

Cross-sectional Associations Between Mothers' and Fathers' Media Parenting Practices and Young Children's Screen Time.

By

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ABSTRACT

CROSS-SECTIONAL ASSOCIATIONS BETWEEN MOTHERS' AND FATHERS' MEDIA PARENTING PRACTICES AND YOUNG CHILDREN'S SCREEN TIME.

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This study examined associations between mothers' and fathers' media parenting practices and young children's screen-time. Linear regression using generalized estimating equations was used to examine associations between media parenting practices and children's weekday and weekend screen-time. Mothers' screen time modelling, mealtime screen use, and using screens to control behaviour were positively associated with children's weekday screen time; whereas monitoring screen-time and limit setting were inversely associated with children's weekday screen-time. Fathers' mealtime screen use was positively associated with children's weekday screen-time; whereas fathers' monitoring screen-time and limit setting were inversely associated with children's weekday screen-time. Mothers' modeling, and mothers' and fathers' mealtime screen use were not significantly associated with children's weekend screen time, and fathers' use of screens to control behaviour was positively associated with children's weekend screen-time. Our results suggest interventions aimed at reducing children's screen-time should address both mothers' and fathers' media parenting practices.

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1.0 Introduction

Childhood obesity is on the rise with sedentary lifestyle practices being a major contributor to the crisis (WHO, 2016; CDC, 2016). Specifically, screen based sedentary behaviours are far exceeding recommendations for young children set by the Canadian Pediatric Society and the Canadian Society for Exercise Physiology. Currently, only 15% of Canadian preschoolers meet the Canadian Sedentary Behaviour Guidelines for the Early Years of less than one hour of screen time per day (Canadian Pediatric Society, 2017; Tremblay et al., 2012). These estimates are alarming and may even underestimate children's screen time given the recent increase in mobile media devices, such as smartphones and tablets. As of 2013, 75% of children under eight years of age had access to a mobile media device, an increase of 23% from 2011 (Rideout et al., 2013). Understanding factors that may influence young children's screen based sedentary behaviour is important as research shows that sedentary behaviour habits are formed early in life and persist over time (Canadian Pediatric Society, 2017). Thus, identifying key factors associated with young children's screen time can help inform interventions to support children developing healthful screen time habits early in life.

One factor that has been shown to influence children's screen based sedentary behaviour is media parenting practices. Parenting practices can be defined as the methods parents use to encourage specific behaviour outcomes in their children (Baranowski et al., 2013). Media parenting practices refer to the specific ways in which parents guide their children's screen use. Media parenting practices such as screen time modeling, mealtime screen use, and allowing children to use screens in the bedroom may be associated with an increase of total screen time among young children (Birken et al., 2011; Tandon et al., 2012). The parenting practice of

setting screen-time limits with children has been shown to reduce overall screen time (Johnson, Chen, Hughes, & O'Connor, 2015)

While this research suggests that parenting practices may be associated with children's television viewing, research investigating parental factors associated with newer forms of mobile media devices, such as tablets and smartphones, is lacking. Given the rapid rise in children's access to mobile media devices, it is critical that research examining influences on children's screen use include mobile media devices.

A second limitation of the existing research on parenting practices is the lack of knowledge concerning other potentially important parenting practices including screen time monitoring and using screens to control behaviour, which are common parenting practices used to influence children's food intake (Lu, Xiong, Arora & Dubé, 2015) and physical activity (Vaughn, Hales & Ward, 2013). Given that these parenting practices have been found to influence children's food and physical activity behaviours, it is important that they are investigated to see if similar results are found with children's media use.

A third limitation with the existing literature is the limited research examining father's media parenting practices. The majority of literature focuses on mother's media parenting practices and maternal demographics, such as education, thereby overlooking a potentially important part of the equation, which is the role that fathers have in guiding children's media use.

This research will address these gaps by examining how maternal and paternal media parenting practices (screen time modeling, mealtime screen use, use of screens in bedroom, limit setting, screen time monitoring, and using screens to control behaviour) are associated with young children's total screen viewing time.

2.0 Literature Review

2.1 Childhood Obesity and Health Consequences

The World Health Organization (WHO) recognizes childhood obesity as a growing epidemic (WHO, 2016). The prevalence of children with obesity and overweight under the age of five worldwide is estimated to be 41 million (WHO, 2016). In Canada, the rate of children with obesity is on the rise with 21.5% of children between two and five years of age categorized as having overweight or obesity (Shields, 2008). Excess weight in childhood has been shown to increase the risk of cardiovascular disease, impaired glucose tolerance and type 2 diabetes, asthma and sleep apnea; as well as diminished quality of life and social well-being (CDC, 2016). Furthermore, children with obesity are more likely to become obese adults (Gordon-Larsen, The, & Adair, 2010). In addition to the adverse consequences at the individual level, the Public Health Agency of Canada reports that this national obesity crisis is costing the Canadian healthcare system between \$4.6 to \$7.1 billion annually (Public Health Agency of Canada, 2011).

2.2 Screen Time Recommendations

A strong predictor of obesity is high levels of screen time (Falbe et al., 2013; Stematakis et al., 2013; Zhang, Wu, Zhou, Lu & Mao, 2015). Screen time is defined as the amount of time spent

using a device that has a screen such as televisions, smartphones, computers, and tablets (CDC, 2016). This association between screen time and obesity has led the Canadian Pediatric Society and the Canadian Society for Exercise Physiology to develop screen time recommendations targeted toward all children and adolescents, which provide specific recommendations for preschool aged children. For children between two and four years of age, recommended screen time is less than one hour per day, and screen time for children five years of age should not exceed two hours per day (Garriguet et al, 2016; Lipnowski et al, 2012). Among Canadian preschool aged children, screen time use exceeds recommendations. A health report published by Statistics Canada (2016) shows that 78% of children between three and four years of age, and 24% of children five years of age exceed current screen time recommendations (Garriguet et al., 2016). This concern regarding children's screen time had been previously identified before the advent of tablets and smartphones, however, the increased accessibility of screen based devices to children makes this issue increasingly relevant for the foreseeable future. This trend is concerning as longitudinal studies show that high levels of screen viewing in early childhood will continue into school age (Certain & Kahn, 2002). Exceeding screen time recommendations can negatively affect young children's cognitive and emotional development, attention span, and future academic performance (Christakis & Zimmerman, 2009; Canadian Pediatric Society, 2017) and increase the risk of childhood obesity (Levin et al, 2004; Robinson, 1999).

