleep duration.	4	China
Liou et al. (2010)	2010	Cross Sectional	8640 Children aged 13-16	1) Gender	Self Report: 1) TV Time, 2) Computer/video game, 3) Reading, 4) Passive Transport, 5) Homework	Watching TV for 2 hours or more each day was positively associated with obesity. On average, boys were more likely to use computers, and had greater overall screen time. Girls TV Viewing, reading, passive transport and homework time were significantly associated with BMI and they had higher overall sedentary time.	4	Taiwan
Li et al. (2007)	2007	Cross Sectional	1804 Children aged 11-17	1) Weekday/weekend, 2) SES	Self Report: SB: 1) TV Time, 2) Video Game, 3) Homework	Children spent on average 6.5 hours/day in SB 3.4hrs/day for homework, and 1.4 hrs/day for TV viewing. On weekends, they spent an average of 3.7 hours/day compared with 2.8 hours/day.	3	China
Lajous et al. (2009)	2009	Cross sectional	9132 Children aged 11-18	1) Gender, 2) Physical Maturation	Self Report: Screen Time: 1) TV Time, 2) Computer Time, 3) Video Game Time	In boys, watching TV for 5 hours or more/day was significantly associated with BMI compared with watching TV for 2 hours or less/day. This association was strongest in boys aged 11-12. Sexual maturation modifies this effect in female children, similar effects were found prior to menarche in girls, but once girls had reach menarche, they were no longer subject to the same effects.	4	Mexico

Lioret et al. (2007)	2007	Cross sectional (enquete Individual et Nationale sure les Cosommations Aimentaires)	1016 Children aged 3-14 (752 aged 6-14)	1) Age, 2) SES, 3) Nutrient Intake	Parent and Child Report: SB: 1) TV Time, 2) Video Game	Older children tended to be more sedentary than younger children. There was no significant association between SB and LTPA. There was a consistent association between SES and SB as SES increased, SB decreased. Energy intake was not significantly associated with SB or SES. SB was positively correlated with being overweight.	4	France
Lowry et al. (2002)	2002	Cross Sectional (National Youth Risk Behavior Survey)	15349 Children Grades 9-12	1) Age, 2) Gender, 3) Ethnicity, 4) Nutrient intake	Self Report: 1) TV Time	On average, TV watching decreased with age. Black children were significantly more likely to watch more than 5 hours/day (39.1%). Children watching over 5 hours/day of TV were significantly more likely to be overweight than those watching 2 or less/day. This was especially true for white children watching over 5 hours/day. 43% of children watched more than 2hours/day. 74% of blacks, 52% of Hispanic, and 34% of white children watched at least 2 hours/day. Watching TV for over 2hours/day was associated with being overweight, being sedentary, and insufficient fruit and vegetable consumption among white females, and with being overweight among Hispanic females. There was no such association with Hispanic males or black females. Among white males, it was associated with being overweight and insufficient fruits and veggies. Among black males, TV viewing was associated with higher PA. Older children watched slightly less TV compared to younger children.	4	U.S.A.
Leatherdale, & Wong (2008) Wong & Leatherdale, (2009)	2008 2009	Cross Sectional (School Health Action, Planning and Evaluation System (SHAPES))	25 416 Children grades 9-12	1) Gender, 2) PA, 3) Parental encouragement of PA, 5) Active Friends, 6) Risk Behaviours (Smoking Status) 7) Age, 8) Parental PA,	Self Report: Screen Time: 1) TV Time, 2) Computer Time 3) Video Games 4) Reading, 5) Homework	BMI, smoking, and being female were all associated with higher screen time. Physical activity, parental encouragement of physical activity, having active friends, age, and parental physical activity were all negatively associated with screen time.	4, 4	Canada
Leatherdale, (2010) Leatherdale et al. (2010)	2010 2010	Cross Sectional (Play-On)	2 449 Children grades 5-8	1) Age, 2) Gender, 3) Parental Encouragement to be active, 4) Active friends, 5) School activity status	Self Report: 1) Sedentary Socializing, 2) Screen Time	Age, being female, and being active at school were positively associated with SB. Parental encouragement to be active and having active peers were negatively associated with sedentary behaviour. Girls spent more time in sedentary socializing, as did older children overall.	4, 4	Canada
Myers et al. (1996)	1996	Cross Sectional (The Bogalusa Heart Study)	995 Children aged 9-15	1) Age, 2) Gender, 3) Ethnicity,	Self Report: Screen Time: 1) TV time, 2) Video/Computer Games	Girls had 7% higher SB compared to boys. Overall, Black children were more sedentary than white children. Older children were more likely to be sedentary than younger children.	4	U.S.A.

Morales-Ruán et al. (2009)	2009	Cross Sectional (Mexican National Health and Nutrition Survey 2006 (ENSANUT 2006))	18784 Children aged 10-14	1) Age, 2) Gender	Self Report: Screen Time: 1) TV/Video Time, 2) Videogames	Older children (17-19) had the highest rate of screen time, watching 21 hours/week on average. Male children spent significantly more time in screen behaviours, with 33.5% watching 21 or more hours a week, compared to 20.8% of females. There was a positive correlation between screen time and overweight/obesity. There were no significant relationships found between age and SB.	4	Mexico
Martinez-Gomez et al. (2010)	2010	Cross Sectional (La Actividad Fisica como Agente Preventio del Desarrollo (AFINOS))	210 Children aged 13-17	1) Gender, 2) CV risk factors	Accelerometer measured PA and SB counts.	On Average, boys had slightly higher SB counts compared to girls. High levels of SB were positively associated with multiple cardiovascular risk factors.	4	Spain
Mathers et al. (2009)	2009	Cross Sectional (Health of Young Victorians Study)	925 Children aged 14-18	1) Gender, 2) Health Status	Self Report: SB: 1) TV Time, 2) Computer Time, 3) Video Game, 4) Sedentary Socializing	On Average, boys used more overall media compared to girls. Boys were higher in TV viewing, Computer use, and Video games, but girls were more inclined to use the telephone. TV use was not significantly associated with health status. Computer use was negatively associated with health status. Low computer use was positively associated with good behaviour scores. Telephone use was not significantly associated with behaviours or health status.	4	Australia
Martinez-Gomez et al. (2010) Ortega et al. (2010) Vincente-Rodriguez et al. (2009) Ortega et al. (2007) Vicente-Rodriguez (2008) Rey-López (2009)	2010 2010 2009 2007 2008 2009	Cross Sectional (Alimentacion y Valoracion del Estado Nutricional de los Adolescentes: Food and Assessment of the Nutritionl Status of Spanish Adolescents (AVENA))	2859 Children aged	1) Gender, 2) CV risk factors 3) Sleep Duration, 4) Fatigue 5) Bone Mineral Concentration 6) Age 7) Waist Circumference 8) Parental Education 9) SES	Self Report: Screen Time: 1) TV Time, 2) Computer time, 3) Video Games	CV risk factors, fatigue, BMI and waist circumference were all found to be positively associated with screen time. Sleep duration and bone mineral concentration were negatively associated with screen time, while age and gender were found to have no significant relationship to overall screen time. Gender differences were found among video games and study time, boys played on average 3 hours or more computer/video games on weekdays, while more girls reported studying on average 3 hours or more/day. For boys, parental education and occupation (SES) were inversely associated with TV time, parental occupation was directly associated with study time, and maternal education was inversely associated with computer and videogame use on weekdays. For girls, parental occupation was inversely associated with TV viewing.	3, 4, 3, 4, 4, 4,	Spain
Marshall et al. (2002)	2002	Cross Sectional	2494 Children aged 11-15	1) Gender	Self Report: SB: 1) TV Time, 2) Reading, 3) Doing homework, 4) Computer Use, 5) Sedentary socializing	There were low inter-correlations found between sedentary behaviours, which led the authors to suggest that SB is multifaceted, not simply to opposite to PA. Gender was not significantly associated with any SB.	4	U.S.A., United Kingdom

Morgenstern et al. (2009)	2009	Cross Sectional	9283 Children aged 10-17	1) SES, 2) TV in bedroom	Self Report: Screen Time: 1) TV/Video Time, 2) Videogames	Screen time was directly related to BMI, and was partially mediated by SES. Having a TV in the bedroom and overall TV time were statistically significant in effecting BMI, while video game use and movie viewing were not.	3	U.S.A., Germany
Mota et al. (2007)	2007	Cross Sectional	841 girls grades 7-12	1) Active vs. Passive transport	Self Report: 1) TV Time, 2) Computer Time	Greater TV and computer use were associated with higher amounts of active transport.	4	Portugal
Mota et al. (2007)	2007	Cross Sectional	1561 Children aged 12-17	1) Gender, 2) Physical Activity	Self Report: 1) TV Time, 2) Computer Time	Boys were 2.5 % more likely to watch over 4 hours of TV/week, and were 6.5% more likely to use a computer for over 4 hours/day if they were involved in leisure time PA. Girls were 8.6% more likely to watch over 4 hours of TV/day and 6.7% less likely to use the computer for over 4 hours/day if they were not involved in LTPA. TV watching was a significant predictor of low LTPA in girls, but not boys.	4	Portugal
Matheson et al. (2004)	2004	Cross Sectional	60 Children Grades 3 and 5	1) Nutrition (Caloric consumption) with TV ON, 2) Weekend/weekday	Self Report: 1) TV Time	On weekdays, 17-18% of daily energy consumption occurred in front of the TV, on weekends it was 26%. The fat content of foods eaten in front of the TV did not differ significantly, but less today, fast food, fruits and vegetables were consumed with the TV on. The amount of food consumed while watching TV was not associated with BMI, but in 3rd graders, the fat content of the food consumed while watching TV was associated with BMI.	3	U.S.A.
Murdey et al. (2004)	2004	Cross Sectional	119 Children aged 10-15	1) Age, 2) Gender, 3) Sleep Time, 4) Physical Maturity, 5) Body Image	Self Report (Momentary time sampling): SB.	Total time spent in SB was significantly higher for girls and boys who had started puberty compared to those who had not. SB was also higher for late pubertal girls and boys compared to early pubertal stage. On average, this means that older children were more sedentary than younger children. After controlling for sleep time, SB was no longer found to increase at puberty. Body image was not found to be significantly related to SB. No significant differences in screen viewing behaviours were found between genders. BMI was positively associated with SB.	2	United Kingdom
Mushtaq et al. (2011)	2011	Cross Sectional (Nutritional assessment among School-Going Children in Lahore, Pakistan)	1860 Children aged 5-12	1) Gender 2) Urban/Rural 3) SES 4) Parental Education 5) Siblings in Home	Self Report: SB	Sedentary behaviour was more common among boys, and was associated with higher BMI. Urban children were found to spend more time in sedentary behaviours compared to suburban children. Higher SES, higher income neighbourhoods, parents with a higher level of education, fewer siblings were all associated with greater levels of sedentary behaviours.	4	Pakistan
Norman et al. (2005)	2005	Cross Sectional	878 Children aged 11-15	1) Age, 2) Gender, 3) Ethnicity, 4) Self Efficacy, 5) Family support	Self Report: SB: 1) TV Time, 2) Computer time, 3) Video Games	In Girls age, family support, TV/Video rules and neighbourhood hills were associated with SB. Correlated with SB were self efficacy, enjoyment, change strategies and pros and cons of change. For boys, age, ethnicity, BMI, cons of change, and self efficacy were associated with SB.	4	U.S.A.
Nogueira et al. (2009)	2009	Cross Sectional	326 Children aged 11-14	1) Gender,	Self Report: SB: 1) TV Time, 2) Computer/Video	SB was not significantly associated with BMI for girls or boys.	2	Brazil

					Game			
Nagel et al. (2009)	2009	Cross sectional (URMEL-ICE)	1079 Children aged 6-9	1) Gender, 2) Weekday/weekend, 3) Immigrant vs. nonimmigrant	Self Report: Screen Time: 1) TV Time, 2) Video Game time	Both girls an boys watched more TV and played more video games on weekend days than weekdays. Boys played significantly more video games compared to girls, and tended to watch more TV as well. Prevalence of TV and video game time was associated with higher BMI. A higher percentage of non-immigrant children watched TV compared to immigrant children.	4	Germany
Olds et al. (2010)	2010	Cross Sectional	2200 Children aged 9-16	1) Age, 2) Gender, 3) SES, 4) Parental Education Level,	Self Report: 1) Screen Time, 2) Non-Screen Sedentary Time	Screen Time was negatively correlated to non-screen sedentary time. NSST was associated with higher SES, while higher screen time was associated with lower SES. Higher parental education level was associated with higher NSST, lower with more screen time. Adolescents living in cities spent more time in NSST compared to rural children. Screen time did not differ significantly between areas. Lower BMI was associated with NSST, and high screen time was associated with higher BMI. Screen time peaked when both boys and girls were around 12-13 years of age. Screen time was determined to be only a moderately accurate means of predicting total SB.	4	Australia
Olds et al. (2006)	2006	Cross Sectional	1039 Children aged 10-13	1) Gender, 2) SES, 3) Weekday/weekend day, 4) Sleep time	Self Report: Screen Time: 1) TV Time, 2) Computer Time, 3) Video Game Time	Screen time was higher in boys, and on non-school (weekend) days. Screen time also increase with age, and decreased with SES. TV was the most common screen time (73%), followed by video games (19%) and non-game computer use (6%). High screen time children were most likely to be boys, and to have low PA. They were also likely to sleep less and be from low SES backgrounds.	4	Australia
Olds et al. (2009)	2009	Cross Sectional	6024 Children aged 10-18	1) Age, 2) Gender, 3) Physical Maturity	Self Report: Screen Time: 1) TV Time, 2) Computer Time, 3) Video Game Time 4) Passive Transport	Boys had higher overall screen time, while girls had more time spent in passive transport. Screen time peaked in the pre-pubertal years.	4	Australia
Ortega et al. (2011)	2011	Cross Sectional	2241 Children aged 9-16	1) Age 2) Physical Maturity 3) Sleep Duration	Accelerometer measures SB counts.	Sedentary behaviour was significantly negatively associated with sleep duration, and was significantly positively associated with age and sexual maturation.	5	Estonia and Sweden
Olds et al. (2011)	2011	Cross Sectional	1132 Children aged 10-13	1) PA	Self Report: Screen Time	Lower screen time was associated with higher MVPA.	4	Australia
Owens et al. (1999)	1999	Cross Sectional	1099 Children aged 4-10	1) TV in bedroom, 2) Number of televisions in the household, 3) Sleep Time	Parent and Child Report: 1) TV time	Having a TV in the bedroom was associated with sleep onset delay and sleep duration. Use of TV as a sleep aid was associated with bedtime resistance, sleep onset delay, sleep duration, and sleep anxiety. TV had a negative overall effect on sleep behaviours.	4	U.S.A.

Pearson et al. (2011)	2011	Cross Sectional	640 Children aged 10-12	1)Parental Concern regarding screen time	Parental Report:	Parents of older children reported more concern with respect to the amount of television their children were watching. The amount of concern a parent exhibited was directly related to the amount of television the child watched. Older children were more likely to eat meals in front of the television.	4	Australia
Peltzer (2009)	2009	Cross Sectional (Global School Based Health Survey (GSHS))	24593 Children aged 13-15	1) Risk Behaviours (Smoking, Drinking, Drug Use)	Self Report: SB: 1) TV Time, 2) Computer time, 3) Sedentary Socializing, 4) Reading, Homework	Higher SB (5 hours or more/day) was associated with greater risk of smoking, drinking, and Drug use.	4	Africa (Botswana, Kenya, Namibia, Senegal, Swaziland, Uganda, Zambia & Zimbabwe)
Patrick et al. (2004)	2004	Cross Sectional (Patient-Centered Assessment and Counseling for Exercise Plus Nutrition Project)	878 Children aged 11-15	1) Gender, 2) Weekend/weekday	Accelerometer measured SB and PA counts, Self Report: 1) TV Time	Overweight or obese boys spent significantly more time watching TV on their non-school (weekend) days compared to normal weight boys.	5	U.S.A.
Rodrigues et al. (2010)	2010	Cross Sectional	302 Children aged 13-16	1) Age, 2) Gender, 3) Weekend/Weekday	Accelerometer measured PA and SB counts.	Females spent more time in SB than males. However, when physical maturation was accounted for, this effect was no longer significant. Accelerometer measured SB increased slightly with age.	4	Portugal
Ramirez et al. (2010)	2010	Cross sectional	160 parent-child dyads	1) Parental rules for Screen time, 2) TV in bedroom 3) Gaming System in bedroom	Parent and Child Report: Screen Time: 1) TV/Video Time, 2) Computer/Video Games Video Time,	Parental rules for watching TV and video game use were found to be significantly negatively associated with the amount of sedentary screen time participated in by the child. Having a television or gaming system in the bedroom was positively associated with total television viewing and gaming.	3	U.S.A.
Renzaho et al. (2008)	2008	Cross Sectional	337 Children aged 3-12	1) PA, 2) Immigrant status	Self Report: SB: 1) TV Time, 2) Computer time, 3) Video Games	Children who had immigrated to Australia were significantly more sedentary than their non-migrant peers, and had higher BMI.	3	Australia
Rey-López et al. (2010)	2010	Cross Sectional (HELENA)	3278 Children aged 12-18	1) Gender, 2) TV in Bedroom, 3) Computer in bedroom	Self Report: 1) TV Time, 2) Computer Time, 3) Reading, 4) Video Games	Time spent in sedentary behaviours were higher on weekends. Males spent more time TV viewing, computer games, and videogames, and females spent more time studying and surfing the internet for non-study reasons. On weekdays, 1/3 of children exceeded the screen time guidelines (2 hours/less/day). Having a TV in the bedroom was associated with higher TV viewing, while having a computer reduced TV viewing.	4	United Kingdom

Schmitz et al. (2002)	2002	Cross Sectional (Teens Eating for Energy at School study)	3798 Children in grade 7	1) Gender, 2) Depression, 3) Authoritative Parents, 4) Value of Health, achievement, and appearance, 5) Perceived academic rank.	Self Report: SB	For females, depression, having an authoritative mother, valuing health, achievement and appearance, and perceived academic rank were all statistically associated with SB. For males, depression, future expectations, and perceived academic rank were all significantly associated with SB.	4	U.S.A.
Shan et al. (2010)	2010	Cross Sectional (Randomized clustering sample)	21198 Children aged 2-18	1) Age, 2) Gender	Parent and Child Report: Screen Time: 1) TV Time, 2) Computer/video games	44% of students spent 2 or more hours each day using screen based media. On average, boys were significantly less likely to meet SB guidelines, and were 51.0% Likely at age 6-12, 44.3% likely at age 13-18, and 48.1% Likely overall to exceed screen time guidelines. in contrast, girls were 43.7% likely aged 6-12, 37.4% likely aged 13-18, and 40.7% Likely overall to not meet screen guidelines. High screen time was significantly associated with the risk of obesity in children of all ages.	4	China
Shi et al. (2010)	2010	Cross Sectional (South Australian Monitoring and Surveillance System (SAMSS))	3495 Children aged 5-15	1) Sleep Time	Parental and Child Report: 1) Screen Time 2) Homework, 3) Reading	Increased time spent in screen time, reading, and on homework, were all associated with lower sleep time.	4	Australia
Sirard et al. (2010)	2010	Cross sectional (baseline measures from longitudinal cohort studies)	613 Parent-Child Dyads (mean age 14.5)	1) Gender, 2) Parent education, 3) Other children in home, 4) Number of TVs in home, 5) TV in bedroom,	Accelerometer measured PA and SB counts, Self Report: 1) Screen Time	Males reported one average one more hour of screen time per day compared to females. Media density, media availability and accessibility summary score (MAASS), total number of televisions in the home and TV in the bedroom were all negatively associated with actigraph sedentary minutes in males. Media density, MAASS were positively associated with self reported screen time in both males and females. Media density and MAASS were positively associated with actigraph sedentary minutes in females, as was the TV in the bedroom. Total TVs in the home was negatively associated with actigraph sedentary minutes in females, but positively associated with self reported screen time minutes. SB measured by accelerometer was not specifically related to age.	4	U.S.A.
Shi & Mao, (2011)	2011	Cross Sectional (California Health Interview Survey)	4029 Children aged 13-15	1) Smoking, 2) Weekend/weekday	Self Report: 1) TV Time, 2) Computer use, 3) Video Games	Hours spent watching TV and video gaming on weekdays were positively associated with having smoked and being a regular smoker. However, video game and TV time on weekends days was negatively associated with having ever smoked and being a regular smoker. Computer use was not associated with smoking.	4	U.S.A.
Springer et al. (2006)	2006	Cross Sectional	718 Children aged 10-14	1) Ethnicity (Non-white), 2) Family	Self Report: SB: 1) TV Time,	Family participation in PA was strongly negatively correlated with SB time. BMI and Ethnicity (non-white or Asian) were positively correlated with SB. No significant correlations	4	U.S.A.

				Encouragement and participation in PA, 3) Peer Encouragement and participation in PA.	2) Computer Time, 3) Video Games	were found between family encouragement, or peer participation and encouragement and SB.		
Sisson et al. (2009)	2009	Cross Sectional (2001-2006 the US National Health and Nutrition Examination Survey)	8707 Children aged 2-15	1) Age, 2) Gender, 3) Ethnicity	Self Report: Screen time: 1) TV Time, 2) Computer Time	Older children were more likely than younger children to engage in over 2 hours/day of screen time, and boys engaged in more screen time than girls. Overweight and obese children were more likely to exceed the hours/day screen time recommendations than normal weight children. African American and Mexican American children had higher screen time compared to white children, with African American children having the highest rates of screen time.	4	U.S.A.
Singh et al. (2008) Singh et al. (2008) Singh et al. (2008) Sisson et al. (2010) Sisson et al. (2011)	2008 2008 2008 2010 2011	Cross Sectional (2003 National Survey of Children's Health)	68288 Children aged 6-17	1) PA 2) Ethnicity, 3) SES 4) Immigrant/non-immigrant	Self Report: Screen Time 1) TV/Video Time, 2) Computer Time 3) Video Game Time	Physical activity was, SES and immigrant status were negatively associated with overall screen time, while BMI, and being of Black or Hispanic descent were positively associated with screen time. Children born in the USA were significantly more likely to be active compared to their immigrant peers, but were also more likely to engage in more than 3 hours/day of screen time.	4, 4, 4, 4, 4	U.S.A.
Scully et al. (2007)	2007	Cross Sectional (Australian Secondary Students Alcohol and Drug Survey)	18486 Children aged 12-17	1) Age, 2) Nutritional Intake	Self report: Screen Time 1) TV/Video Time, 2) Computer Time, 3) Homework	Older children, especially females, were significantly more likely to spend 2 hours or more on homework each school day (41.5%). Heavier TV use was associated with lower consumption of fruits and vegetables, and higher consumption of unhealthy/junk food. Only 29.3% of children met the SB guidelines (less than 2 hours of electronic media/day). Younger children spent more time on electronic media compared with older children. Older children had slightly lower overall screen time compared to younger children	4	Australia
Smith et al. (2010)	2010	Cross sectional	3986 Parents total. 764 preschool, 1557 K-4, 1665 grades 6-10.	1) Age, 2) SES, 3) Maternal education, 4) Urban/Rural 5) Parental Self efficacy	Self Report: Screen Time	Pre-school aged children were less likely to exceed television watching guidelines if their mother had a higher level of education, a family income over $100 000, and high parental self efficacy in terms of influencing their Childs PA. Overall, younger children were least likely to exceed screen time guidelines if they were female, living in a rural location, and had mothers with a higher standard of education. For the oldest group, girls and children whose parents had high self efficacy were the least likely to exceed screen time guidelines.	4	Australia
Santos et al. (2005)	2005	Cross Sectional	550 Children aged 14	1) Gender, 2) PA	Self Report: SB: 1) TV Time, 2) Computer Time	Girls were significantly more inactive compared to boys. Active children reported comparable SB to non-active children. Active children watched less TV on weekends than non-active children. Computer use on weekdays was predictive of PA (Greater computer time = greater PA time).	2	Portugal

Springer et al. (2010)	2010	Cross sectional	734 Children grades 1-7	1) Parental TV rules, 2) Parental TV watching, 3) TV in bedroom, 4) Weekend/Weekday	Self Report: 1) TV Time	Children with rules regarding television use were significantly more likely to meet television use guidelines for both weekend and weekdays. Parental TV use and having a TV in the child's bedroom were found to increase daily TV consumption.	4	U.S.A.
Shannon et al. (1991)	1991	Cross Sectional	773 Children in grade 6	1) Gender, 2) Weekend/weekday, 4) SES	Self Report: 1) TV Time	On average, boys watched slightly more TV than girls on both week and weekend days. Total viewing time was higher on weekend than weekdays. Children from lower SES areas were more likely to show a significant relationship between TV time and having a higher BMI.	3	U.S.A.
Sigmund et al. (2008)	2008	Cross Sectional	193 Parent Children dyads	1) PA, 2) Parental PA/SB	Parent and Child Report: SB: 1) Sitting	Both maternal and paternal PA, walking behaviours and sitting behaviours were significantly associated with the same behaviours in their daughters. Maternal and paternal PA, & sitting behaviours were significantly reflected in sons. There was also a significant negative correlation between parental sitting and walking in boys, and paternal sitting and overall PA in boys.	3	Czech Republic
Songul et al. (2002)	2002	Cross Sectional	163 Children aged 7-11	1) TV in bedroom, 2) Parental & Sibling viewing habits	Parental and Child Report: Screen time: 1) TV Time, 2) Computer Time	62% of children watched at least 2 hours/day, and 8.3% watched over 4 hours/day. Presence of TV in bedroom was not significantly associated with TV time. TV time was significantly correlated to parental and sibling viewing time.	2	Turkey
Steele et al., (2009)	2009	Cross Sectional	1862 Children aged 9-10	1) PA, 2) Maternal Activity, 3) Nutritional Intake,	Accelerometer measured PA and SB counts. Self Report: Screen Time	SB was positively associated with waist circumference and fat mass index, independent of age and gender, but dependent on PA. No Significant relationship was found between SB and maternal PA, or nutrient intake.	5	United Kingdom
Salmon et al. (2005)	2005	Cross sectional	878 parent-child dyads, Childs mean age 11.5	1) Parental Education, 2) SES, 3) Family Structure, 4) Family Rules for TV Time, 5) Parental Screen Time & Enjoyment, 6) Gender 7) PA	Accelerometer measured PA and SB counts. Self Report: 1) TV Time 2) Computer Time, 3) Video Games	There were no significant differences found between genders with respect to television viewing or computer use. Boys were found to play more electronic games than girls. Parents of boys were more likely to report restricting their children's playing of electronic games. Boys were twice as likely to report preference for watching TV and playing video games rather than participating in PA, compared to girls. Girls were significantly more likely to report that their parents watched and enjoyed some or lots of TV. Boys from higher SES families and children whose parents restricted TV access were less likely to watch 2 or more hours of TV/day. Boys whose families watched TV together and children whose parents reported watching more that 2 hours/day of TV were more likely to exceed the recommended TV time.	5	Australia
Trost et al. (1999)	1999	Cross Sectional	198 Children in grade 6	1) Gender, 2) PA	Accelerometer measured SB & PA Counts, Self Report: Screen Time:	Screen time was slightly negatively associated with PA in both girls and boys, but these results were not statistically significant.	4	U.S.A.

					1) TV Time, 2) Video Game Time			
Tudor-Locke et al. (2007)	2006	Cross Sectional	2031 children aged 14-16	1) Gender	Self Report: SB: 1) TV/Video Time, 2) Reading, writing, drawing, 3) Sitting games	Males participated in significantly more of all measured SBs compared to Pilipino females.	4	Philippines, China
Trang et al. (2009)	2009	Cross Sectional	2684 Children in junior high	1) Age, 2) Gender,	Self Report: SB: 1) TV Time, 2) Computer time, 3) Computer/video Games, 4) Passive Transportation 5) Listening to Music, 6) Homework	SB was positively associated with BMI, Passive transportation, no recess exercise time, higher rates of homework and screen media use. SB was negatively associated with being in schools who participated in sports meets, outside play space, older age, and being male.	4	Vietnam
Thibault et al. (2010)	2010	Cross Sectional	2385 Children aged 11-18	1) Age, 2) Gender, 3) SES,	Self Report: SB: 1) TV Time, 2) Computer time, 3) Video Games	SB was significantly associated with higher BMI. SB was higher in Boys compared to girls, as boys spent more time playing video games. SB was lower in adolescents from higher SES families, but no significant differences were found between age groups.	3	France
Tammelin et al. (2007)	2007	Cross Sectional (Finland Birth Cohort)	6928 Children aged 15-16	1) Gender, 2) PA	Self Report: 1) TV Time	48% of boys and 44% of girls watched more than 2 hours/day of TV. High levels of SB were associated with lowered levels of PA in both genders.	4	Finland
te Velde et al. (2007)	2007	Cross Sectional (Pro Children Cross-sectional Survey (CSS))	12538 Children aged 9-14	1) Gender, 2) Meal in front of TV, 3) PA	Self Report: 1) TV Time, 2) Computer Time	Across all populations, boys watched more TV and used computers more than girls, as well as eating more meals in front of the TV. PA was significantly negatively correlated to hours of TV as well as to meals in front of the TV, but no significant correlation was found between computer use and PA (Slight positive correlation). High TV users were also likely to be regular computer users. High screen time was significantly associated with risk of being overweight.	4	Austria, Belgium, Denmark, Iceland, Netherlands, Norway, Portugal, Spain, Sweden
Ullrich-French et al. (2010)	2010	Cross Sectional (Teen Eating and Activity Mentoring in Schools (TEAMS))	153 Children aged11-15	1) BP, 2) CV fitness	Self Report: Screen Time: 1) TV Time, 2) Computer Time, 3) Video Game Time	Screen time is significantly negatively associated with BMI percentile, Waist to height ratio, and BP.	3	U.S.A.
Utter et al. (2006)	2006	Cross Sectional (National Children's Nutrition Survey	3275 Children aged 5-14	1) Age, 2) Gender	Self Report: 1) TV Time	Older children watched more TV compared to younger children. Among younger children, boys reported higher TV time compared to girls, while in the older age group, the opposite was true. Higher TV watching was associated with higher BMI, especially in younger children.	4	New Zealand

		(CNS02))						
Urrutia-Rojas et al. (2008)	2008	Cross Sectional	1076 Children in grade 5	1) Ethnicity	Self Report: 1) TV Time	62% of African American children watched TV for more than 2 hours/day, compared to 44% of Hispanic children and 35% of Caucasian children. No Association was found between TV time and BMI.	4	U.S.A.
Ussher et al. (2007)	2007	Cross Sectional	2623 Children aged 13-16	1) Gender, 2) Psychological wellbeing	Parental and Child Report: Screen time: 1) TV time, 2) Computer/Video game Time	The majority of children, both girls and boys, watched between 1 and 2 hours of TV/day. Screen time was associated with lower levels of psychological wellbeing,	4	United Kingdom
van Zutphen et al. (2007)	2007	Cross Sectional	1926 Children age 4-12	1) TV During meals, 2) TV in Bedroom, 3) Parental TV viewing guidelines,	Parent and Child Report: 1) TV time	Children whose parents were more restrictive with TV time or who did not watch TV during meals, or had limited access to TV had significantly less total TV time compared to their peers. Overweight children were more likely to have higher TV time than normal weight children.	4	Australia
Vaughan et al. (2007)	2007	Cross Sectional	443 Children aged 12-16	1) Gender,	Self Report: 1) TV Time	Only 40 % of boys met the SB guidelines of less than 2hours/day, compared to 85% of girls. There was no significant difference in BMI between those meeting the guidelines compared to those who did not. Hispanic children had the highest prevalence of sedentary behaviours.	3	Australia
Vandewater et al. (2004)	2004	Cross Sectional	2831 Children aged 1-12	1) Age,	Self Report: 1) TV Time, 2) Computer/Video Time, 3) Reading.	Older children with lower BMI had moderate non-game computer use, while those who had higher BMI either used computers very little, or a lot. This same relationship was found between video game use and reading. TV use was not found to be related to BMI. There were no significant relationships found between SB and age or gender.	4	U.S.A.
Vandewaterv (2006)	2006	Cross Sectional (Child Development Supplement)	1712 Children aged 0-12	1) PA 2) Creative Play, 3) Family Time	Self Report: 1) TV Time,	Time spent watching TV (With or without family) was negatively associated with overall family time. TV time was also negatively associated with time spent doing homework, and creative play. There was no significant relationship between TV time and reading time or active play.	4	U.S.A.
van Sluijs et al. (2010)	2010	Cross Sectional (European Heart Study)	2107 Children aged 9-15	1) Behavioural Variables, 2) TV in bedroom, 3) SES, 4) Parental weight status.	Accelerometer measured PA and SB counts. 1) TV Time	Older children were more sedentary than younger children. High computer use and no TV time before school in Norway, and being sedentary during recesses in Estonia were positively associated with SB. SES was positively associated with SB in Portugal and Estonia, and negatively with fathers BMI. Children with game console at home in Norway, and TV in their bedroom in Portugal were more sedentary.	5	Denmark, Estonia, Norway, Portugal
Wen et al. (2009)	2009	Cross Sectional (Central Sydney Walk to School Research Program)	1975 Children aged 10-12	1) Gender, 2) Physical Activity	Self Report: Screen Time: 1) TV Time, 2) Computer time, 3) Video Games	43% of children spent 2 hours or more each day in screen time. Children who were allowed to walk outside alone were significantly more likely to have more active play outside. Boys were more likely than girls to spend over 2 hours/day in screen time.	4	Australia