2.3 Screen Time and Obesity

Both observational and intervention research has shown that higher levels of screen time, typically measured as TV viewing, is associated with increased risk of obesity among children (Levin, Martin & Riner, 2004; Robinson, 1999). Two randomized controlled trials in the United States found a significant association between screen time viewing and childhood obesity

(Epstein et al., 2008; Robinson, 1999). The study by Epstein et al. (2008) examined whether reducing screen time (television and computer use) influenced the body mass index (BMI) of 70 children aged four to seven. Screen time was measured over a two-year period using a television monitoring device, and children in the treatment group experienced a 50% reduction in their weekly screen time (Epstein et al., 2008). A significant reduction in BMI was found in the intervention group compared to the control at both six months and 12 months, with no significant change in physical activity (Epstein et al., 2008). Robinson (1999) examined 192 children between seven and 10 years of age in the school environment. The intervention group received classroom education over a six-month duration to reduce television viewing, and body composition measurements were obtained including height, weight, triceps skinfold thickness, and waist and hip circumference (Robinson, 1999). Along with a significant decrease in reported television time for the treatment group, significant differences were found for BMI, triceps skinfold thickness, waist circumference, and waist-to-hip ratio (Robinson, 1999).

Numerous observational studies have also found an association between TV time and obesity risk among young children (Dennison, Erb & Jenkins, 2001; Tudor-Locke, Craig, Cameron & Griffiths, 2011; Vandebosch & Ven Cleemput, 2007). One such study in the United States by Levin et al. (2004) examined the influence of television viewing habits on body mass index in 148 four-year-old children. This study relied on parent reports for screen time, with height and weight measured by the researcher (Levin et al., 2004). Results of this study determined that children who had a BMI greater than the 95th percentile were more likely to watch two hours or more of television per day compared to children below the 95th percentile (Levin et al., 2004). This robust evidence from both observational and intervention research underscores the importance of screen time as an important risk factor for the development of childhood obesity.

2.4 Parenting Practices

Parents are the gatekeepers to the amount and mode of screen time consumed by young children (Knowles, Kirk, & Hughes, 2015). Parenting practices, defined as the methods parents use to encourage specific behaviour outcomes in their children (Baranowski et al., 2013), can be used to guide media use. This practice of parents guiding children's media use through specific methods is referred to as media parenting practices. The media parenting practices that may influence children's screen time include parental modeling of screen-viewing (Abbott et al, 2016; Matarma et al, 2015; Lauricella, Wartella & Rideout, 2015; Birken et al, 2011), mealtime screen use (Birken et al, 2011), screen viewing in the child's bedroom (Tandon et al, 2012), limit setting (Johnson et al., 2015), and use of screens to control behaviour (Vaughn et al., 2013). Each of these practices may be important to consider when thinking of influencing young children's screen time.

2.4.1 Screen Time Modeling

The degree to which parents use screens is associated with their children's screen time (Lauricella et al., 2015). A study among a nationally represented sample of 2326 American mothers (58%) and fathers (42%) of children aged eight and under (split into three age groups: 0-2 years old, 2-5 years old, and 5-8 years old) examined the association between parental and children's screen time use by screen type, i.e., TV, computer, tablet and smartphone use (Lauricella et al., 2015). Results show that parental screen time was significantly associated with child screen time for each screen type for all three age groups ($p < 0.001$). Children aged two to five whose parents viewed more than 180 minutes of television per day had approximately 1 hour more television viewing each day compared to children whose parents viewed less than 180 minutes of television per day ($p < 0.001$) (Lauricella et al., 2015). Further,

preschool aged children had a mean smartphone use increase of 42 minutes, and a mean tablet use increase of 20 minutes per day if their parents were high users (greater than 60 minutes per day) of these screen types compared to children of parents who are moderate users (1 - 59 minutes per day) $p < 0.001$ (Lauricella et al., 2015). These findings are consistent with the Canadian TARGet Kids! (The Applied Research Group for Kids) study which investigated the maternal factors associated with screen time (i.e., television, DVD/video, computer and video games) among 157 three-year-old children in Toronto, Canada (Birken et al., 2011) and whose goal was to measure associations between exposures in early childhood and health status as they age (TARGet Kids!, 2017). Birken et al. (2011) found that maternal TV time was positively associated with television time among three-year olds. Each additional hour of maternal television time was associated with an estimated mean increase of weekday television time of 49 minutes (95% CI, 33, 66) and an estimated mean increase of weekend television time of 34 minutes (95% CI, 18, 50) (Birken et al., 2011).

A limitation to the study by Birken et al. (2011) is that it did not include the role of fathers in the data collection, and although Lauricella et al. (2015) included both mothers and fathers, they did not differentiate between maternal and paternal screen time use. However, Matarma et al. (2016) who used data from 634 parent-child dyads, and Abbott et al. (2016) who used data from 450 parent-child dyads (203 girls and 247 boys) to examine cross sectional and three-year longitudinal associations between the television viewing of preschoolers and their parents, did examine both mothers and fathers independently. Abbott et al. (2016) found that both mother's and father's television time were significantly associated with the television time of girls (mothers: $\beta = 0.32$, 95% CI, 0.17, 0.46; fathers: $\beta = 0.23$, 95% CI, 0.06, 0.40) and boys (mothers:

$\beta = 0.36$, 95% CI, 0.24, 0.47; fathers: $\beta = 0.23$, 95% CI, 0.08, 0.37). Although cross sectional associations were identified between maternal and paternal television viewing and child television time, maternal television time was a stronger predictor of child television time (Abbott et al., 2016). This was supported by findings from Matarma et al. (2016) which show that mean preschooler television time increased by 12 minutes per day if mothers viewed two or more hours of television versus less than two hours of television daily ($p = 0.004$). The television time of fathers was found to have no significant association with preschooler television time (Matarma et al., 2016). These findings highlight the importance of looking at both mothers and fathers in relation to preschool screen time, as notable differences may exist.

Similarly, the study by Jago et al. (2012) which used data from 2965 families from the Portuguese Prevalence Study of Obesity in Childhood found that on weekdays maternal television viewing of greater than two hours per day was a stronger predictor of television time for boys (OR = 3.28, 95% CI, 1.88, 5.75) and girls (OR = 7.94, 95% CI, 3.56, 17.68), compared to paternal television time as a predictor of television time for boys (OR = 2.66, 95% CI, 1.78, 3.99) and girls (OR = 2.05, 95% CI, 1.20, 3.50) (Jago et al., 2012). Likewise, weekend maternal television time of greater than two hours per day was shown to be a stronger predictor of children's television time than paternal television time (Jago et al., 2012).