Wagner et al. (2004)	2004	Cross Sectional	2852 Children aged 12	1) Gender, 2) SES, 3) Parental Co-viewing	Self Report: SB: 1) TV Time, 2) Computer/video game use, 3) Reading.	Familial association with inactivity was only statistically significant in boys. Children were more likely to be sedentary if one or both parents were sedentary as well, compared to children with active parents. Parent-child PA and SB relationships were not modified by SES or BMI.	4	France
Wiecha et al. (2001)	2001	Cross sectional	1197 Children	1) Age, 2) TV in bedroom, 3) Number of televisions in household, 4) Parental limits on television use, 5) Family dinners, 6) Siblings, 7) PA, 8) Academic performance, 9) Health limitations,	Self Report: Screen Time 1) TV/Video Time, 2) Computer/Video Games, 3) Reading	Children spent on average 3.35 +/- 2.2 hours involved in screen time per day. Those with a TV in their bedroom reported more hours of TV/day than those without. Children whose parents set limit to amount of TV time watched less than those without limits. Children who almost always had family dinners watched less TV than those who rarely ate family dinners.	4	U.S.A.
Warren et al. (2002)	2002	Cross sectional	312 Children aged 0-17	1) Parental Mediation of television use, 2) Family co-viewing, 3) Parental engagement in children's activities.	Self report: 1) TV Time	Parental engagement in children's' activities, and mediation of television use were negatively associated with TV time, while family co-viewing was positively associated with TV time.	2	U.S.A.
Wolf et al. (1993)	1993	Cross Sectional	551 Children aged 11-14	1) Ethnicity,	Self Report: 1) TV Time	Black children were significantly more likely to watch TV for 5 hours or more each day compared to white, Asian, and Hispanic children. White and Asian children had the lowest prevalence of TV Time.	3	U.S.A.
Wake et al. (2003)	2003	Cross Sectional	2862 Children aged 5-13	1) Age, 2) Gender,	Parent and Child Report: SB: 1) TV Time, 2) Computer/video games	BMI was significantly related to TV time, but not to computer/video game time. Once PA was accounted for, SB was no longer associated with BMI. On average, male children and those aged 11-13 had the highest prevalence of SB.	4	Australia
Zabinski et al. (2007)	2007	Cross sectional	878 Children aged 11-13	1) Gender, 2) PA, 3) Productive time	Self Report: SB: 1) TV Time, 2) Computer/video Games, 3) Sedentary socializing, 4) Listening to Music, 5) Homework,	Significantly sedentary children had lower numbers of productive hours compared to less sedentary children. Moderately sedentary children were more likely to be female. Selectively high sedentary children were more likely to be male. Moderately sedentary children were likely to be older than less sedentary children. Very sedentary children were most likely to have higher BMI and low fitness/PA levels compared to moderate, low or selective high sedentary children.	3	U.S.A.

					6) Reading			
Barnett et al. (2010)	2010	Longitudinal Cohort Study (Nicotine Dependence in Teens Study)	744 Children aged 12 and 13 at baseline	1) Gender, 2) Family status, 3) Parental Education, 4) PA	Self Report: Screen time: 1) TV/Video Time, 2) Computer/Video Games, 3) Internet Time	Gender, family status, and number of siblings had statistically significant impact on screen time. Percent body fat was 2.9% higher in boys who increased their screen viewing compared to those who started at the same level but increased over time. Similarly, body fat was 2.4% higher among boys who started at high viewing time and stayed there, compared to those who stayed at low viewing. Physically active girls whose screen time decreased during follow up had a lower percent body fat in the final survey than did those who had maintained a low screen viewing time throughout the study. Boys who either maintained low viewing time or increased were 2.2x more likely to be overweight and over fat, and 5.1x more likely to be over fat but not overweight.	5	Canada
Berkey et al. (2002)	2002	Longitudinal Cohort Study (Growing Up Today Study)	11 887 Children aged 10-15.	1) Age, 2) Gender	Self Report: Screen Time: 1) TV/Videos 2) Computer/Video Games	Increased inactivity was directly associated with higher BMI in girls. On average, boys reported a greater amount of average inactivity each day, and spent more time playing computer and video games than girls. Average activity was higher for younger children than for older children.	5	U.S.A.
Bauer et al. (2008) Nelson et al. (2006) Simetin et al. (2009)	2008 2006 2009	Longitudinal (Project EAT-I and EAT-II)	2516 Children aged 10-13 at baseline	1) Age, 2) Gender, 3) Parental encouragement to be active 4) PA	Self Report: Screen Time: 1) TV/Video Time, 2) Computer Time	Maternal and Paternal encouragement to be active and to care for physical fitness was positively associated with weekly hours of MVPA in youth. Maternal encouragement was positively associated with reduced TV/video use for younger females. This association was not found among other groups. Computer use increased dramatically in both girls and boys over time. TV time remained quite consistent over time. Parental encouragement to PA was positively associated with weekly hours of MVPA. Parental encouragement was most significant among their same-gendered children at the older age. Maternal encouragement to be active was positively associated with decreased TV/Video time in younger females. Other parental factors were not associated with reduced TV/Video among the other groups. Older females reported the least parental focus on being active.	5, 5, 5	U.S.A.
Brodersen (2007)	2007	Longitudinal (Health and Behavour in Teenagers Study)	5863 Children aged 11-16	1) Age, 2) Ethnicity, 3) SES	Self Report: SB: 1) TV Time, 2) Computer/Video Games	Lower SES was associated with greater prevalence of SB. Black boys had more SB than White boys. These differences in SB were present at age 11, and did not evolve over the teenage years.	4	England
Bradley (2000)	2000	Longitudinal (Cardiovascular Health in Children and Youth)	656 Children from grades 4-10	1) Age, 2) Gender, 3) Ethnicity	Self Report: SB: 1) TV Time, 2) Homework, 3) Reading,	Girls reported more SB overall. SB was more common as children aged. African American boys reported more SB as they aged than boys of other ethnicities.	5	U.S.A.

					4) Sedentary Socializing			
Boynton-Jarrett et al. (2003)	2003	Longitudinal	548 Children aged 12	1) Nutrition (fruits and vegetable consumption)	Self Report: 1) TV Time	For each additional hour of TV watched, servings of fruit and vegetables per day decreased. Baseline hours of TV/day were also independently associated with change in servings of fruits and vegetables.	4	U.S.A.
Boone et al. (2007) Liu et al. (2010) Primack et al. (2009)	2007 2010 2009	Longitudinal (National Longitudinal Study of Adolescent Health (NLSAH))	13339 Children grades 7-12 4142 Children grades 7-12 at basline 9 155 Children	1) PA, 2) Depression 3) Gender,	Self Report: Screen Time: 1) TV/Video Time, 2) Computer/Video	Children with moderate PA and high SB were more likely to exceed screen time guidelines compared to children with High PA. low SB. Subjects who reported more TV use had significantly greater odds of developing depression (x1.08 for every extra hour of TV use/day). Total media exposure was also associated with higher rates of depression (x1.05 for each additional hour of daily use). These trends were especially prevalent in young men. At wave II, non-obese males and females reported less screen time and more PA than obese females and males. Obese females reported an increase in screen time at wave III, while non-obese females reported either maintaining the same viewing time, or reducing viewing. Screen time was significantly associated with obesity in both males and females, especially if it increased during adolescence.	5, 5, 5	U.S.A.
Cecchini et al. (2009) Cecil-Karb & Grogan-Kaylor, (2009)	2009 2009	Longitudinal (National Longitudinal Survay of Youth)	5886 Children	1) Neighborhood Safety,	Self Report: 1) TV Time	Parents' perceptions of neighborhood safety had a significant association with children's BMI. and this relationship was fully mediated by television viewing. Overweight children watched an average of 4.2 hours of TV/day, those at risk of being overweight watched an average of 3.8 hours/day, and those not overweight watched an average of 3.7 hours/day.	5, 5	U.S.A.
Delmas et al. (2007)	2007	longitudinal (ICAPS)	379 Children	1) Gender, 2) PA, 3) TV in bedroom	Self Report: 1 1) TV/Video Time	The presence of a TV in the bedroom at baseline was associated with higher BMI and TV viewing over time in boys, but not in girls. Having a TV in the bedroom was also associated with less reading time, but not associated with different PA levels from those without a TV in the bedroom.	4	France
Davison et al. (2005)	2005	Longitudinal	173 adolescent girls	1)Age, 2) Family co-viewing practices, 3) Mothers & fathers daily viewing time	Parent and Child Report: 1) TV Time	40% of the girls exceeded daily TV viewing recommendations. Girls watched significantly more television when their parents were high volume TV viewers, relying heavily on TV as a recreational activity.	3	U.S.A.
Davison et al. (2006)	2006	Longitudinal	169 Girls from age 7-11	1) Age	Parental Report: 1) TV Time,	In cross sectional analysis, there were no significant associations found between TV viewing and BMI. In longitudinal analysis, girls who exceeded TV viewing recommendations were 13.2 times more likely to be overweight at age 11, and 4.71 times more likely to become overweight between the ages of 7 and 11 compared to girls who never exceeded TV guidelines. No significant differences were found between change of percent body fat between these two groups.	3	U.S.A.

Francis et al. (2003)	2003	Longitudinal	173 parent child dyads from age 5-9.	1) Nutrition while TV Viewing, 2) Snacking frequency, 3) Nutrient (Fat) intake, 4) BMI	Self Report: 1) TV Time	Girls who watched more TV also ate more snacks while watching TV, whether they were of normal weight or overweight. TV viewing was the only significant predictor of girls increase in BMI. In families where one or both parents were overweight, girls who watched more TV also snacked more frequently, and those who snacked more frequently also consumed more high fat density foods, which predicted their increase in BMI over the duration of the study. So TV viewing was not a direct predictor of change in BMI.	3	U.S.A.
Gordon-Larsen et al. (2004)	2004	Longitudinal Cohort Study (the Early Childhood Longitudinal Study - Kindergarten Cohort)	8 000 Children from Kindergarten on	1) Family Meals, 2) Perceived Neighborhood Safety.	Parental Report: 1) TV time	Children who watched more TV ate fewer family meals and were more likely to be overweight for the first time at the spring semester of 3rd grade. If these children also lived in neighborhoods perceived by parents to be less safe for outdoor play were more likely to be persistently overweight.	5	U.S.A.
Gordon-Larson et al. (1999) Gordon Larson, Adair & Popkin (2002)	1999 2002	Longitudinal Cross Sectional (National Longitudinal Study of Adolescent Health)	12 157 Children 12 759 Children aged 12-22	1) Age, 2) Gender, 3) Ethnicity 4) PA	Self Report: Screen Time: 1) TV Time, 2) Computer use, 3) Video Games	Being male, being Black, and BMI were all significantly positively associated with screen time. Age and physical activity were negatively associated with screen time.	5, 5	U.S.A.
Gable et al. (2007)	2007	Longitudinal (Early Childhood Longitudinal Study-Kindergarten Cohort)	8000 Children	1) Family meal frequency, 2) Opportunities for PA, 3) Perception of neighbourhood safety.	Parental Report: 1) TV Time	Children who watched more TV and ate fewer family meals were more likely to be overweight for the first time in the spring semester of 3rd grade. When these children also lived in neighbourhoods their parents perceived as unsafe, they were also more likely to be persistently overweight. PA and opportunities to be active were not associated with greater likelihood of being overweight.	5	Asia and Pacific Islands
Hesketh et al. (2009) Hesketh et al. (2007)	2009 2007	Longitudinal (Epidemiological (Health of Young Victorians Study (HOYVS))	1 373 Children aged 5-10 at baseline 1 373 Children aged 5-10 at baseline	1) Weekend/Weekday	Parental Report: Screen Time: 1) TV Time, 2) Video Game/Computer Time	BMI change was positively associated with TV and video time. Viewing time was higher on weekend days compared to weekdays. At the baseline, 40% of children met the SB guidelines, while at follow up only 18% of the population met the guidelines. Baseline BMI was positively associated with screen time at follow up, but the inverse relationship was not found (i.e. baseline screen time not related to BMI t follow up). Children who exceeded guidelines were more likely to be classified as overweight/obese.	4, 4	Australia
Henderson (2007)	2007	Longitudinal Cohort (National Heart, Lung, and Blood Institute Growth and Health study)	2379 girls aged 10-21	1) Age	Self Report: 1) TV Time	TV viewing time was strongly associated with increasing BMI in girls aged 11-14. If was not as significantly associated in girls from 15-21.	5	U.S.A.

Janz et al. (2005)	2005	Longitudinal	378 Children aged 5-8	1) Gender	Accelerometer measured PA and SB counts. Parental and Child Report: Screen Time: 1) TV Time, 2) Computer/Video Game Time	Both girls and boys watched less TV at age 8 than at age 5. Boys almost doubled their time paying video games between age 5 and 8, while there was no change in girls video game time. Sedentary minute counts were significantly higher in the 8 year olds compared to their 5 year old counts.	5	U.S.A.
Johnson et al. (2004)	2004	Longitudinal (Children in the Community Study)	976 mother Child Dyads, Children aged 14 at baseline	1) Sleep Dysfunction.	Parental and Child Report: 1) TV Time	Children watching 3 hours a day or more of TV were at risk for significant sleep problems, irrespective of age, previous experience with sleep problems, psychiatric disorders, neglect, parental education, and SES.	5	U.S.A.
Laurson et al. (2008)	2008	Longitudinal Cross Sectional Cohort Study	268 Children aged 10 at baseline	1) PA, 2) Nutrition	Self Report: Screen Time: 1) TV Time, 2) Computer Time, 3) Video Game Time	At baseline, 10% of boys and girls were obese, and 17.8% of boys and 14.8% of girls were overweight. BMI remained stable over the 18 month study, but SB and dietary habits were highly variable. There was no significant relationship between SB, PA, Diet and BMI.	4	U.S.A.
Lowry et al. (2009)	2009	Longitudinal Cross Sectional (Youth Risk Behavioural System Survey (YRBSS))	14000 Children Grades 9-12	1) Age, 2), Gender, 3) Ethnicity	Self Report: 1) TV Time	The prevalence of TV viewing on school days increased significantly among male, female, while, black and Hispanic students in all grades except grade 12.	5	U.S.A.
Murdey et al. (2005)	2005	Longitudinal (Sedentary Teenagers and Inactive Lifestyles (STIL))	83 Children aged 10-16	1) Gender, 2) Physical maturity	Self Report SB; 1) TV/Video Time, 2) Computer, 3) Reading	Boys SB increased significantly in boys who had reached a more advanced pubertal level compared to those who had not. No significant correlations were found between changing pubertal status, BMI, or body image for either gender. For girls, a significant change in weekend SB was explained by changing body composition independent of changing pubertal status.	3	United Kingdom
Motl et al. (2006)	2006	Longitudinal (Teens Eating for Energy and Nutrition at School (TEENS))	4594 Children in grade 7 at baseline	1) Gender, 2) Change over time, 3) PA	Self Report: Screen Time: 1) TV Time, 2) Video Games.	On average, TV and video game time decreased over the 2 year study time. Decreases in time spent watching TV was associated with an increase in PA. Boys spent slightly more hours/day on average in SB compared to girls.	5	U.S.A.
Nelson & Gordon-Larsen (2005) Nelson et al. (2005)	2005 2005	Longitudinal (National Longitudinal Survey of Children and Youth)	11957 Children grades 7-12	1) Age, 2) PA 4) Risk Behaviours, 5) Grades, 6) Self Esteem.	Self Report: 1) TV/Video Time	Active children were less likely to participate in risk behaviours compared to those who had high screen time overall. Active children were also more likely to have higher self esteem and grades. High TV/Video time was associated with low PA, especially in older children	5, 5	U.S.A.
Purslow et al. (2008)	2008	Longitudinal (Physical Exercise and Appetite in	345 Children aged 8-9	1) Gender	Accelerometer measured PA and SB counts.	More time spent in SB was associated with increase risk in BMI, especially among girls.	5	England

		Children Study (PEACHES))						
Robinson et al. (1993)	1993	Longitudinal Cohort	971 girls grades 6 & 7	1) PA	Self Report: 1) TV Time	Baseline TV time was not significantly associated with baseline or longitudinal change in BMI or skin-folds. Baseline After school TV time was weakly negatively associated with PA time in cross sectional analysis, but not significantly associated with change in PA over time. One adjusted for age, race, and parental education and BMI, all results were statistically insignificant.	5	U.S.A.
Raudsepp et al. (2008)	2008	Longitudinal	345 Children in grade 6 at baseline	1) Gender, 2) PA	Self Report: SB: 1) TV Time, 2) Computer Time, 3) Computer/video Games, 4) Sedentary socializing, 5) Listening to Music, 6) Homework, 7) Reading	All sedentary behaviours increased significantly over the three years, and PA decreased. Boys TV viewing increased more compared to girls, while computer phone/homework use increased equally.	4	Estonia
Sharif et al. (2010)	2010	Longitudinal	6486 Children aged 10-14	1) School Performance	Self Report: 1) TV/Video Time	Screen exposure time and media content were found to have negative effects on school performance. Viewing PG-13 and R-rated movies had indirect effects on poor school performance, mediated through increases in substance use and sensation seeking. R-rated movies had an indirect effect on school performance due to increased school behavioural problems.	5	U.S.A.
Saelens et al. (2002)	2002	Longitudinal (Study of Child Activity and Nutrition (SCAN))	228 Children aged 6-12	1) Gender, 2) Ethnicity, 3) TV in bedroom, 4) Number of televisions in the household, 5) Meals in front of TV, 6) VCR in home	Self Report: 1) TV Time	Hours of TV/week increased more significantly in boys than in girls. Hispanic boys and girls showed overall more viewing time per week at all stages, compared to Anglo children. Overall TV watching increased from time 1 (age 6) to time 2 (age 12), specifically on weekday afternoons and evenings, and across all parts of weekend days. The number of meals eaten in front of the television also increased over time. Both parents and Childs report of their TV viewing time increased as there were more TVs in the home.	4	U.S.A.
Tavaras et al.	2007	Longitudinal Cohort (Growing up Today Study)	10856 Children aged 10-15	1) Age, 2) Gender	Self Report: SB: 1) TV/Video Time, 2) Computer/video games	Younger children watched more TV and played more computer and video games compared to older children. Over time, both younger and older children reduced their TV, computer and video game use. Girls tended to watch less TV and play fewer video games than boys at all ages and timelines.	5	U.S.A.
Wong et al. (1992)	1992	Cross Sectional (Epidemiological)	550 Children aged 0-15	1) Age, 2) PA, 3) Nutrition, 4) Cholesterol Level	Self Report: 1) TV Time	High cholesterol was associated with higher TV Time. Older children were more inclined to watch over 4 hours/day. Children watching over 4 hours/day of TV were less likely to choose to consume lean meat, or to engage in PA outside of school hours.	3	U.S.A.

Hardy et al. (2007)	2007	Prospective Cohort Study	200 girls aged 12-15	1) Weekend/Weekday	Self Report: SB: 1) TV Time, 2) Computer time, 3) Video Games, 4) Homework, 5) Reading, 5) Sedentary Socializing	At the beginning of the study, girls spent approximately 45% of their leisure time (34.8 hours/week) in SB, with the greatest prevalence occurring weekend days. Small Screen Recreation was the most popular, accounting for 33%, followed by homework, studying and reading (25%) and sedentary socializing (20%). Over 2/5 years the amount of leisure time spent in SB increase by 28%, representing 63% of their leisure time. Overall, girls spent significantly more time in SB on Saturdays compared to Sundays, and compared to other weekdays.	3	Australia
Van den bulck & Hofman (2009)	2009	Prospective Cohort Study	1276 Children aged 13-16 at baseline	1) PA	Self Report: 1) TV Time	A TV to PA ratio of 2.3 or higher was 72% likely to predict high BMI.	4	Belgium
Wiecha et al. (2006)	2006	Prospective study	548 Children aged 11 at baseline	1) Food eaten while watching TV	Self Report: 1) TV Time	Each hour of TV time was associated with an additional 167 kcal/day, and with increased consumption of foods advertised on TV.	3	U.S.A.

Thirty samples found that overall sedentary behaviours increased with age (Andersen et al., 1998; Bradley et al., 2000; Brodersen et al., 2005; Carson et al., 2009; Crespo et al., 2001; Hesketh et al., 2007a; Iannotti et al., 2009; Iannotti et al., 2009b; Leathedale et al., 2010; Leatherdale, 2010; Lioret et al., 2007; Liu et al., 2010; Mark et al., 2006; Melkevik et al., 2010; Murdey et al., 2004; Myers et al., 1996; Nelson et al., 2005; Norman et al., 2005; Ortega et al., 2011; Shan et al., 2010; Sisson et al., 2009; Smith et al., 2010; Torsheim et al., 2010; Trang et al., 2009; Tudor-Locke et al., 2003; Vereecken et al., 2006; Wiecha et al., 2006; Wong et al., 1992)including three that used(Anderson et al., 2008; Foltz et al., 2011; Rodrigues et al., 2010a; Whitt-Glover et al., 2009), and four samples specifically supporting that children had the lowest levels of sedentary behaviours(Alamian and Paradis, 2009; Ekelund et al., 2006; Gordon-Larsen et al., 2002; Leatherdale and Wong, 2008; Lowry et al., 2009; Lowry et al., 2002; Taveras et al., 2007; Wong and Leatherdale, 2009). Fifteen samples suggested that there was no significant relationship between age and sedentary behaviour (Atkin et al., 2008; Bauer et al., 2008; Biddle et al., 2009b; Biddle et al., 2009b; Brodersen et al., 2007; Cui et al., 2011; Davison et al., 2005; Dietz and Gortmaker, 1985; Gorely et al., 2009; Hoelscher et al., 2009; Martinez-Gomez et al., 2010; Morales-Ruan et al., 2009; Ortega et al., 2010; Ortega et al., 2007; Rey-Lopez et al., 2009; Thibault et al., 2010; Vandewater et al., 2004; Vicente-Rodriguez et al., 2008; Vincente-Rodriguez et al., 2009). Of the 64 samples relating sedentary behaviour to age, 20 samples assessed general screen time, of which 8 found that screen time increased with age (Carson et al., 2009; Devis-Devis et al., 2009; Iannotti et al., 2009; Iannotti et al., 2009b; Li et al., 2007a; Mark et al., 2006; Melkevik et al., 2010; Myers et al., 1996; Shan et al., 2010; Sisson et al., 2009; Smith et al., 2010; Torsheim et al., 2010; Vereecken et al., 2006; Wiecha et al., 2001), 6 found that screen time was highest among adolescents (Al-Hazzaa et al., 2011; Atherson and Metcalf, 2005; Berkey et al., 2003; Eisenmann et al., 2002; Jansen et al., 2009; Olds et al., 2009; Olds et al., 2010; Pate et al., 1996; Springer et al., 2006a), 3 found that children had the highest levels of screen time (Cui et al., 2011; Gordon-Larsen et al., 2002; Gordon-Larsen et al., 1999; Leatherdale and Wong, 2008; Scully et al., 2007; Wong and Leatherdale, 2009), and 3 found no significant relationship between screen time and age (Bauer et al., 2008; Martinez-Gomez et al., 2010; Nelson and Gordon-Larsen, 2006; Ortega et al., 2010; Ortega et al., 2007; Rey-Lopez et al., 2009; Simetin et al., 2009; Vicente-Rodriguez et al., 2008; Vincente-Rodriguez et al., 2009; Vincente-Rodriguez et al., 2008). Eleven assessed TV/Video time specifically, of which five found that TV time increased with age (Crespo et al., 2001; Hesketh et al., 2007a; Nelson and Gordon-Larsen, 2006; Nelson et al., 2005; Wong et al., 1992), one found that TV time was highest among adolescents (Alamian and Paradis, 2009), two found that children had the highest levels of TV time (Ekelund et al., 2006; Lowry et al., 2002) and three found no significant relationship between age and TV time(Davison et al., 2005; Davison et al., 2006; Hesketh et al., 2006; Lowry et al., 2009) (Davison et al., 2006; Brodersen et al., 2007; Hesketh et al., 2006; Lowry et al., 2009). Twenty-three samples assessed general reported sedentary behaviour (Sitting, TV, video games, homework, and hobbies, of which

11 found that general sedentary behaviours increased with age (Bagley et al., 2006; Bradley et al., 2000; Hardy et al., 2006b; Hardy et al., 2009; Hussey et al., 2007; Lioret et al., 2007; Murdey et al., 2004; Norman et al., 2005; Ortega et al., 2011; Rodrigues et al., 2010b; Tudor-Locke et al., 2003; Wake et al., 2003), four found that general sedentary behaviours were highest among adolescents (Anderson et al., 2008; Brodersen et al., 2005; Cooper et al., 2006; Foltz et al., 2011; Whitt-Glover et al., 2009), three found that children had the highest levels of general sedentary behaviours (Cui et al., 2011; Taveras et al., 2007; Trang et al., 2009), and five found no significant relationship between general sedentary behaviours and age (Atkin et al., 2008; Biddle et al., 2009b; Biddle et al., 2009c; Brodersen et al., 2007; Gorely et al., 2009; Hoelscher et al., 2009; Thibault et al., 2010; Vandewater et al., 2004). One study assessed each of computer time and sedentary socializing (Leathedale et al., 2010; Leatherdale, 2010) separately from other sedentary behaviours and found that youth (aged 14-18) had the highest levels of computer time (Jackson et al., 2010). These results suggest that age is positively related to all accelerometer-measured sedentary behaviours, as well as being linked to screen based sedentary behaviours, with TV time being highest during adolescence, and computer and internet use increasing as young people approach adulthood. (see Table 2).

Of the studies assessing age with respect to sedentary behaviours, 14 were considered high quality, low risk of bias, while the other 50 were of moderate quality and risk of bias. The results of the higher quality and lower bias samples were consistent with the overall findings of the full collection of samples.

Physical Maturity

Five studies assessed the relationship between physical maturity and sedentary behaviour. These comprised four cross sectional studies, and one longitudinal study. Three studies assessed general sedentary behaviours, and showed a positive relationship to physical maturity (Murdey et al., 2004, 2005; Ortega et al., 2011). Two studies assessed screen time with respect to physical maturity, and both found a negative relationship (Lajous et al., 2009; Olds et al., 2009). These results suggest that although sedentary behaviours may increase as youth achieve physical maturity, their sedentary time is no longer spent in screen behaviours.

Four of the five studies assessing sedentary behaviours with respect to sedentary behaviours were of moderate quality and risk of bias, and one was of high quality and low risk of bias. The high quality study supported children being more sedentary as they reached physical maturity with accelerometer measured counts (Ortega et al., 2011).

Gender

A total of 124 samples reported on the relationship of gender to sedentary behaviours. Studies assessing gender differences were cross sectional (n = 94), longitudinal (n = 26), and cohort design (n = 4). Study populations were based in North America, Europe, Australia and New Zealand, Asia, South America, and on pan continental populations. Forty-five samples assessed general screen time, 24 of which found significant evidence that males spent more time in screen behaviours compared to females (Atherson and Metcalf, 2005; Berkey et al., 2003; Biddle et al., 2009c; Cao et al., 2011; Carson et al., 2009; Cui et al., 2011; Cummings and Vandewater, 2007; Devis-Devis et al., 2009; Eisenmann et al., 2002;

Fairclough et al., 2009; Fazah et al., 2010; Gordon-Larsen et al., 2002; Gordon-Larsen et al., 1999; He et al., 2010; Hernandez et al., 1999; Iannotti et al., 2009; Iannotti et al., 2009b; Jackson et al., 2010; Jansen et al., 2009; Janz et al., 2005; Loucaides et al., 2011; Mark et al., 2006; Martinez-Gomez et al., 2010; Martinez-Gomez et al., 2010b; Melkevik et al., 2010; Morales-Ruan et al., 2009; Mota et al., 2007; Motl et al., 2006; Nagel et al., 2009; Olds et al., 2006; Olds et al., 2009; Ortega et al., 2010; Ortega et al., 2007; Pate et al., 1996; Rey-Lopez et al., 2009; Rey-Lopez et al., 2010; Shan et al., 2010; Sisson et al., 2009; Springer et al., 2006b; te Velde et al., 2007; Torsheim et al., 2010; Vereecken et al., 2006; Vicente-Rodriguez et al., 2008; Vincente-Rodriguez et al., 2009; Wake et al., 2003; Wen et al., 2009). Four samples contradicted this and found that females spent more time in screen related behaviours compared to males (Al-Hazzaa et al., 2011; Koezuka et al., 2006; Myers et al., 1996; Sirard et al., 2010; Sisson et al., 2009), and 14 samples found no significant differences in screen time between genders (Alamian and Paradis, 2009; Barnett et al., 2010; Bauer et al., 2008; Biddle et al., 2009c; Boone et al., 2007; Brodersen et al., 2005; Burke et al., 2006; Chaput et al., 2006; Granich et al., 2011; Hohepa et al., 2009; Huang et al., 2011; Hussey et al., 2001; Lajous et al., 2009; Liu et al., 2010; Martinez-Gomez et al., 2010; Martinez-Gomez et al., 2010b; Murdey et al., 2004; Nelson and Gordon-Larsen, 2006; Olds et al., 2010; Ortega et al., 2010; Ortega et al., 2007; Primack et al., 2009; Rey-Lopez et al., 2009; Simetin et al., 2009; Trost et al., 2009; Trost et al., 1999; Ussher et al., 2007; Vicente-Rodriguez et al., 2008; Vincente-Rodriguez et al., 2009). Of the 24 samples comparing general sedentary behaviour to gender, 12 samples found that males participated in significantly higher amounts of sedentary behaviour (Barr-Anderson et al., 2008; Brodersen et al., 2005; Gorely et al., 2009; Hume et al., 2009; Jackson et al., 2008; Mathers et al., 2009; Mushtaq et al., 2011; Norman et al., 2005; Raudsepp et al., 2008; Taveras et al., 2007; Thibault et al., 2010; Tudor-Locke et al., 2007; Utter et al., 2003; Wagner et al., 2006; Wake et al., 2003; Zabinski et al., 2007), five samples found that females were more sedentary than males (Bradley et al., 2000; Hardy et al., 2007; Hardy et al., 2006; Hardy et al., 2009; Khunti et al., 2007; Santos et al., 2005; Trang et al., 2009), and six samples found no significant relationship between gender and sedentary behaviours (Brodersen et al., 2005; Marshall et al., 2002; Murdey et al., 2004, 2005; Nogueira and da Costa, 2009; Purslow et al., 2008; Schmitz et al., 2002; Vaughan et al., 2007). Of the 22 samples considering passive screen time (TV/video viewing) with respect to gender, 13 samples found that males watched significantly more TV compared to females (Andersen et al., 1998; Anderson et al., 2008; Atkin et al., 2008; Biddle et al., 2009b; Biddle et al., 2009c; Crespo et al., 2001; Cui et al., 2011; Delmas et al., 2007; Eisenmann et al., 2008; Ekelund et al., 2006; Foltz et al., 2011; Gorely et al., 2009; Karaca et al., 2011; Liou et al., 2010; Lowry et al., 2002; Patnode et al., 2011; Patrick et al., 2004; Rey-Lopez et al., 2010; Shannon et al., 1991; Tudor-Locke et al., 2003; Utter et al., 2006; Vaughan et al., 2007; Whitt-Glover et al., 2009), two studies found that females participated in more passive screen time than males (Bagley et al., 2006; Dumith et al., 2010; Roemmich et al., 2007), and six samples found that there was no significant relationship

Table 2: Relationships between sedentary behaviours and correlates.