Interestingly, when looking at longitudinal results found by Abbott et al. (2016) a significant association exists between the parent and their sex-matched child. In this study, the television viewing of mothers was significantly associated with their daughters' television time ($\beta = 0.16$,

95% CI, 0.03, 0.29); and television viewing of fathers was significantly associated with their sons' television time ($\beta = 0.15$, 95% CI, 0.01, 0.28) (Abbott et al., 2016). For boys, this transition to fathers having the stronger influence on television viewing over time could be a result of viewing their father as the “primary role model” as they move from preschool to school age (Abbott et al., 2016).

Taken together, these results suggest that screen time modeling from both mothers and fathers plays a significant role in the screen time use of their preschool aged children. Except for the American study by Lauricella et al. (2015), all published research that investigated parental screen time modeling as a predictor of preschool screen time used only traditional screen based devices, and did not include newer types of mobile media devices, such as tablets and smartphones. Given the accessibility of these newer and widely used mobile screen based devices, further research in this area is needed to identify factors associated with increased screen time among preschoolers in the current media environment.

2.4.2 Mealtime Screen Use

Mealtime screen use includes watching screens during meals or allowing mobile media devices to be used during mealtime. Mealtime screen use may result in an increase in overall screen viewing among children. The Canadian TARGet Kids! study determined that one of the factors significantly associated with increased total daily screen time was television viewing during meals (Birken et al., 2011). Specifically, television viewing during breakfast was associated with an estimated mean increase of 52 minutes per day (95% CI, 18, 86) on weekdays and 72 minutes per day (95% CI, 45, 100) on weekends of television viewing; lunch was associated with

an estimated mean increase of 69 minutes per day (95% CI, 18, 120) on weekdays and 122 minutes per day (95% CI, 85, 159) on weekends of television viewing; and dinner was associated with an estimated mean increase of 85 minutes per day (95% CI, 44, 126) on weekdays and 126 minutes per day (95% CI, 87, 165) on weekends of television viewing (Birken et al., 2011). Television viewing during snack time was not found to be significantly associated with overall daily television time in preschoolers (Birken et al., 2011).

An American study by Piotrowski, Jordan, Bleakley & Michael (2015), examining the associations between family television practices and television viewing time using data from 360 parents of children between three and 12 years of age, found television viewing during meals was moderately, positively correlated with children's total daily screen time ($p < 0.05$). This study found that 16.4% of families watched television during meals "some of the time" and 33.6% watched television during meals "most of the time" (Piotrowski et al., 2015). Excessive screen viewing among preschoolers is associated with increased caloric intake (Schrempft, van Jaarsveld, Fisher & Wardle, 2015) and obesity (Twarog, 2015). Specifically, mealtime screen use is associated with calorically high, nutrient poor food choices for both mothers and their children (Horodyski, Stommel, Brophy-Herb & Weatherspoon, 2010).

The above findings indicate that screen viewing during meals is significantly associated with the total screen viewing time of preschool aged children. The main limitation of these studies is that only traditional forms of media were considered. With newer forms of mobile media devices (smartphones and tablets) being used frequently within the home setting, more study that

incorporates these accessible screen based technologies needs to be done to better reflect the current media environment.

2.4.3 Use of Screens in Bedroom

Having a television in the bedroom has been associated with decreased sleep time, increased BMI (Sijtsma, Koller, Sauer & Corpeleijn, 2014), and increased television viewing time among young children. Studies show that having a television in a child's bedroom is common, with the main reason being to "free up" a shared television for other family members to watch (Vandewater et al., 2007). Piotrowski et al. (2015) found that 56.7% of American children aged three to twelve years had a television in their bedroom. Having a bedroom television is also common for Portuguese children between the age of three and 10 years, where 48% of boys and 52% of girls have a television in their bedroom (Jago et al., 2012). Research suggests that having a screen in the bedroom may differ by socio-economic status. Tandon and colleagues (2012) examined the presence of media in the bedroom among 713 children in the United States and found that children of low, medium, and high Socioeconomic Status (SES) families were found to have televisions in their bedrooms 45%, 16%, and 11% of the time, respectively ($p < 0.001$). Significant differences were also identified by SES group for children who had DVDs/VCRs (34%, 16%, 12%) and video game systems (23%, 9%, 8%) in their bedrooms ($p < 0.001$) (Tandon, et al., 2012). No significant differences were found among SES groups for children who had computers or hand-held video game players in their bedrooms (Tandon, et al., 2012).

A systematic review by Cillero & Jago (2010) investigating children seven years of age and younger to determine if an association exists between having a television in the bedroom and

total television viewing time yielded unclear results. This review identified five studies that found a positive association and four studies that found no association between young children having a television in their bedroom and total television viewing time (Cillero & Jago, 2010). Likewise, a review by Hinkley, Salmon, Okely and Trost (2010) also determined there was an unclear association due to a lack of studies that examined this association.

More recent research conducted by Sijtsma et al. (2014) and Piotrowski et al. (2015) had results that indicate a positive association between having a television in the bedroom and total screen time. The study by Sijtsma et al. (2014) investigated the associations between television, sleep, outdoor play, and BMI among 2874 children between 3-4 years of age and found a moderate, positive correlation with television time and having a television in the bedroom ($p < 0.05$). These findings are consistent with the study by Piotrowski et al. (2015) which showed having a television in the bedroom was associated with an estimated increased total screen time of 25 minutes per day ($p = 0.04$). These findings are supported by Rutherford, Brown, Skouteris, Fuller-Tyszkiewicz and Bittman (2015) who also found a positive association between children having a television in their bedroom and total television viewing time. This study used data collected from three waves including 2004, 2006, and 2008 in a longitudinal study of Australian children (LSAC) born in 1999 and found that a television in a child's bedroom resulted in the child watching an estimated additional 22 minutes per day compared to children who did not have a television in their bedroom ($p < 0.001$) (Rutherford et al., 2015).

Recent research supports the hypothesis that children who have a television in their bedroom have increased viewing time compared to those who do not have a television in their bedroom. However, there are two major limitations to the current research. The first limitation is the absence of published studies examining whether access to newer types of mobile media devices, such as tablets and smartphones, in the bedrooms of children is associated with increased screen time. The other limitation involves the lack of research related to the role of fathers with the parenting practice of allowing screens in bedrooms. The studies by Rutherford et al. (2015) and Sijtsma et al. (2014) obtained data from mothers only, thereby omitting the potentially important role that fathers play in this parenting practice. In order to achieve a solid understanding related to the parenting practice of using screens in the bedroom in this current media environment, research that includes all types of media devices and the roles of both mothers and fathers is needed.