Correlate	Sedentary Behaviour	Number	Association
Age (64):			
(Older)	Screen Time	20	~
	TV/Video Time	11	~
	General Sedentary Behaviour	23	~
	Accelerometers	3	+
Physical Maturity (4):			
(More Physically Mature)	General Sedentary Behaviour	3	+
Gender (124):			
(Males)	Screen Time	45	~
	General Sedentary Behaviour	24	~
	TV/Video Time	23	+
	Computer Time	5	+
	Video Games	6	+
	Reading/Homework	3	-
	Accelerometers	6	0
Ethnicity (23):			
(Non-Caucasian)	Screen Time	10	+
	General Sedentary Behaviour	6	+
	TV/Video Time	6	+
SES (36):			
(High)	Computer/Video Games	6	+
	Screen Time	15	-
	General Sedentary Behaviour	9	-
	TV/Video Time	5	-
Week/Weekend (19):			
(Weekend)	TV Time	6	+
	Screen Time	8	+
	General Sedentary Behaviour	6	+
Urban/Rural (6)			
(Urban)	Screen Time	6	+
Neighbourhood Satisfaction and Safety (9):			
(Higher safety and aesthetics)	TV Time	5	-
	Screen Time	3	-
Access (22):			
	TV Time	9	+
	Screen Time	5	+
Sleep (10):			
(Sleep Duration)	Screen Time	3	-
Mental Wellbeing (14):			
(Self Esteem)	Screen Time	10	-

between gender differences and television viewing (Hager, 2006; Hoelscher et al., 2009; Lowry et al., 2009; Saelens et al., 2002; Salmon et al., 2005; Tammelin et al., 2007). Computer and video game time was found to be

significantly higher in males in all six samples assessing it separately (Biddle et al., 2009b; Dumith et al., 2010; Hoelscher et al., 2009; Liou et al., 2010; Patnode et al., 2011; Salmon et al., 2005). General computer time was also found to be significantly higher in males in four of the five studies that looked at it separately (Gorely et al., 2009; Ho and Lee, 2001; Liou et al., 2010; Patnode et al., 2011); the fifth study found no significant relationship between gender and computer time (Salmon et al., 2005). The five studies examining sedentary socializing (Leathedale et al., 2010; Leatherdale, 2010; Patnode et al., 2011), sitting time (Gorely et al., 2009), and reading and/or homework time (Biddle et al., 2009c; Liou et al., 2010; Rey-Lopez et al., 2010; Tudor-Locke et al., 2003) with respect to gender all found that females spent more time in those behaviours compared to males. One Study also found that females spend more time using the internet than males (Jackson et al., 2010). Three of the seven samples comparing accelerometer measured sedentary counts to gender found no significant differences between genders (Hager, 2006; Patnode et al., 2011; Purslow et al., 2008; Trost et al., 1999), two found that male children and adolescents had higher sedentary behaviour counts (Anderson et al., 2008; Hussey et al., 2007), and two found that females had higher sedentary counts (Ekelund et al., 2004; Rodrigues et al., 2010b). Overall, males in general were found to spend significantly more time in screen based sedentary behaviours such as video games and watching television, while females spent significantly more time using the internet, doing homework, and in non-screen sedentary behaviours (see Table 2).

Nineteen of the 124 samples assessing gender with respect to sedentary behaviours were considered to be of high quality and low risk of bias, with the other 105 being of moderate quality and risk of bias. The results of the higher quality and lower bias samples were consistent with the overall findings of the full collection of samples.

Ethnicity

The ethnicities assessed were primarily Black, White, Asian, and Hispanic. Ten of these samples assessed ethnicity with respect to screen time (Anderson et al., 2008; Atherson and Metcalf, 2005; Beets and Foley, 2010; Brodersen et al., 2005; Eisenmann et al., 2002; Foltz et al., 2011; Gordon-Larsen et al., 2002; Gordon-Larsen et al., 1999; Myers et al., 1996; Pate et al., 1996; Singh et al., 2008; Singh et al., 2008b; Singh et al., 2008c; Sisson et al., 2010; Sisson et al., 2011; Sisson et al., 2009; Springer et al., 2006a; Springer et al., 2006b; Whitt-Glover et al., 2009) six with respect to general sedentary behaviours (Andersen et al., 1998; Brodersen et al., 2007; Brodersen et al., 2005; Hardy et al., 2007; Hardy et al., 2009; Norman et al., 2005; Thomas et al., 1993), and six samples assessed ethnicity with respect to TV viewing (Gordon-Larsen et al., 2002; Lowry et al., 2009; Lowry et al., 2002; Saelens et al., 2002; Urrutia-Rojas et al., 2008; Wolf et al., 1993). Of the six samples comparing TV/Video time to ethnicity, three found that Black children and adolescents watched the most TV/Videos (Andersen et al., 1998; Crespo et al., 2001; Hoelscher et al., 2009; Urrutia-Rojas et al., 2008), two found that both Hispanic and Black young people had higher viewing tendencies (Brodersen et al., 2007; Lowry et al., 2002), one found that Hispanic youth alone watched the greatest amount of TV time (Saelens et al., 2002), and one found

no significant relationship between TV time and ethnicity (Lowry et al., 2009). Of the 10 samples assessing general screen time with respect to ethnicity, six studies found that Black young people spent the greatest time in screen behaviours (Atherson and Metcalf, 2005; Eisenmann et al., 2002; Foltz et al., 2011; Gordon-Larsen et al., 2002; Gordon-Larsen et al., 1999; Brodersen et al., 2007; Myers et al., 1996; Pate et al., 1996; Springer et al., 2006a), two samples suggested that Black and Hispanic young people both spent significantly more time in screen behaviours (Singh et al., 2008; Singh et al., 2008b; Singh et al., 2008c; Sisson et al., 2011; Sisson et al., 2009), one study found that Asian and Black youth spent the greatest time in screen behaviours (Brodersen et al., 2005), and one study found that Hispanic youth alone spent the greatest time in screen behaviours (Beets and Foley, 2010). Of the six samples assessing general sedentary behaviour, two found that Black young people were the most sedentary (Bradley et al., 2000; Brodersen et al., 2007), two found that Asian young people were the most sedentary (Brodersen et al., 2005; Hardy et al., 2006b; Hardy et al., 2009), and two found that non-Caucasian young people were most likely to have high reported sedentary behaviours (Norman et al., 2005; Springer et al., 2006b), Overall, Black youth were found to spend the greatest time in sedentary behaviours, followed by young people of Hispanic descent, compared to their White and Asian descent peers (see Table 2). Due to the specific countries of origin, these results may not be predictive of the trends outside of the United States, U.K., or Australia.

Six of the 23 samples assessing sedentary behaviours with respect to ethnicity were high quality and low risk of bias, while the other 17 were of moderate quality and bias. Three supported Black youth having the greatest prevalence of sedentary behaviours, one found that Asian and Black youth were more sedentary than their peers, one found that Asian youth alone were most sedentary, and one high quality/low risk of bias sample found no significant differences among sedentary behaviours based on ethnicity.

Immigrant status was assessed in three moderate quality and risk of bias cross sectional samples (Nagel et al., 2009; Renzaho et al., 2008; Singh et al., 2008; Singh et al., 2008b; Singh et al., 2008c; Sisson et al., 2011). The study populations were based in Australia, Germany, and the U.S.A. In two of the studies, screen time was lower in immigrant youth compared to those born in the country, while in the third, sedentary behaviour in general was higher among young people who had immigrated to the country (Nagel et al., 2009), suggesting that immigrant youth may watch less TV, but are also more sedentary compared to their non-immigrant peers. However, due to the limited number of studies assessing immigrant status with respect to sedentary behaviours, more research is required before any generalizations can be made.

Socio-Economic Status (SES)

Thirty-six samples focused on sedentary behaviour with respect to socio-economic status (SES). Samples assessing SES were cross sectional (n = 33) and longitudinal (n = 3). Samples were drawn from North America, Australia, the United Kingdom, Europe, Asia, and South America, as well as two being based on international samples. Twenty-five of the samples comparing

SES to sedentary behaviours found a negative correlation (Alamian and Paradis, 2009; Bellisle and Rolland-Cachera, 2007; Brodersen et al., 2007; Brodersen et al., 2005; Cao et al., 2011; Carson et al., 2009; Collins et al., 2008; Fairclough et al., 2009; Gorely et al., 2009; Granich et al., 2011; Iannotti et al., 2009; Iannotti et al., 2009b; Jackson et al., 2010; Jackson et al., 2008; Li et al., 2007a; Lioret et al., 2007; Mark et al., 2006; Melkevik et al., 2010; Morgenstern et al., 2009; Olds et al., 2006; Salmon et al., 2005; Shannon et al., 1991; Singh et al., 2008; Singh et al., 2008b; Singh et al., 2008c; Sisson et al., 2010; Sisson et al., 2011; Smith et al., 2010; Thibault et al., 2010; Torsheim et al., 2010; Vereecken et al., 2006), eight found a positive correlation (Brodersen et al., 2005; Dumith et al., 2010; Brodersen et al., 2007; Hernandez et al., 1999; Hesketh et al., 2007a; Jackson et al., 2010; Mushtaq et al., 2011; Olds et al., 2010; van Sluijs et al., 2010), and three studies found no significant relationship (Anderson et al., 2008; Foltz et al., 2011; Jansen et al., 2009; Wagner et al., 2006; Whitt-Glover et al., 2009). Six samples compared time spent playing computer and video games to SES. Four of these samples found a positive relationship (Brodersen et al., 2005; Dumith et al., 2010; Brodersen et al., 2007; Hernandez et al., 1999), one found a significant negative relationship (Fairclough et al., 2009), and one of the studies focusing on computer time found a positive relationship to SES (Jackson et al., 2010). One sample assessing non-screen sedentary behaviours was positively associated with SES (Olds et al., 2010). Of the samples comparing SES to general sedentary behaviour, six found a significant negative relationship to SES (Brodersen et al., 2007; Brodersen et al., 2005; Li et al., 2007a; Lioret et al., 2007; Salmon et al., 2005; Torsheim et al., 2010), two samples assessing general sedentary behaviours found a positive relationship to SES (Mushtaq et al., 2011), including one based on accelerometer measured sedentary behaviour counts (van Sluijs et al., 2010), and one found no significant relationship between general sedentary behaviour and SES (Wagner et al., 2006). Thirteen of the 15 samples comparing screen time to SES found a negative relationship (Cao et al., 2011; Carson et al., 2009; Collins et al., 2007; Granich et al., 2011; Iannotti et al., 2009; Iannotti et al., 2009b; Jackson et al., 2010; Mark et al., 2006; Martinez-Gomez et al., 2010; Melkevik et al., 2010; Morgenstern et al., 2009; Olds et al., 2006; Ortega et al., 2010; Ortega et al., 2007; Rey-Lopez et al., 2009; Singh et al., 2008; Singh et al., 2008b; Singh et al., 2008c; Sisson et al., 2010; Sisson et al., 2011; Torsheim et al., 2010; Vereecken et al., 2006; Vicente-Rodriguez et al., 2008; Vincente-Rodriguez et al., 2009), and two found no significant relationship (Anderson et al., 2008; Foltz et al., 2011; Jansen et al., 2009; Whitt-Glover et al., 2009). The five samples comparing SES to TV time all found a significant negative relationship (Alamian and Paradis, 2009; Bellisle and Rolland-Cachera, 2000; Casey et al., 2001; Fairclough et al., 2009; Gorely et al., 2009; Hesketh et al., 2007b; Salmon et al., 2005; Shannon et al., 1991). Nine of the 36 samples comparing SES to sedentary behaviours were high quality and low risk of bias, while the remaining 27 were of moderate quality and risk of bias. Six of the high quality studies found that sedentary behaviours were negatively associated with SES, two found no significant differences among economic status, and one found that accelerometer measured sedentary behaviours were

highest among high SES children and youth.

Although the relationship between SES and sedentary behaviours was significantly negative, the type of sedentary behaviour assessed was important, because children and adolescents from lower economic backgrounds tended to spend more time in passive screen behaviours (e.g. watching TV), while those from higher economic backgrounds tended to center their sedentary behaviours around more engaged activities (e.g., video games). The research underscores the importance of assessing types of sedentary behaviours rather than sedentary behaviour as a whole (see Table 2). It is also important to acknowledge that many of the samples finding that sedentary behaviours were more common in higher SES populations were based in parts of the world where families of lower economic status would be less likely to have access to televisions and computers.

Environmental Factors: Week/Weekend

Nineteen samples assessed sedentary behaviours comparing week to weekend days. Samples were cross sectional (n = 17), longitudinal (n = 1), and cohort design (n = 1). Study populations were based in Europe, North America, Asia, Australia, and the United Kingdom. Fifteen of the samples assessing prevalence on sedentary behaviours based on the day of the week found that children were more sedentary on weekends (Atkin et al., 2008; Biddle et al., 2009a; Biddle et al., 2009b; Biddle et al., 2009b; Biddle et al., 2009c; Feldman et al., 2003; Gorely et al., 2009; Granich et al., 2011; Hardy et al., 2007; Hesketh et al., 2007a; Hesketh et al., 2009; Hesketh et al., 2007b; Karaca et al., 2011; Li et al., 2007a; Li et al., 2007b; Matheson et al., 2004; Nagel et al., 2009; Olds et al., 2006; Patrick et al., 2004; Shannon et al., 1991; Shi and Mao, 2011), while four studies found no differences between week and weekend days (Bathrellou and Lazarou, 2007; Rodrigues et al., 2010b; Shannon et al., 1991; Springer et al., 2010). Of the six samples comparing time of week to TV time, four found that TV time was higher on weekend days (Atkin et al., 2008; Biddle et al., 2009a; Biddle et al., 2009b; Biddle et al., 2009b; Gorely et al., 2009; Hesketh et al., 2007b; Karaca et al., 2011; Matheson et al., 2004; Nagel et al., 2009; Patrick et al., 2004), and two found no significant difference between week and weekend days (Bathrellou and Lazarou, 2007; Shannon et al., 1991). Seven of the eight samples comparing screen time, to time of the week found that screen time was higher on weekend days (Atkin et al., 2008; Gorely et al., 2009; Gorely et al., 2007; Hesketh et al., 2007a; Hesketh et al., 2007b; Li et al., 2007a; Li et al., 2007b; Matheson et al., 2004; Patrick et al., 2004; Shannon et al., 1991), and one found that there was no significant difference between week and weekend days (Bathrellou and Lazarou, 2007). Of the six samples comparing general sedentary behaviours to time of the week, four found that sedentary behaviours were higher on weekend days (Biddle et al., 2009c; Feldman et al., 2003; Hardy et al., 2007; Li et al., 2007a), and two studies, including one using accelerometer measured counts (Rodrigues et al., 2010b), found that there was no significant difference in general sedentary behaviour between week and weekend days. One sample found that although TV time was higher on weekend days, homework time was higher on weekdays (Atkin et al., 2008; Biddle et al., 2009b; Biddle et al., 2009b; Gorely et al., 2009).

Four of the 19 samples comparing week sedentary behaviours to weekend sedentary behaviours were of high quality and low risk of bias, al of which found that sedentary behaviours were higher on weekend days.

With the exceptions of homework and computer use, sedentary behaviours were significantly higher on weekend days compared to weekdays (see Table 2).

Urban/Rural

Seven moderate quality and risk of bias samples assessed whether urban vs. rural locale affected sedentary behaviours. Sample populations were based in Australia, Europe, the United States and one population was based on a pan continental population. All samples were cross sectional; six compared locale to screen time and one compared location to general sedentary behaviour. One found no significant difference (Bathrellou and Lazarou, 2007), five samples found that urban young people spent had higher screen time than rural youth (Atherson and Metcalf, 2005; Eisenmann et al., 2002; Hardy et al., 2006b; Hardy et al., 2009; Mushtaq et al., 2011; Pate et al., 1996; Smith et al., 2010; Springer et al., 2006a), and one sample found that rural young people had higher screen time compared to urban youth (Carson et al., 2009; Iannotti et al., 2009; Iannotti et al., 2009b; Mark et al., 2006; Melkevik et al., 2010; Torsheim et al., 2010; Vereecken et al., 2006). Overall, study samples assessing sedentary behaviours with respect to urban/rural living suggest that urban children and adolescents have higher overall screen time compared to their rural peers. However, due to the limited samples available, more research is required before these results can be considered conclusive.

Neighbourhood Satisfaction and Aesthetic Variables

Nine studies assessed the relationship between neighbourhood satisfaction, aesthetics, and safety and sedentary behaviour. Studies were cross sectional (n = 5), longitudinal (n = 3), and cohort design (n = 1). Sample populations were based in North America, South America, the United Kingdom, and Asia. All five of the studies comparing neighbourhood factors to TV time found a significant negative association (Cecchini et al., 2009; Cecil-Karb and Grogan-Kaylor, 2009; Gable et al., 2007; Gordon-Larsen et al., 2004; Roemmich et al., 2007). Three studies compared neighbourhood factors to screen time, two of which found a negative relationship (Carson et al., 2010; Brodersen et al., 2005), and one found a positive relationship (Dumith et al., 2010). Two studies assessed general sedentary behaviours with respect to neighbourhood aesthetics; one found a positive association (Carson et al., 2009), and one found no significant difference between different aesthetic neighbourhoods when using accelerometers (Evenson et al., 2007). Overall, although limited samples were available, TV time was negatively associated with neighbourhood factors; while overall screen time and accelerometer counts were not significantly related to neighbourhood factors (see Table 2).

Six of the nine samples comparing neighbourhood factors to sedentary behaviours are of high quality and low risk of bias, while the other three are of moderate quality and risk of bias. Four of these found a significant negative relationship between neighbourhood aesthetics and low safety, while two found no significant relationship between

neighbourhood factors and sedentary behaviours.

Access to Media/Electronics

Sixteen samples assessed sedentary behaviours with respect to access to media/electronics. Samples were cross sectional (n = 13), longitudinal (n = 2), and cohort (n =1). Sample populations were based in North America, Australia, Europe, and Asia. 14 samples assessed whether having a television in the bedroom had an impact on sedentary behaviours (Barr-Anderson et al., 2008; Cui et al., 2011; Delmas et al., 2007; Jago et al., 2007; Jago et al., 2008; Li et al., 2007b; Morgenstern et al., 2009; Owens et al., 1999; Ramirez et al., 2010; Rey-Lopez et al., 2010; Saelens et al., 2002; Sirard et al., 2010; Songül et al., 2002; Springer et al., 2010; Utter et al., 2003; van Sluijs et al., 2010; van Zutphen et al., 2007; Wiecha et al., 2001), five assessed whether number of television sets in the household had an impact on sedentary behaviours (Jago et al., 2008; Owens et al., 1999; Saelens et al., 2002; Sirard et al., 2010; van Sluijs et al., 2010; Wiecha et al., 2001), and one study assessed each of having a VCR in the home (Saelens et al., 2002). Having a video game system in the bedroom (Ramirez et al., 2010), or having a computer in the bedroom (Li et al., 2007b; Rey-Lopez et al., 2010), respectively. All of the samples assessing access to media with respect to screen time found a positive relationship. The other nine samples assessed access to media/electronics with respect to TV time, eight of which found a positive relationship to sedentary behaviours (Delmas et al., 2007; Roemmich et al., 2007; Saelens et al., 2002; Springer et al., 2010; van Sluijs et al., 2010; van Zutphen et al., 2007), and one found no significant relationship between having a television in the bedroom and TV time (Songül et al., 2002). Four of the 16 samples comparing access to media/electronics are high quality and low risk of bias, all of which found a significant positive relationship between children having easy access to a television or entertainment system and sedentary behaviours. The other 12 samples were of moderate quality and risk of bias. Due to the ease with which children and adolescents can sit down and engage in screen time, access to media/electronics has a significant positive relationship to overall sedentary behaviour (see Table 2).

Behavioural Correlates

Sleep Behaviours

Ten samples assessed the relationship between sedentary behaviours and sleep. Sample populations were cross sectional (n=9), and longitudinal (n=1). Studies were based in Australia, South America, North America, Asia, and Europe. Eight samples compared sleep duration to sedentary behaviours. Two of the ten samples comparing sedentary behaviours to sleep time are of high quality and low risk of bias, while the remaining eight are of moderate quality and bias.

Three samples looked at sleep duration with respect to general screen time (Li et al., 2007b; Martinez-Gomez et al., 2010b; Olds et al., 2006; Ortega et al., 2010; Ortega et al., 2011; Ortega et al., 2007; Shi et al., 2010; Vincente-Rodriguez et al., 2009; Vincente-Rodriguez et al., 2008), two with respect to TV time (Johnson et al., 2004; Owens et al., 1999; Wells et al., 2008), and two with respect to sedentary behaviours in general (Murdey et al., 2004; Nishiyasu et al., 1993). All eight samples comparing sleep duration to sedentary behaviours found that sleep duration decreased as sedentary behaviours increased. One study

assessed bedtime and wake time when compared to screen time, and found that children and adolescents both went to bed later and slept in later in the morning as their screen time increased (Li et al., 2007b). One study assessed sleep disturbances with respect to TV time, and found that as TV time increased, so did disturbed sleep (Johnson et al., 2004). Although only ten samples assessed sleep with respect to sedentary behaviours, the results overwhelmingly suggest that increased time spent in sedentary behaviours is related to lower quality sleep (see Table 2).

Psychological Correlates

Sixteen samples assessed self-esteem, quality of life, and psychological well-being with respect to sedentary behaviours. Samples were cross sectional (n = 15), and longitudinal (n = 1). Sample populations were based in North America, South America, Europe, and two were based on samples drawn from an international population. Thirteen of the 16 samples found a significant negative relationship between self-esteem and sedentary behaviours (Attenwell and Suazo-Garcia, 2003; Boone et al., 2007; Brodersen et al., 2005; Cao et al., 2011; Carson et al., 2009; Dumith et al., 2010; Iannotti et al., 2009; Iannotti et al., 2009b; Jago et al., 2007; Katon et al., 2010; Liu et al., 2010; Mark et al., 2006; Melkevik et al., 2010; Nelson and Gordon-Larsen, 2006; Nelson et al., 2005; Norman et al., 2005; Primack et al., 2009; Schmitz et al., 2002; Torsheim et al., 2010; Ussher et al., 2007; Vereecken et al., 2006). One study found there was no significant relationship between self-esteem and screen time (Murdey et al., 2004), and one found a positive relationship between self-esteem and cell phone use (Jackson et al., 2010). The samples finding a negative relationship between sedentary behaviour and self-esteem assessed a variety of different sedentary behaviours: video games (Jackson et al., 2010), TV time (Nelson and Gordon-Larsen, 2006; Nelson et al., 2005), screen time(Dumith et al., 2010; Jago et al., 2007; Nelson and Gordon-Larsen, 2006; Nelson et al., 2005; Nelson et al., 2006; Norman et al., 2005; Ussher et al., 2007), general sedentary behaviour (Jago et al., 2007; Norman et al., 2005), internet use (Jackson et al., 2010), computer time (Attenwell and Suazo-Garcia, 2003), and accelerometer measured sedentary behaviour counts (Jago et al., 2007). Quality of life and psychological wellbeing were also negatively associated with screen time (Cao et al., 2011; Carson et al., 2011; Dumith et al., 2010; Iannotti et al., 2009; Iannotti et al., 2009b; Mark et al., 2006; Melkevik et al., 2010; Samdal et al., 2007; Torsheim et al., 2010; Vereecken et al., 2006), and four samples found that psychological factors such as depression were positively associated with computer time (Dumith et al., 2010; Katon et al., 2010; Schmitz et al., 2002), screen time(Boone et al., 2007; Liu et al., 2010; Primack et al., 2009), and sedentary behaviours in general (Brodersen et al., 2005). Overall, self-esteem was negatively associated with sedentary behaviours, and depression was positively associated with sedentary behaviours (see Table 2).

Two of the 16 samples comparing psychological correlates to sedentary behaviours are of high quality and low risk of bias, while the remaining 14 are of moderate quality and risk of bias. The results of the higher quality and lower bias samples were consistent with the overall findings of the full collection of samples.

Risk Behaviours

Seven cross-sectional samples assessed the impact of sedentary behaviours on risk behaviours such as smoking, drinking, and drug use. Samples were based on populations from Europe, North America, Africa, and one was drawn from an international base. Three samples assessed TV time with respect to participation in risk behaviours (Alamian and Paradis, 2009; Nelson and Gordon-Larsen, 2006; Nelson et al., 2005), one sample assessed sedentary behaviour in general (Peltzer, 2009) and two assessed screen time (Carson et al., 2009; Iannotti et al., 2009; Iannotti et al., 2009b; Leatherdale and Wong, 2008; Mark et al., 2006; Melkevik et al., 2010; Torsheim et al., 2010; Vereecken et al., 2006; Wong and Leatherdale, 2009), all of which found a positive relationship. Two studies assessed computer time with respect to participation in risk behaviours. One found a positive relationship (Carson et al., 2009), and one found a negative relationship (Shi and Mao, 2011). Finally, the study finding no significant relationship between sedentary behaviours and risk behaviours assessed video game time (Carson et al., 2009). Overall, sedentary behaviours seem related to a higher likelihood of participation in risk behaviours. However, the differences between the types of sedentary behaviours (e.g., television viewing compared to video games) and participation in risk behaviours could potentially have an impact on future research in this area.

Two of the eight samples comparing risk behaviours to sedentary behaviours are of high quality and low risk of bias, while the remaining six are of moderate quality and risk of bias. The results of the higher quality and lower bias samples were consistent with the overall findings of the full collection of samples.

Physical Activity

Sixty samples assessed the relationship between physical activity and sedentary behaviours. Studies were cross sectional (n=48), longitudinal (n=11), and cohort (n=1). Samples were drawn from North America, Europe, Australia and New Zealand, Asia, South America, and three were based on international populations. Forty-four samples found a significant negative relationship between physical activity and sedentary behaviour (Al-Hazzaa et al., 2011; Anderson et al., 2008; Atherson and Metcalf, 2005; Atkin et al., 2008; Attenwell and Suazo-Garcia, 2003; Barnett et al., 2010; Barr-Anderson et al., 2008; Bauer et al., 2008; Bellisle and Rolland-Cachera, 2007; Biddle et al., 2009b; Biddle et al., 2009b; Biddle et al., 2009c; Boone et al., 2007; Cameron et al., 2011; Carson et al., 2009; Delmas et al., 2007; Dumith et al., 2010; Eisenmann et al., 2008; Eisenmann et al., 2002; Evenson et al., 2007; Foltz et al., 2011; Gordon-Larsen et al., 2002; Gordon-Larsen et al., 1999; Gorely et al., 2009; Graff et al., 2011; Hager, 2006; Hohepa et al., 2009; Iannotti et al., 2009; Iannotti et al., 2009b; Jackson et al., 2010; Jackson et al., 2008; Jago et al., 2007; Khunti et al., 2007; Koezuka et al., 2006; Leatherdale and Wong, 2008; Liu et al., 2010; Mark et al., 2006; Melkevik et al., 2010; Mota et al., 2007; Motl et al., 2006; Nelson and Gordon-Larsen, 2006; Nelson et al., 2005; Nelson et al., 2006; Olds et al., 2011; Pate et al., 1996; Primack et al., 2009; Raudsepp et al., 2008; Renzaho et al., 2008; Robinson et al., 1993; Salmon et al., 2005; Santos et al., 2005; Sigmund et al., 2008; Simetin et al., 2009; Singh et al., 2008; Singh et al., 2008b; Singh et al., 2008c; Sisson et al., 2010; Sisson et al.,

2011; Springer et al., 2006b; Steele et al., 2009; Tammelin et al., 2007; te Velde et al., 2007; Torsheim et al., 2010; Utter et al., 2003; Van den Bulck and Hofman, 2009; Vereecken et al., 2006; Wen et al., 2009; Whitt-Glover et al., 2009; Wiecha et al., 2001; Wong et al., 1992; Wong and Leatherdale, 2009; Zabinski et al., 2007). Five samples found a significant positive relationship between sedentary behaviour and physical activity (Feldman et al., 2003; Laurson et al., 2008; Laurson et al., 2008b; Trost et al., 1999; Vandewater et al., 2006), and eight samples found no significant relationship (Delmas et al., 2007; Eisenmann et al., 2008; Fulton et al., 2001; Hager, 2006; Katzmarzyk et al., 1998; Kerner et al., 2004; Nelson and Gordon-Larsen, 2006; Nelson et al., 2005; Robinson et al., 1993; Van den Bulck and Hofman, 2009; Wong et al., 1992). Twenty-five samples compared screen time to physical activity, 20 of which found a significant negative relationship (Al-Hazzaa et al., 2011; Anderson et al., 2008; Atherson and Metcalf, 2005; Atkin et al., 2008; Barnett et al., 2010; Bauer et al., 2008; Biddle et al., 2009b; Biddle et al., 2009b; Boone et al., 2007; Carson et al., 2009; Eisenmann et al., 2002; Foltz et al., 2011; Gorely et al., 2009; Granich et al., 2011; Hohepa et al., 2009; Iannotti et al., 2009; Iannotti et al., 2009b; Liu et al., 2010; Mark et al., 2006; Melkevik et al., 2010; Mota et al., 2007; Motl et al., 2006; Nelson and Gordon-Larsen, 2006; Olds et al., 2011; Pate et al., 1996; Primack et al., 2009; Salmon et al., 2005; Springer et al., 2006a; Steele et al., 2009; te Velde et al., 2007; Torsheim et al., 2010; Trost et al., 1999; Vereecken et al., 2006; Wen et al., 2009; Whitt-Glover et al., 2009; Wiecha et al., 2001), and five of which found no significant relationship between screen time and physical activity (Fairclough et al., 2009; Kerner et al., 2004; Laurson et al., 2008; Laurson et al., 2008b; Van Der Horst et al., 2007). Fourteen samples compared TV time to physical activity. Twelve found a significant negative relationship (Biddle et al., 2010; Delmas et al., 2007; Eisenmann et al., 2008; Hager, 2006; Nelson and Gordon-Larsen, 2006; Nelson et al., 2005; Tammelin et al., 2007; Van den Bulck and Hofman, 2009; Wong et al., 1992) and two found no significant relationship (Feldman et al., 2003; Katzmarzyk et al., 1998). Nine of the 10 samples assessing general sedentary behaviours with respect to physical activity found a negative relationship (Anderson et al., 2008; Foltz et al., 2011; Hager, 2006; Jago et al., 2007; Salmon et al., 2005; Steele et al., 2009; Trost et al., 1999; Whitt-Glover et al., 2009), including four using accelerometers (Hager, 2006; Jago et al., 2007; Salmon et al., 2005; Steele et al., 2009; Zabinski et al., 2007). One sample found no significant relationship between accelerometer measured general sedentary behaviour and physical activity (Trost et al., 1999). Two samples compared video gaming to physical activity, both of which found a negative relationship (Dumith et al., 2010; Feldman et al., 2003). Five samples compared computer time to physical activity; four found a positive relationship (Barr-Anderson et al., 2008; Dumith et al., 2010; Ho and Lee, 2001; Koezuka et al., 2006; Santos et al., 2005), and one found a negative relationship (Attenwell and Suazo-Garcia, 2003). Four studies assessed reading/homework time with respect to physical activity; three found a positive relationship (Barr-Anderson et al., 2008; Koezuka et al., 2006; Utter et al., 2003), and one found no significant relationship (Feldman et al., 2003). Overall, screen based sedentary behaviours are significantly negatively

associated with lower physical activity, while non-screen sedentary behaviours such as reading and homework are associated with increased physical activity (see Table 2).