2.4.4 Limit Setting

The parenting practice of limit setting refers to parents who have rules governing their children's total daily screen time. Studies measure this parenting practice by asking parents whether they set screen time limits in the initial questionnaire. Questions in past studies include, "are there rules about how many hours the study child may watch television each week?" (Rutherford et al., 2015) and "how often do you set specific viewing hours for your child?" (Johnson et al., 2015). Studies investigating associations between limit setting practices and screen time are mostly in support of a negative association, with few studies finding a positive association.

Results from a study focusing on screen time limit setting by Johnson, et al. (2015), with 287 parents of children aged 6-12 years old in the United States, found that limit setting parenting practices were successful in reducing child television weekday viewing time ($p < 0.001$), and reducing the likelihood of children having a television in their bedroom ($p < 0.01$). This negative association between limit setting and total screen time among children was supported by the Australian LSAC study which found that the parental practice of limit setting is associated with an estimated average reduction of total television viewing time of seven minutes per day ($p < 0.001$) (Rutherford et al., 2015).

A study in the United Kingdom where 735 mothers of children aged six to eight years completed an anonymous online survey that investigated weekday screen time limit setting and its association with total screen viewing time (television, computer, smartphone, and videogames) had findings that were inconsistent with the aforementioned studies (Kesten et al., 2015). Parental limit setting was divided into “always”, “sometimes”, and “rarely/never”. This study found that “always” and “sometimes” setting limits were associated with watching greater than two hours of television per day (boys: OR = 1.99, 95% CI, 0.91, 4.37; girls: OR = 5.72, 95% CI, 2.36, 12.46), compared to children who watched two hours or less (Kesten et al., 2015). The study also found that “always” setting limits with videogames and smartphones was associated with increased odds (OR = 2.38, 95% CI, 1.34, 4.22; OR = 2.20, 95% CI, 1.10, 4.41, respectively) of girls using these media devices (Kesten et al., 2015). Kesten et al. (2015) noted that associations were stronger between mothers and daughters, compared to mothers and sons. This demonstrates the importance of research examining parenting practices that includes both mothers and fathers, as different paternal associations may exist. Interestingly, there was an

effort to include fathers in the study by Kesten et al. (2015), however, due to the lack of response from fathers (2%), the analysis was completed using only mothers.

Research related to the parenting practice of limit setting and total screen time in young children has three major limitations. First, there is only one study that investigated how this parenting practice is associated with a newer type of mobile media device (smartphones). However, it did not include tablets and only investigated weekday, not weekend, screen viewing time. Given the accessibility and increase in popularity of these newer types of mobile devices, further research that includes both types of media (smartphones and tablets) is needed. The second limitation is the lack of research that includes the father's role in this parenting practice. In the study by Johnson et al. (2015), of the 287 parents involved in the study, 270 were mothers, resulting in a lack of representation from fathers. Furthermore, the data obtained in the Australian LSAC study by Rutherford et al. (2015) including interviews, questionnaires, and diaries were only completed by the child's mother, once again omitting fathers from the data collection process. Studies that include fathers are needed to understand how this parenting practice is associated with total screen time of young children within a family context. Finally, the literature related to the parenting practice of screen time limit setting is almost non-existent in the preschool aged population. Other than the first wave of data collection (2004) where children were between four and five years of age in the study by Rutherford et al. (2015), no other research that explores the parenting practice of screen time limit setting and its association with total television viewing time includes children of preschool age.

2.4.5 Using Screen Time to Control Behaviour

The parenting practice of using screens to control behaviour includes offering children screen time as a reward for good behaviour, or removing screen time as punishment for a child's bad behaviour. To date, only Vaughn et al. (2013) have examined this parenting practice in their American study of 324 parents of children aged two to five years which investigated the influence of parenting practices on television viewing. The use of screen time to control behaviour was significantly and positively correlated with both meal time television viewing ($r = 0.131, p = 0.02$) and parental television co-viewing ($r = 0.321, p < 0.001$).

The major limitation of research related to using screen time to control behaviour is the lack of studies that investigate this potentially important parenting practice. The study by Vaughn et al. (2013) is the only one that has been identified to examine this parenting practice, and it has four notable limitations. First, in the questionnaire, parents were only asked how often they remove television time as punishment, and not whether they use it as a reward. Therefore, findings are not necessarily representative of the full spectrum related to how parents may use screen time to control behaviour. Second, 93% of the participants were mothers, resulting in limited representation from fathers who may have a role to play in this parenting practice. Third, this study does not include the total television viewing time of children as a measure, and instead only considers mealtime screen viewing and parental co-viewing. Lastly, this study does not include newer types of mobile media devices such as tablets and smartphones, and therefore is not necessarily representative of this parenting practice in the current media environment. Further study is needed for the parenting practice of using screen time to control behaviour that includes both negative and positive reinforcement, the role of fathers, its influence on total television time, and all types of media devices.

2.5 Parental Demographic Factors Associated with Children's Screen Time

Research suggests that children's screen time may vary by parents' level of education (Matarma, Koski, Löyttyniemi, & Lagström, 2015; Cillero & Jago, 2010) and SES (Cillero & Jago, 2010; Carson, Rosu & Janssen, 2014). Each of these demographic factors as they relate to children's screen time will be expanded upon below.

2.5.1 Education

A study by Matarma et al. (2016) with a sample size of 1827 children in Finland found that children whose mothers had an education level of a bachelor's degree or higher had lower levels of screen viewing (television, DVD/video and computers) ($p = 0.009$) compared to children whose mothers had either no professional training or some vocational training. Another study involving 75 children aged 3 years or under from Southern Taiwan found that children with highly educated mothers had less screen time, measured as television only, than children with mothers who possessed a lower education level ($r = -.18, p < 0.05$) (Lin et al., 2015). Further, a cross-sectional study conducted in Kingston, Ontario, Canada with 551 child-parent dyads found a significant negative association between parental education and daily minutes of screen time, assessed as television and computer/video games, of children aged 0-5 years ($\beta = -0.80, 95\% \text{ CI}, -1.10, -0.51$) (Carson et al., 2014).

The above findings are consistent with a systematic review completed by Cillero & Jago (2010) assessing the correlates of television time (television, DVD/video) and screen viewing (computer, hand-held video games and computer games) among children aged seven years and under. Specifically, 11 out of 16 studies found a negative association between maternal

education and children's television and screen viewing, with one study showing a positive association and four studies showing no association (Cillero & Jago, 2010). Seven out of eight studies showed a negative association between paternal education and children's television and screen viewing, with one study showing no association (Cillero & Jago, 2010). Finally, this same review found five studies that investigated parental (both maternal and paternal) education on children's television time and screen viewing and found three studies that showed a negative association and two studies that showed no association (Cillero & Jago, 2010). Overall, this review concluded that both maternal education and parental education (measured across parents) levels were moderately, negatively associated with television and screen viewing, and fathers' education level was strongly, negatively associated with television and screen viewing (Cillero & Jago, 2010). However, these negative associations are not consistent in all studies. In a systematic review by Hinkley et al. (2010), which examined correlates of sedentary behaviours in children aged three to five years, 16 studies investigated associations with television viewing (television, DVD/video) and screen viewing (electronic games and computers). Of these studies, four examined parental education as a correlate with television viewing. Hinkley et al. (2010) identified that two of these studies found a negative association between parental education and television viewing and two found no association.

A systematic review by Duch, Fisher, Ensari and Harrington (2013) examining correlates of screen time (television, DVD/video, computer and videogames) in children under the age of three, identified 12 studies that investigated maternal education, three studies that examined paternal education, and one study where the data was not disaggregated and investigated parental education as a whole. This systematic review concluded that maternal education had an unclear

association with preschool screen time with five studies showing a negative association and seven studies identifying no association (Duch et al., 2013). Furthermore, Duch et al. (2013) found that paternal education has no association with preschool screen time viewing.

Among a sample of 703 Australian children aged three to five years, Downing, Hinkley and Hesketh (2015) found no association between maternal education and screen time (defined as electronic game and computer use) or television viewing (defined as television, video and DVD use) among boys. However, among girls, maternal education was inversely related to screen time ($\beta = -13.81$, 95% CI, -24.57, -3.15) and television viewing ($\beta = -10.16$, 95% CI, -18.21, -2.12) (Downing et al., 2015).

A significant limitation to each of the above studies is that they only examined associations between parental education and screen time using traditional forms of media such as television, DVD/video, computers, and videogames. No published research was found that examined this association with newer forms of media, such as tablets and smartphones. However, what many of the studies to date show is that parental education is negatively associated with screen time viewing among preschool aged children. This has been more thoroughly studied with maternal education. Given there are only three studies found in the literature that examine an association between paternal education and preschool screen time, more research is needed to further elucidate this association among preschool aged children. Despite these limitations, findings from existing research suggest that children whose families have a lower education level are at higher risk of exceeding screen time recommendations.

2.5.2 Socio-economic Status

A study conducted in Edmonton, Alberta examined the association between neighbourhood SES and screen time (television/movies, video games, and computers) among families with preschool aged children. This study found that children living in lower SES neighbourhoods engaged in significantly more screen time by estimated means of 55 and 96 minutes per week compared to preschoolers in moderate and high SES neighbourhoods, respectively ($p < 0.01$). When stratified by child sex, the association between SES and screen time was no longer significant among boys, but remained significant among girls. It was found that girls in lower SES neighbourhoods had significantly more screen time when compared to those in high SES neighbourhoods by 142.30 minutes per week (95% CI, 49.75, 234.85; Carson et al., 2010). The researchers also examined differences in screen types by SES and found notable results. Specifically, video game use was significantly higher in lower SES groups compared to moderate and high SES groups (boys: $p < 0.01$, girls: $p = 0.02$). In contrast, children's computer use was significantly higher in moderate and high SES groups compared to those in low SES groups ($p < 0.01$) (Carson et al., 2010). This illustrates the importance of studying all types of screen based devices as they relate to SES, as results can differ based on screen type among the different SES groups.

A systematic review by Cillero & Jago (2010) showed that father SES has a strong, negative association with screen viewing, with seven studies showing a negative association and one study showing no association. Further, the association between preschool screen time and dual parent SES seems unclear with three studies showing a negative association and two studies showing no association (Cillero & Jago, 2010). However, this dual parent association was not consistent with a Canadian study by Carson, Rosu and Janssen (2014) in Kingston, Ontario who

found an inverse relationship between family and neighbourhood SES and levels of screen time in children under five years of age.

A major limitation to the studies investigating socioeconomic status and screen time is that they do not include newer types of mobile media devices such as tablets and smartphones. This is especially important as the findings described above indicate that there may be an association between screen time and SES, but that the association may differ by sex and screen type.

2.6 Gaps in Literature

Existing research examining the association between parental practices and children's screen time is limited by the following three fundamental gaps. First, newer types of mobile media devices such as tablets and smartphones are lacking in the literature (Aftosmes-Tobio et al., 2016; Matarma et al., 2016). In recent years, there has been a substantial increase in the frequency of smartphone and tablet use among parents and among children under eight years of age (Rideout et al., 2013). Failing to include these newer types of mobile media could result in an incomplete picture of screen use in children. Therefore, in order to gain a complete understanding of the associations between parenting practices and screen time, research that includes these newer, widely used mobile media devices is needed.

Second, existing research examining media parenting practices does not include all types of potentially relevant parenting practices. Specifically, there is very limited research examining the parenting practices of monitoring screen time and using screen time to control behaviour. These parenting practices are likely to be important factors in total screen time as these same

parenting practices are used regularly with physical activity (Vaughn et al., 2013) and food rewards (Lu et al., 2015). Parental monitoring of screen time has yet to be investigated, and the practice of using screen time to control behaviour has only been examined in one study. In order to achieve an understanding of the role all types of parenting practices have on total screen time in young children, these additional parenting practices must be examined.

The final fundamental gap of this research is the lack of representation from fathers. The role of fathers in the examination of parenting practices in relation to young children's screen time is limited (Aftosmes-Tobio et al., 2016). Fathers may play a central role in parenting practices as it relates to young children's screen time, but research including fathers in the literature is lacking.