Thirteen of the 60 samples assessing physical activity with respect to sedentary behaviours are high quality and low risk of bias, while the remaining 47 samples are of moderate quality and risk of bias. The results of the higher quality and lower bias samples were consistent with the overall findings of the full collection of samples, ten finding that physical activity was significantly negatively correlated to sedentary behaviours, one finding that computer time was positively related to physical activity, and two finding no significant relationship between sedentary behaviours and physical activity.

Social Factors

Peer Influences

Four cross-sectional, moderate quality and risk of bias samples assessed the relationship between peer support for physical activity and sedentary behaviours (Carson et al., 2009; Cummings and Vandewater, 2007; Iannotti et al., 2009; Iannotti et al., 2009b; Leathedale et al., 2010; Leatherdale, 2010; Leatherdale and Wong, 2008; Mark et al., 2006; Melkevik et al., 2010; Springer et al., 2006b; Torsheim et al., 2010; Vereecken et al., 2006; Wong and Leatherdale, 2009). Samples were based in the United States, Europe, and one on an international population. Three samples found that peer support was negatively associated with screen time (Cummings and Vandewater, 2007; Leathedale et al., 2010; Leatherdale, 2010; Leatherdale and Wong, 2008; Wong and Leatherdale, 2009), and one sample found that peer support had no significant impact on overall sedentary behaviours (Springer et al., 2006b). More research is required, but these preliminary results suggest that peer activity and support may relate to time spent watching a screen, but may not have any impact on overall time spent in sitting (see Table 2).

Parental and Family Influences

Forty-five samples assessed the impact of parental variables on sedentary behaviours in their children. Samples were cross sectional (n = 43), and longitudinal (n = 2). Sample populations were based on North America, Australia, New Zealand, Europe, Asia, and three were based on pan-continental populations. Four samples assessed number of parents in the home with respect to their children's TV (Bagley et al., 2006) or overall screen time (Barnett et al., 2010; Cao et al., 2011; Hardy et al., 2006; Jackson et al., 2010; Jackson et al., 2008; Salmon et al., 2005). All four of these samples found that children and adolescents living with a single parent were significantly more likely to have higher TV/screen time compared to those living with two parents.

Twelve samples compared parental behaviours to their children's sedentary behaviours. Seven samples assessed parental screen time or enjoyment, all of which found a positive relationship to their children's sedentary behaviours (Cui et al., 2011; Davison et al., 2005; Kremers et al., 2007; Salmon et al., 2005; Songül et al., 2002; Springer et al., 2010; Wagner et al., 2006). The samples finding a positive relationship between the child's sedentary behaviours and their parents screen time assessed TV time (Davison et al., 2005; Springer et al., 2010), overall sedentary behaviours (Cui et al., 2011; Sigmund et al., 2008; Wagner et al., 2006), and screen time (He et al., 2010; Kremers

et al., 2007; Songül et al., 2002). Five samples compared parental physical activity to their child's sedentary behaviours. Three of these samples found a significant negative relationship between parental physical activity and their child's sedentary behaviours (Huang et al., 2011; Leatherdale and Wong, 2008; Sigmund et al., 2008; Wong and Leatherdale, 2009). Two compared parental physical activity to their children's screen time (Huang et al., 2011; Leatherdale and Wong, 2008; Wong and Leatherdale, 2009), and one compared it to general sedentary behaviours (Wagner et al., 2006). One sample found no significant relationship between parental physical activity and their children's sedentary behaviour when comparing it to accelerometer measured sedentary behaviour (Steele et al., 2009). These results suggest that parental behavioural modeling is significantly associated with childhood behaviours.

Nine samples assessed parental encouragement of their children to be physically active. Of these samples, eight compared parental encouragement to screen time (Hohepa et al., 2009; Huang et al., 2011; Jackson et al., 2008; Leathedale et al., 2010; Leatherdale, 2010; Leatherdale and Wong, 2008; Norman et al., 2005; Wong and Leatherdale, 2009), and all of these had a significant negative correlation. One study compared parental encouragement to be active to general sedentary behaviour (Springer et al., 2006b), and found no significant relationship either way.

Twelve samples compared parental education to their children's sedentary behaviours. Six of these samples assessed general screen time, four of which found a significant negative relationship (Jackson et al., 2010; Jackson et al., 2008; Martinez-Gomez et al., 2010; Mushtaq et al., 2011; Olds et al., 2010; Ortega et al., 2010; Ortega et al., 2007; Rey-Lopez et al., 2009; Smith et al., 2010; Vincente-Rodriguez et al., 2008), one found no significant relationship (Barnett et al., 2010), and one found a positive relationship (Mushtaq et al., 2011). Four samples compared parental education to TV time, three of which found a significant negative relationship (Alamian and Paradis, 2009; Bellisle and Rolland-Cachera, 2007; Hesketh et al., 2007a; Hesketh et al., 2009), while one found a positive relationship (Hesketh et al., 2006). Two studies assessed parental education with respect to accelerometer measured sedentary counts, and found a significant negative relationship (Salmon et al., 2005; Sirard et al., 2010). Overall, parental education had a significantly negative impact on the amount of time children and adolescents spent in sedentary behaviours.

Four samples assessed the affect that family viewing habits had on young peoples sedentary behaviours (Cummings and Vandewater, 2007; Davison et al., 2005; Songül et al., 2002; Warren et al., 2002; Yalcin et al., 2002). Three found a significant positive association between family viewing and sedentary behaviours in youth (Davison et al., 2005; Warren et al., 2002; Yalcin et al., 2002), and one found a significant negative relationship (Cummings and Vandewater, 2007). The three samples finding a positive relationship assessed screen time (Yalcin et al., 2002), and TV time (Davison et al., 2005; Warren et al., 2002) as their main variables. The negative association was found between family viewing and video games (Cummings and Vandewater, 2007), suggesting that the type of sedentary behaviour may be the cause of the difference between the findings.

Eleven samples assessed differences in sedentary behaviours due to family rules regarding viewing time (Barr-Anderson et al., 2010; Cui et al., 2011; Hardy et al., 2006; He et al., 2010; Hohepa et al., 2009; Ramirez et al., 2010; Salmon et al., 2005; Springer et al., 2010; van Zutphen et al., 2007; Warren et al., 2002; Wiecha et al., 2001). Six samples assessed screen time, five of which found a significant negative relationship between rules limiting screen time and the screen time (Cui et al., 2011; He et al., 2010; Hohepa et al., 2009; Ramirez et al., 2010; Springer et al., 2010; van Zutphen et al., 2007; Warren et al., 2002; Wiecha et al., 2001), and one sample found no significant relationship between perceived rules for television use and screen time (Barr-Anderson et al., 2010). Four samples compared TV time to family rules, and found a significant negative relationship (Hardy et al., 2006b; He et al., 2010; Hohepa et al., 2009; Springer et al., 2010; van Zutphen et al., 2007; Warren et al., 2002). Overall, family time had a negative relationship to sedentary behaviours, suggesting that family involvement can significantly reduce sedentary behaviours (see Table 2).

Fourteen of the 45 samples assessing physical activity with respect to sedentary behaviours are high quality and low risk of bias, while the remaining 31 samples are of moderate quality and risk of bias. The results of the higher quality and lower bias samples were consistent with the overall findings of the full collection of samples.

Siblings

Five cross sectional studies, one high quality and low risk of bias, four of moderate quality and bias, assessed the relationship between having siblings or other young people in the home compared to sedentary behaviours (Bagley et al., 2006; Hardy et al., 2006; Mushtaq et al., 2011; Sirard et al., 2010; Wiecha et al., 2001). Studies were based on Australian, European, Pakistani, and North American populations. Two studies looked at TV time (Bagley et al., 2006; Hardy et al., 2006), and two assessed overall screen time (Granich et al., 2011; Wiecha et al., 2001), while one study looked at general sedentary behaviours (Mushtaq et al., 2011). All five studies found that the presence of other youth in the home had a negative effect on the sedentary behaviour being measured (see Table 2).

Conclusions

The purpose of this study was to review the literature that has focused on the correlates of sedentary behaviour among children and adolescents aged seven to eighteen. The review consisted of 188 independent samples (226 peer-reviewed papers) from all inhabited continents, making this the largest and most comprehensive review on young people and sedentary behaviour to date. Findings were themed by broad categories of demographic, behavioural, psychological, environmental, and social correlates commensurate with a socio-ecological framework (Sallis et al., 2000). Interestingly, key correlates emerged in all of these categories, highlighting the complexity of sedentary behaviour among youth. Amalgamated screen time was the most commonly assessed variable, including TV, computer and video game time. TV time and computer and video games were also commonly assessed variables. The majority of the studies included in the review were cross sectional.

Considerable research has amassed on age, gender, socio-economic status, and

physical activity with respect to sedentary behaviours. Research is more limited with respect to physical and mental well-being, environmental variables, participation in risk behaviours, physical maturity, psychological motives, social variables, parental influences on their children's sedentary behaviours, and sleep behaviours. This suggests that future research should focus on these correlates in order to allow for a more comprehensive view of how sedentary behaviours affect correlates in young people.

Older children and adolescents were found to spend more overall time in sedentary behaviours compared to younger children (Murdey et al., 2004; Ortega et al., 2011). The type of sedentary behaviour, however, appears to vary across age; older children and adolescents spent less time watching television or in general screen time than younger children, but spent more time in general sedentary behaviours. This same trend was found with respect to physical maturity (Murdey et al., 2004). As young people progressed through puberty, their participation in general sedentary behaviours increased, while screen time decreased. Although significant, these results are potentially confounded by the fact that adolescents tend to be awake later in the evening compared to younger children, and sedentary activities tend to be more dominant in the later hours of the day (Biddle et al., 2009b).

With the noted exception of homework and reading time, 57 of the 60 samples comparing physical activity to sedentary behaviours found a significant negative relationship, suggesting that one behaviour tends to replace the other in a young persons leisure time activities.

Males tended to spend significantly more time in screen based (computer, television, video games) (Burke et al., 2006; Fairclough et al., 2009) sedentary behaviours compared to females, who spent more time than boys in non-screen based sedentary behaviours (Marshall et al., 2002). This suggests that interventions targeting reducing screen time should be focused more on male children and adolescents, while interventions to decrease overall sitting may be a key focus for females.

All 23 of the studies comparing ethnicity to sedentary behaviours found that non-Caucasian youth were significantly more sedentary compared to their Caucasian peers (Atherson and Metcalf, 2005; Eisenmann et al., 2002; Pate et al., 1996). Continued research delving into cultural differences in child discretionary time seems prudent.

Among the 36 studies assessing SES, there lacked consensus between different sedentary behaviours. While children from higher SES backgrounds were more likely to play video games and participate in non-screen sedentary behaviours (e.g., music), children and adolescents from lower SES backgrounds spent significantly more time sitting in general and overall screen based sedentary behaviours (Fairclough et al., 2009; Thibault et al., 2010). This suggests that SES might have greater impact on the type of electronic equipment and activities young people have access to, not necessarily on their overall sedentary behaviour.

All 19 of the samples comparing sedentary behaviours to time of the week found that sedentary behaviour, whether screen based or general, was higher on weekends (Granich et al., 2011; Olds et al., 2006). This means that interventions focused on getting youth up and active on

Saturdays and Sundays could go far to changing young peoples overall sedentary behaviours. Similarly, young people living in more urban areas were found to spend significantly more time in sedentary behaviours than those living in more rural areas (Mark et al., 2006; Vereecken et al., 2006), again suggesting that targeted interventions by geographic region could be implemented to positive effect.

As anticipated, children and adolescents with greater access to electronic media were significantly more likely to spend more time in sedentary behaviours that youth who had less access. Specifically, children and adolescents with televisions or gaming systems in their bedroom spend more time each day in sedentary behaviours compared to those who had these devices in a common room (Rey-Lopez et al., 2010). This suggests that increased supervision and limitation of access to electronic media could change the amount of time young people spend in sedentary behaviours. Coupled with having a television set or gaming system in the bedroom, there was an inverse relationship between sedentary behaviours and sleep duration; as sedentary behaviours increased, so did the likelihood of a young person experiencing disturbed sleep (Johnson et al., 2004; Shi et al., 2010). Insufficient sleep is a recognized health risk, and can cause reduced cognitive function and emotional well-being (Strine and Chapman, 2004). This means that removing television sets and gaming systems from children and adolescents bedrooms could have a twofold positive effect: Better sleep, and reduced overall sedentary behaviours.

Twelve of the 13 studies assessing psychological variables found a significant negative relationship between self-esteem and sedentary behaviours (Iannotti et al., 2009; Iannotti et al., 2009b). Similarly, young people with higher rated of sedentary behaviours, with the exception of computer time, were significantly more likely to participate in risk behaviours, such as drinking, drugs, or smoking (Nelson and Gordon-Larsen, 2006; Nelson et al., 2005). However, it is not clear whether the relationship between sedentary behaviours and risk behaviours and self esteem is causal, or that increased time spent in sedentary behaviours is the result of low self esteem and participation in risk behaviours.

Social influences had significant correlations with young peoples participation in sedentary behaviours. Young people with peers who were more physically active spent less time in screen behaviours compared to those with peers who did not support physical activity (Al-Hazzaa et al., 2011; Granich et al., 2011; Mushtaq et al., 2011; Sirard et al., 2010; Wiecha et al., 2001). Children and adolescents who had other youth living in their home were also less sedentary compared to those who did not live with other young people. Parental factors were also very important, as youth from single parent homes were found to spend significantly more time watching television compared to those from two parents homes (Barnett et al., 2010; Cao et al., 2011; Hardy et al., 2006; Jackson et al., 2010; Salmon et al., 2005). This difference could be accounted for by taking into consideration the reduced resources single income families frequently face, or by the increased use of the television as a baby-sitter. Children of more sedentary parents were also more sedentary, suggesting a family culture or modeling effect (Kremers, 2007). Finally,

children of more educated parents tended to be less sedentary than those whose parents had a lower level of education (Olds, 2010).

Future implications suggested by this review are the need for separate assessment of sedentary behaviours (e.g., computer use vs. TV time vs. time spent doing homework), as opposed to simply clustering them into one measurement. Also required in future research is an understanding of whether participation in risk behaviours and low self esteem are caused by, or the results of sedentary behaviours. Previous work has acknowledged the need for a standardized metric for measurement of sedentary behaviours (Rhodes et al., 2012). Specifically lacking is the individual measurement of computer time, video games, and portable devices such as cell phones.

Interventions to date have targeted an overall change in sedentary behaviours through efforts to increase physical activity and intrinsic motivation to be active (Epstein et al., 2005; Spruijt-Metz et al., 2008), as well as targeting sedentary behaviours using school based interventions (Campbell and Hesketh, 2007). The primary target of most published interventions has been to cause a reduction in overall sedentary behaviours, without taking into consideration the psychosocial underpinnings related to participation in sedentary behaviours. Based on the significant relationships found between sedentary behaviour and social and psychological variables, future interventions must take into consideration the significant pressures of these variables in order to successfully effect change. Further, in accordance with the findings of Rhodes et al., (2012) in adults, in applying this review to future interventions, a global approach to reducing sedentary behaviours should be considered.

The limitations of this review are that the assessment was limited to peer reviewed articles published in English. The review was also limited to the search terms and databases contained within the methods section and the hand searching of the reference sections, meaning that studies which did not surface using these keywords will be missing from this review. The findings of this review summarize the wealth of the existent information regarding correlates sedentary behaviours in children and adolescents, and gives rise to areas in this field where future research is needed.