3.0 Rationale and Research Objectives

3.1 Rationale

Overweight and obesity rates continue to be a growing concern among Canadian children (He et al., 2010). A major contributor to the growing obesity crisis is screen based sedentary behaviour among young children (He et al., 2010; Vale et al., 2013; & Coombs & Stamatakis, 2014). With only 15% of Canadian preschoolers meeting the Canadian Sedentary Behaviour Guidelines for the Early Years of less than one hour of screen time per day (Canadian Pediatric Society, 2017; Tremblay et al., 2012), concerns related to sedentary behaviour and screen time in young children continue to grow. It is especially important for young children to meet screen time recommendations as research has found that not only are television habits formed in childhood,

but that screen viewing at this age can affect their cognitive and emotional development, attention span, and future academic performance (Christakis & Zimmerman, 2009; Canadian Pediatric Society, 2017). Parents play a critical role in young children's weight-related behaviours, including screen time (West, Sanders, Cleghorn & Davies, 2010). Therefore, it is important to understand how media parenting practices influence children's screen time as this information can support the development of interventions and recommendations to promote the development of healthful screen habits early in life.

Research suggests that media parenting practices, defined as the specific methods parents employ to guide the media use of their children, may be important. However, the current research is limited in three key ways. First, newer types of mobile media devices such as tablets and smartphones are lacking in the literature (Aftosmes-Tobio et al., 2016; Matarma et al., 2016). These newer types of increasingly accessible mobile media devices have soared in popularity among young children in recent years, and are being introduced at a more rapid pace than the corresponding research on their effects on children (Canadian Pediatric Society, 2017). In fact, between 2011 and 2013 in the United States, the percentage of two to four-year-old children using newer types of mobile media devices increased from 39% to 80%, while television viewing time (the major focus of the literature to date) has decreased (Rideout et al., 2013). Thus, to gain an understanding of how parenting practices influence children's screen based sedentary behaviours in this current media environment, it is essential to conduct research that includes these newer types of mobile media devices.

Second, the research is currently not inclusive of all types of potentially relevant parenting practices. These include the parenting practices of using screen time to control behaviour and monitoring screen time. Currently, the practice of using screen time to control behaviour has been investigated by only one study, but has methodological limitations; and the parenting practice of monitoring screen time is non-existent in the literature. As mentioned earlier, these parenting practices are likely to be important factors in total screen time as these same parenting practices are used with physical activity (Vaughn et al., 2013) and food rewards (Lu et al., 2015). Thus, to successfully achieve an understanding of the role all types of parenting practices have on total screen time in young children, it is crucial that these additional parenting practices are examined.

Finally, the last limitation is the lack of representation from fathers in the current research related to parenting practices and screen time. Aftosmes-Tobio et al. (2016) noted in their systematic review of media parenting and childhood obesity that the literature could benefit from increased research related to the role of fathers in media parenting practices. Fathers may play a central role in media parenting practices, but in order to have a full understanding of what those associations are, further research that focuses on fathers is required.

To address these gaps, this research will examine the associations between maternal and paternal parenting practices (screen time modeling, mealtime screen use, use of screens in the bedroom, limit setting, use of screens to control behaviour, and screen time monitoring) and screen time (television, computers, videogames, tablets and smartphones) among young children.

3.2 Research Objective

The objective of this research is to determine associations between mother and father media parenting practices, i.e., parental screen time modeling, mealtime screen use, use of screens in bedroom, limit setting, using screens to control behaviour, monitoring screen time and children's total screen time.

3.3 Hypothesis

We hypothesize that media parenting practices, including mealtime screen use, use of screens in bedroom, screen time modeling, and using screens to control behaviour will be positively associated with children's total screen time; whereas the media parenting practices that involve limit setting and monitoring screen time will have an inverse relationship with children's total screen time.

4.0 Methods

4.1 Recruitment & Participants

This study will use baseline data from the Guelph Family Health Study (GFHS) phase 2 pilot, a pilot cluster randomized controlled trial of a home-based obesity prevention study. Phase 1 was not included in the data analysis as many of the screen related parenting practice questions were not included in the phase 1 questionnaire. Recruitment took place in the Guelph and Wellington area utilizing flyers and social media at local organizations who serve families with young children including the Guelph Family Health Team, Guelph Community Health Centre, and Ontario Early Years Centres. Families were eligible to participate in the GFHS if they had at least one child aged 18-months to 5 years at the time of recruitment, lived in or near Guelph,

Ontario, Canada, had a parent who could respond to questionnaires in English and the children were without severe health conditions that would prohibit participation in study activities.

Parents provided informed consent. A total of 39 families, including 62 children and 64 parents (39 mothers, 25 fathers) participated in the GFHS phase 2 pilot. Approximately 92% of families were two-parent households, and 8% of families were single-parent households. The study was approved by the University of Guelph Research Ethics Board (REB14AP008).

4.2 Data Collection

Parents completed on-line questionnaires that included questions about their media parenting practices, parenting style, and their demographics. Parent one, defined as the first parent to sign up for the study, also reported their children's screen time. In the questionnaires, screen time was defined for parents as "any time that is spent on screens such as televisions, cell phones, iPads or tablets, and videogames."

4.3 Measures

4.3.1 Outcome

The research outcome is children's screen time. Parent one reported children's total screen time on an average weekday and weekend day. The specific questions were "not including screen time for school/homework, how many hours does your child spend on screens on an average weekday?" and "not including screen time for school/homework, how many hours does your child spend on screens on an average weekend day?"

Response options were none, less than one hour per day, 2-3 hours per day, 4-6 hours per day, and 7 or more hours per day. Response options are coded as 0, 1, 2.5, 5 and 7, respectively and assessed as a continuous variable. Weekday and weekend day screen times were examined

separately as research suggests that children's screen time and associations between media parenting and children's screen time may differ between weekdays and weekend days (Sigmundová et al., 2016).

4.3.2 Predictors

Media Parenting Practices

Questions related to specific media parenting practices were asked of each parent. Response options were: 1) strongly disagree; 2) disagree; 3) agree; 4) strongly agree. Coding for each of these response options was scored with a value of 1, 2, 3 and 4, respectively.

Parental modeling. The parenting practice of screen time modeling was assessed with the questions: "When I am with my child I use a screen based device (e.g., cell phone, laptop)" and "I try to limit how much I use a screen based device (e.g., cell phone, laptop) when I am with my child" (reverse coded). Responses for this parenting practice were totalled and used as a continuous measure, with the highest possible score being 8 and the lowest score being 2.

Mealtime screen use. The parenting practice of mealtime screen use was assessed with the questions: "Our family watches a screen (e.g., television, computer) during meals" and "Family members are allowed to use screen based devices (e.g., cell phones) during meals". Responses for this parenting practice were totalled and used as a continuous measure, with the highest possible score being 8 and the lowest score being 2.

Use of screens in bedroom. The parenting practice of allowing screens to be used in the bedroom was assessed with the following questions: “My child falls asleep while using a screen based device”, “a screen based device is usually playing in the room when my child falls asleep” and “my child has access to a mobile screen based device while in bed” Responses for this parenting practice were totalled and used as a continuous measure, with the highest possible score being 12 and the lowest score being 3.

Limit setting. The parenting practice of limit setting was assessed using the following questions: “I limit my child’s screen-time during the week”, “I limit my child’s screen-time during the weekend”, and “I encourage my child to do activities other than screen-time.” Responses for this parenting practice were totalled separately for weekday and weekend scores and used as a continuous measure. Therefore, the highest possible score was 8 and the lowest possible score was 2, for weekday and for weekend.

Use of screens to control behaviour. The parenting practice of using screens to control their child’s behaviour was assessed with the questions: “I offer screen time to my child as a reward for good behavior” and “I take away screen time from my child as a punishment for bad behavior.” Responses for this parenting practice were totalled and used as a continuous measure, with the highest possible score being 8 and the lowest score being 2.

Parental monitoring of screen time. The parenting practice of monitoring screen time was asked with the following questions: “I keep track of my child’s screen-time during the week” and “I

keep track of my child’s screen-time during the weekend.” Responses for this parenting practice were totalled separately for weekday and weekend, and used as a continuous measure.

Therefore, the highest possible score was 4 and the lowest score was 1.

4.3.3 Covariates

Household income, child sex, child age, and total number of children in the family were used as covariates in the model. Household income data was gathered in the parent questionnaire as income has been shown to be associated with children’s screen time (Matarma et al., 2015; Cillero & Jago, 2010). Response options were \$0 to \$10,000, \$10,000 to \$19,999, \$20,000 to \$29,999, \$30,000 to \$39,999, \$40,000 to \$49,999, \$50,000 to \$59,999, \$60,000 to \$69,999, \$70,000 to \$79,999, \$80,000 to \$89,999, \$90,000 to \$99,999, \$100,000 to \$149,999, and \$150,000 or more. They were coded as 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, and 12, respectively. Child sex data was gathered as female or male, coded as 1 and 2 respectively. Child age was calculated using the child’s birthdate and the date of the child’s baseline assessment. Finally, information regarding total number of children in the family was gathered from parent one in the parent questionnaire, and grouped as one child, two children, and three or more children, coded as 1, 2 and 3 respectively.

4.4 Statistical analysis

Statistical analysis was done using SAS University Edition, version 3.6 (SAS Institute Inc., 2015). Descriptive statistics were used to identify possible outliers, determine the distribution of variables, characterize participants, and summarize the important features of the data.

To determine associations between parenting practices and children's screen time while adjusting for correlations among study participants (i.e., siblings), linear regression using a generalized estimating equations (GEEs) approach was used. To examine whether associations differ for weekday and weekend day screen time, separate models were run for each outcome. To examine whether associations between media parenting practices and children's screen time differ for mothers and fathers, models stratified by mothers and fathers were run. We first ran unadjusted models, then multivariable adjusted models including household income, number of children in family, child sex and child age.

5.0 Manuscript

Title: Cross-sectional associations between mothers' and fathers' media parenting practices and young children's screen time

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Abstract:

Objective: To examine the cross-sectional associations between both mothers' and fathers' media parenting practices (screen time modeling, mealtime screen use, use of screens in the bedroom, limit setting, use of screens to control behaviour, and screen time monitoring) and weekend/weekday screen time (television, computers, videogames, tablets, and smartphones) among young children.

Methods: This study used data from 39 families, 62 children between 1.5 and 5 years of age and their parents (39 mothers, 25 fathers), who were part of the Guelph Family Health Study - phase 2 pilot. Mothers and fathers separately reported six media parenting practices. Parent 1, defined as the first parent to enroll in the study, reported on children's screen time for week and weekend days. Linear regression using generalized estimating equations was used to examine associations between media parenting practices and children's weekday and weekend screen time. In all models, household income, number of children in the family, child sex, and child age were included.

Results: Mothers' screen time modeling ($\beta = 0.42$, $p = 0.013$), mealtime screen use ($\beta = 0.21$, $p = 0.017$), and use of screens to control behaviour ($\beta = 0.15$, $p = 0.038$) were positively associated with children's weekday screen time. Mothers' practices of monitoring screen time ($\beta = -0.34$, $p < 0.001$) and limiting screen time ($\beta = -0.31$, $p < 0.001$) were inversely associated with children's weekday screen time. Fathers' mealtime screen use ($\beta = 0.21$, $p = 0.023$) was positively associated children's weekday screen time; whereas fathers' monitoring screen time ($\beta = -0.40$, $p < 0.001$) and limiting setting ($\beta = -0.44$, $p < 0.001$) were inversely associated with children's weekday screen time. While most associations were similar for weekend day screen time there were a few differences: mothers' modeling and mothers' and fathers' mealtime screen use were not significantly associated with children's weekend screen time and fathers' use of screens to control behaviour ($\beta = 0.31$; 95% CI, 0.04 to 0.57; $p = 0.024$) was positively associated with children's weekend screen time.

Conclusion: Mothers' and fathers' media parenting practices were associated with children's screen time. Interventions aimed at reducing children's screen time should address both mothers' and fathers' media parenting practices.

Introduction

The World Health Organization (WHO) recognizes childhood obesity as a growing epidemic (WHO, 2016). The prevalence of children with obesity and overweight under the age of five worldwide is estimated to be 41 million (WHO, 2016). In Canada, the rate of children with obesity is on the rise with 21.5% of children between two and five years of age categorized as having overweight or obesity (Shields, 2008). A major contributor to the growing obesity crisis is screen based sedentary behaviour among young children (He et al., 2010; Vale et al., 2013; & Coombs & Stamatakis., 2014). Both observational and intervention research has shown that higher levels of screen time, typically measured as TV viewing, is associated with increased risk of obesity among children (Levin et al., 2004; Robinson, 1999). With only 15% of Canadian preschoolers meeting the Canadian Sedentary Behaviour Guidelines for the Early Years of less than one hour of screen time per day (Tremblay et al., 2017), identifying effective strategies to reduce young children's screen time is needed. To inform such strategies, we must first understand key determinants of children's screen time.