Authors' Qualifications

The authors' qualifications are as follows: Cara P. Temmel, BSc, CPT and Ryan E. Rhodes, MA, PhD.

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Appendices

Appendix A

Search Syntax:
June 15th 2011 – Feb 2nd 2012
PsycINFO, CINAHL with Full Text, Database of Abstracts of Reviews of Effects, Health Source - Consumer Edition, Health Source: Nursing/Academic Edition, Health Technology Assessments, MEDLINE with Full Text, PsycARTICLES, SPORTDiscus

1) Sedentary Behaviour, Youth, Children, Review
2) Sedentary Behaviour, Youth, Children
3) Inactivity, Children
4) Screen Time
5) Television
6) Television, Youth, Sedentary Behaviour
7) Video Game, Youth, Sedentary Behaviour
8) Computer Use, Sedentary Behaviour
9) Sedentary Behaviour, Adolescent
10) Cell Phone, Child, Sedentary
11) Cell Phone, Youth, Sedentary
12) Cell Phone, Adolescent, Sedentary
13) Internet, Adolescent, Sedentary
14) Internet, Youth, Sedentary
15) Internet, Child, Sedentary
16) Music, Child, Sedentary
17) Music, Youth, Sedentary
18) Music, Adolescent, Sedentary

Appendix B: Quality Ratings of Studies

Assessment Tool Questions:
1. Did the study include a theoretical framework?
2. Was an objective measure of Sedentary Behaviour used?
3. Were the measures of Sedentary Behaviour reliable (eg. Pre tested)?
4. Was the study powered to detect a nontrivial correlation?
5. Was the design an RCT?
6. Was baseline Sedentary Behaviour considered in analyses (analysis longitudinal)?
7. Were statistically appropriate/acceptable methods of data analyses used?

Authors	1	2	3	4	5	6	7	Total/7
Aires (2011)	X		X	X			X	4
Al-Hazzaa (2011)	X		X	X			X	4
Alamian (2009)	X		X	X			X	4
Andersen (1998)	X		X	X			X	4
Anderson (2008)	X		X	X			X	4
Atherson (2005)	X		X	X			X	4
Atkin (2008)	X		X	X			X	4
Attenwell (2003)	X		X	X			X	4
Bagley (2006)	X	X	X	X			X	5
Barnett (2010)	X		X	X		X	X	5
Barr-Anderson (2010)	X		X				X	3
Barr-Anderson (2007)	X		X	X			X	4
Bathrellou (2007)	X			X			X	3
Bauer(2008)	X		X	X		X	X	5
Beets (2010)	X		X	X			X	4
Bellisle (2007)	X		X	X			X	4
Berkey (2002)	X		X	X		X	X	5
Biddle (2009a)	X		X	X			X	4

Biddle (2009b)	X		X	X			X	4
Biddle (2009c)	X		X	X			X	4
Biddle (2009d)	X		X	X			X	4
Boone (2007)	X		X	X		X	X	5
Boynton-Jarrett (2003)	X		X			X	X	4
Bradley (2000)	X		X	X		X	X	5
Brodersen (2007)	X			X		X	X	4
Brodersen (2005)	X			X			X	3
Burke (2006)	X						X	2
Cameron (2011)	X		X				X	3
Cao (2011)	X		X	X			X	4
Carson (2011a)	X		X	X			X	4
Carson (2011b)	X		X	X			X	4
Carson (2010)	X		X	X			X	4
Carson (2009)	X		X	X			X	4
Casey (2001)	X			X			X	3
Cecchini (2009)	X		X	X		X	X	5
Cecil-Karb (2009)	X		X	X		X	X	5
Chaput (2006)	X		X				X	3
Collins (2007)	X		X	X			X	4
Coon (2001)	X		X				X	3
Cooper (2006)	X						X	2
Crespo (2001)	X		X	X			X	4

Cui (2011)	X		X	X		X	X	5
Cummings (2007)	X		X	X			X	4
Davison (2005)	X					X	X	3
Davison (2006)	X					X	X	3
Delmas (2007)	X		X			X	X	4
Devis-Devis (2009)	X		X				X	3
Dietz (1985)	X		X	X			X	4
Dumith (2010)	X		X	X			X	4
Eisenmann (2000)	X		X	X			X	4
Eisenmann (2008)	X		X	X			X	4
Ekelund (2006)	X		X	X			X	4
Ekelund (2004)	X	X	X	X			X	5
Epstein (2000)	X		X		X	X	X	5
Epstein (2005a)	X		X		X	X	X	5
Epstein (2005b)	X		X		X	X	X	5
Epstein (2004)	X		X		X	X	X	5
Evenson (2007)	X	X	X	X			X	5
Fairclough (2009)	X		X	X			X	4
Fazah (2010)	X			X			X	3
Feldman (2003)	X			X			X	3
Foltz (2011)	X		X	X			X	4
Francis (2003)	X					X	X	3
Gable (2007)	X		X	X		X	X	5

Gordon Larson (2002)	X		X	X		X	X	5
Gordon-Larsen (2004)	X		X	X		X	X	5
Gordon-Larson (1999)	X		X	X		X	X	5
Gorely (2009)	X		X	X			X	4
Gorely (2007)	X		X	X			X	4
Graff (2011)	X		X	X		X	X	5
Granich (2011)	X		X	X			X	4
Grund (2001)	X		X				X	3
Hagar (2006)	X	X	X				X	4
Hancox (2006)	X		X	X		X	X	5
Hancox (2004)	X		X	X		X	X	5
Hanson (2007)	X						X	2
Hardy (2007)	X		X				X	3
Hardy (2006a)	X		X				X	3
Hardy (2006b)	X		X	X			X	4
Hardy (2009)	X		X	X			X	4
He (2010)	X						X	2
Henderson,(2007)	X		X	X		X	X	5
Hernandez (1999)	X		X	X			X	4
Hesketh (2007)	X		X	X			X	4
Hesketh (2009)	X		X	X			X	4
Hesketh (2006)	X	X	X	X			X	5

Hesketh (2007)	X		X	X			X	4
Ho (2001)	X		X	X			X	4
Hoelscher (2009)	X		X	X			X	4
Hohepa (2009)	X			X			X	3
Huang (2011)	X		X				X	3
Hume (2009)	X		X				X	3
Hussey (2007)	X	X	X				X	4
Hussey (2001)	X		X	X			X	4
Iannotti (2009a)	X		X	X			X	4
Iannotti (2009b)	X		X	X			X	4
Islam-Zwart (2008)	X			X			X	3
Jackson (2010)	X		X				X	3
Jago (2007)	X	X	X				X	4
Jansen (2009)	X		X	X			X	4
Janz (2005)	X	X	X			X	X	5
Johnson (2004)	X		X	X		X	X	5
Jones (2008)	X		X		X	X	X	5
Kang (2010)	X		X	X			X	4
Karaca (2011)	X		X	X			X	4

Katon (2010)	X		X				X	3
Katzmarzyk (1998)	X		X	X			X	4
Kerner (2007)	X						X	2
Khunti (2007)	X		X	X			X	4
Klesges (1993)	X						X	2
Koezuka (2006)	X		X	X			X	4
Kremers (2007)	X						X	2
Lajous (2009)	X		X	X			X	4
Landhuis (2008)	X			X		X	X	4
Laurson (2008a)	X		X			X	X	4
Laurson (2008b)	X		X	X			X	4
Leatherdale (2010a)	X		X	X			X	4
Leatherdale (2010b)	X		X	X			X	4
Leatherdale (2008)	X		X	X			X	4
Li (2007a)	X			X			X	3
Li (2007b)	X		X	X			X	4
Lioret (2007)	X		X	X			X	4
Liou,(2010)	X		X	X			X	4
Liu (2010)	X		X	X		X	X	5
Loucaides (2011)	X		X	X			X	4
Lowry (2009)	X		X	X		X	X	5

Lowry (2002)	X		X	X			X	4
Mark (2008)	X		X	X			X	4
Mark (2006)	X		X	X			X	4
Marshall (2002)	X		X	X			X	4
Martinez-Gomez (2010a)	X	X	X				X	4
Martinez-Gomez (2010b)	X		X			\	X	3
Mathers (2009)	X		X	X			X	4
Matheson (2004)	X		X				X	3
Melkevik (2010)	X		X	X			X	4
Mhurchu (2009)	X	X			X	X	X	5
Morales-Ruán (2009)	X		X	X			X	4
Morgenstern (2009)	X			X			X	3
Mota (2007a)	X		X	X			X	4
Mota (2007)	X		X	X			X	4
Mota (2006)	X		X				X	3
Motl (2006)	X		X	X		X	X	5
Murdey (2004)	X						X	2
Murdey (2005)	X					X	X	3
Mushtaq (2011)	X		X	X			X	4
Mutz (1993)	X			X			X	3
Myers (1996)	X		X	X			X	4

Nagel (2009)	X		X	X			X	4
Nelson (2006a)	X		X	X		X	X	5
Nelson (2005)	X		X	X		X	X	5
Nelson (2006b)	X		X	X		X	X	5
Nogueira (2009)	X						X	2
Norman (2005)	X		X	X			X	4
Olds (2011)	X		X	X			X	4
Olds (2010)	X		X	X			X	4
Olds (2006)	X		X	X			X	4
Olds (2009)	X		X	X			X	4
Ortega (2010)	X		X	X			X	4
Ortega (2011)	X	X	X	X			X	5
Ortega (2007)	X		X	X			X	4
Owens (1999)	X		X	X			X	4
Ozmert (2011)	X			X			X	3
Pate (1996)	X		X	X			X	4
Patnode (2011)	X	X	X	X			X	5
Patrick (2004)	X	X	X	X			X	5
Pearson (2011)	X		X	X			X	4
Peltzer(2009)	X		X	X			X	4
Primack (2009)	X		X	X		X	X	5
Purslow (2008)	X	X	X			X	X	5

Ramirez (2010)	X		X				X	3
Raudsepp 2008)	X		X			X	X	4
Renzaho (2008)	X		X				X	3
Rey-López (2009)	X		X	X			X	4
Rey-López (2010)	X		X	X			X	4
Robinson (1999)	X		X		X	X	X	5
Robinson (1993)	X		X	X		X	X	5
Robinson (2003)	X		X		X	X	X	5
Rodrigues (2010)	X	X	X				X	4
Roemmich (2007)	X	X	X				X	4
Saelens (2002)	X		X			X	X	4
Salmon(2005)	X	X	X	X			X	5
Samdal (2006)	X		X	X			X	4
Santos (2005)	X						X	2
Schmitz (2002)	X		X	X			X	4
Scully (2007)	X		X	X			X	4
Shan (2010)	X		X	X			X	4
Shannon (1991)	X			X			X	3
Sharif (2006)	X			X			X	3
Sharif (2010)	X		X	X		X	X	5
Shi (2011)	X		X	X			X	4
Shi (2010)	X		X	X			X	4
Sigmund (2002)	X		X				X	3
Sigmund (2008)	X		X				X	3

Simetin (2009)	X		X	X		X	X	5
Singh (2008a)	X		X	X			X	4
Singh (2008b)	X		X	X			X	4
Singh (2008c)	X		X	X			X	4
Sirard (2010)	X	X	X				X	4
Sisson (2011)	X		X	X			X	4
Sisson (2010)	X		X	X			X	4
Sisson (2009)	X		X	X			X	4
Smith (2010)	X		X	X			X	4
Spinks (2006)	X		X				X	3
Springer (2006a)	X		X	X			X	4
Springer (2006b)	X		X	X			X	4
Springer (2010)	X		X	X			X	4
Spruijt-Metz (2008)	X				X	X	X	4
Steele (2009)	X	X	X	X			X	5
Tammelin (2007)	X		X	X			X	4
Tavaras (2007)	X		X	X		X	X	5
te Velde (2007)	X		X	X			X	4
Thibault (2010)	X			X			X	3
Torsheim (2010)	X		X	X			X	4
Trang (2009)	X		X	X			X	4
Trost (1999)	X	X	X				X	4
Trost (2009)	X		X		X	X	X	5
Tudor-Locke (2006)	X		X	X			X	4

Tudor-Locke (2003)	X		X	X			X	4
Ullrich-French (2010)	X		X				X	3
Urrutia-Rojas (2008)	X		X	X			X	4
Ussher (2007)	X		X	X			X	4
Utter (2003)	X		X	X			X	4
Utter (2006)	X		X	X			X	4
Van den bulck (2009)	X		X	X			X	4
van Sluijs (2010)	X	X	X	X			X	5
van Zutphen(2007)	X		X	X			X	4
Vandewater (2006)	X		X	X			X	4
Vandewater (2004)	X		X	X			X	4
Vaughan (2007)	X		X				X	3
Vereecken (2006)	X		X	X			X	4
Vicente-Rodriguez (2008)	X		X	X			X	4
Vincente-Rodriguez (2009)	X		X				X	3
Viner (2005)	X		X	X			X	4
Wagner (2004)	X		X	X			X	4
Wake (2003)	X		X	X			X	4
Warren (2002)	X						X	2
Wells (2008)	X		X	X			X	4
Wen (2009)	X		X	X			X	4
Whitt-Glover (2009)	X	X	X	X			X	5
Wiecha (2006)	X		X				X	3
Wiecha (2001)	X		X	X			X	4
Wolf (1993)	X		X				X	3
Wong (2009)	X		X	X			X	4
Wong (1992)	X		X				X	3
Zabinski (2007)	X			X			X	3

Appendix C: Excluded correlates

Correlates of sedentary behaviours which were excluded from this review due to inability to theme them (i.e., there were fewer than three samples which covered these correlates) were: Access to activity (n = 1), active transport (n = 1)(Mota et al., 2007), authoritative parents (n = 1)(Schmitz et al., 2002), barriers to physical activity (n = 1)(Smith et al., 2010), behavioural variables (n = 1)(van Sluijs et al., 2010), blood pressure (n = 2)(Ullrich-French et al., 2010; Wells et al., 2008), BMI in adulthood (n = 2)(Landhuis et al., 2008; Viner and Cole, 2005), bone mineral concentration (n = 1), creative play (n = 1)(Vandewater et al., 2006), child autonomy (n = 1)(Jago et al., 2007), cognitive understanding (n = 1)(Attenwell and Suazo-Garcia, 2003), time of year (n = 1)(Devis-Devis et al., 2009), family structure (n = 2)(Vandewater et al., 2006), energy expenditure (n = 1)(Katzmarzyk et al., 1998), fatigue (n = 1), future expectations (n = 1), hobbies (n = 1)(Mutz et al., 1993), instructive mediation (n = 1)(Warren et al., 2002), metabolic rate (n = 1)(Cooper et al., 2006), metabolic syndrome (n = 2)(Kang et al., 2010; Mark and Janssen, 2008), nutrition (Sufficient) (n = 1)(Casey et al., 2001), physical activity at school (n = 2)(Leathedale et al., 2010; Leatherdale, 2010), passive transport (n = 1)(Olds et al., 2009), preference for activity (n = 2)(Jago et al., 2007), private/public school (n = 2)(Devis-Devis et al., 2009; Karaca et al., 2011), productive time (n = 1)(Zabinski et al., 2007), reliance on TV for recreation (n = 1)(Davison et al., 2005), Reading (n = 1)(Attenwell and Suazo-Garcia, 2003), time of day (n = 1), upbringing (n = 1)(Dumith et al., 2010), waist circumference (n = 6),(Hussey et al., 2007; Martinez-Gomez et al., 2010b; Ortega et al., 2010; Ortega et al., 2007; Vicente-Rodriguez et al., 2008; Vincente-Rodriguez et al., 2009) and value of health (n = 1)(Schmitz et al., 2002). Of the parental correlates assessed, eight did not have enough samples assessing them in order to be considered for inclusion. These were parental: weight status (n = 1)(van Sluijs et al., 2010), self-efficacy (n = 1)(Smith et al., 2010), sedentary behaviour (n = 1), engagement (n = 1)(Warren et al., 2002), employment (n = 1)(Hesketh et al., 2006), diabetes status (n = 1), and attitudes towards sedentary behaviour (n = 1)(He et al., 2010).