Parents have been identified as playing a critical role in the development of their young children's weight-related behaviours, including screen time (West et al., 2010). In particular, media parenting practices, defined as the specific methods parents employ to guide the media use of their children, may be an important determinant of children's screen time. Research related to media parenting practices to date has focused on children's television time with few studies including mobile media devices such as tablets and smartphones (Aftosmes-Tobio et al., 2016;

Matarma et al., 2016). These mobile media devices have soared in popularity among young children in recent years; from 2011 and 2013 the percentage of two to four-year-old children using mobile media devices in the United States increased from 39% to 80%, while television viewing time decreased (Rideout et al., 2013). Thus, research aiming to understand how media parenting practices are associated with children's screen based sedentary behaviours in this current media environment must include screen-time assessments that take into consideration time spent on mobile media devices as well as more traditional modes of screen time.

There is also limited representation of fathers in the current research related to media parenting practices and children's screen time. Aftosmes-Tobio and colleagues (2016) examined 103 studies in their systematic review of media parenting and childhood obesity, and found that only 57 of these studies included fathers. The majority of these studies combined information across parents rather than distinguish mothers from fathers. Thus, little is known about how fathers' parenting practices influence children's screen time. The underrepresentation of fathers is particularly concerning given emerging research identifying fathers as key stakeholders in childhood obesity prevention. A prospective study found that children with an obese father and a healthy weight mother were over 10 times more likely to be obese four years later than children with two healthy weight parents, whereas the same pattern was not observed for children with an obese mother and healthy weight father (Freeman et al, 2012). This finding underscores the need to understand fathers' role in the development of childhood obesity-related behaviours, including children's screen time.

Using data from the Guelph Family Health Study, a family-based cohort study in Ontario, Canada, this study examined the associations between both mothers' and fathers' parenting

practices (screen time modeling, mealtime screen use, use of screens in the bedroom, limit setting, use of screens to control behaviour, and screen time monitoring) and weekend/weekday screen time (television, computers, videogames, tablets and smartphones) among young children aged 1.5 to 5 years.

Materials and methods

Recruitment and eligibility

This study used baseline data collected between February 24, 2016 to December 15, 2016 among parents participating in the Guelph Family Health Study (GFHS) phase 2 pilot study. The GFHS is a family-based cohort study designed to identify early life risk factors for obesity and chronic disease and to test family-based approaches for health promotion. Recruitment efforts included flyers and social media at local organizations who serve families with young children in the Guelph and Wellington County, Ontario, Canada. Families were eligible to participate in the GFHS if they had at least one child aged 1.5-5 years at the time of recruitment, lived in or near Guelph, Ontario, Canada, had a parent who could respond to questionnaires in English, and the children were without severe health conditions that would prohibit participation in study activities. Parents provided informed consent. A total of 39 families (62 children and 68 parents) participated in the GFHS phase 2 pilot. Four fathers did not complete child questionnaires and were therefore not included in this study. The final analytic sample included 39 families, with 25 of those families providing data from both mother and father, resulting in a total of 64 parents (39 mothers and 25 fathers), and 62 children. Approximately 92% of families were two-parent households, and 8% of families were single-parent households. The study was approved by the University of Guelph Research Ethics Board (REB14AP008).

Measures

Media parenting practices

To assess media parenting practices, both mothers and fathers separately completed an on-line questionnaire that included purpose-designed items that were informed by previously designed measures to assess media parenting practices (Larios et al, 2009; Vaughn et al, 2013). For parents with multiple children, one questionnaire was completed by both mother and father for each child enrolled in the study. The following six parenting practices were assessed: Parental modeling (2 items): “when I am with my child I use a screen based device” and “I try to limit how much I use a screen based device when I am with my child”; Mealtime screen use (2 items): “our family often watches a screen during meals” and “family members are allowed to use screen based devices during meals”; Use of screens in bedroom (3 items): “my child falls asleep while using a screen based device”, “a screen based device is usually playing in the room when my child falls asleep”, and “my child has access to a mobile screen based device in bed”; Use of screens to control behaviour (2 items): “I offer screen time to my child as a reward for good behaviour” and “I take away screen time from my child as a punishment for bad behaviour”; Parental monitoring of screen time (2 items): “I keep track of my child’s screen time during the week” and “I keep track of my child’s screen time during the weekend”; Limit setting (3 items): “I limit my child’s screen time during the week”, “I limit my child’s screen time during the weekend” and “I encourage my child to do activities other than screen time”. Response options for each media parenting practice item included a 4-point Likert scale ranging from “strongly disagree” to “strongly agree.” Responses were coded numerically from 1 to 4 and then totalled to create a score for each media parenting practice, with the exception of limit setting and monitoring, where score for parenting practice was totalled separately for weekday and weekend

day. The parenting practice of using screens in the child's bedroom was endorsed by only one out of 64 parents in the Guelph Family Health Study, phase 2 pilot. Given this lack of variation, the parenting practice of using screens in the bedroom was removed from analysis. Separate Cronbach's α for mothers and fathers were run to measure internal consistency among questions asked within each of the six parenting practices [Table 1]. For parental modeling, there was poor internal consistency (Cronbach's α for Mothers = 0.12, Fathers = 0.36), resulting in the modelling item "I try to limit how much I use a screen based device when I am with my child" being excluded, and "when I am with my child I use a screen based device" to be examined independently. The remaining four parenting practices showed good internal consistency for both mothers and fathers ranging between 0.72-0.95 [Table 1].

Child screen time

Parent one, defined as the first parent to enroll in the study, reported on children's total screen time on an average weekday and weekend day. In the questionnaire, screen time was defined for parents as "any time that is spent on screens such as television, cell phones, iPads or tablets, and videogames." The specific questions were "not including screen time for school/homework, how many hours does your child spend on screens on an average weekday?" and "not including screen time for school/homework, how many hours does your child spend on screens on an average weekend day?" Response options were none, less than one hour per day, 2-3 hours per day, 4-6 hours per day, and 7 or more hours per day. Response options were coded as 0, 1, 2.5, 5, and 7, respectively. Weekday and weekend day screen times were examined separately as research suggests that level of children's screen time and associations between media parenting practices and children's screen time may differ between weekdays and weekend days (Sigmundová et al., 2016).

Covariates

Parent one provided the information for household income, number of children in the family, and sex of the child on the baseline questionnaire. Child age was calculated using the child's birthdate and the date of the child's baseline assessment.

Statistical analysis

SAS University Edition, version 3.6 (SAS Institute Inc., 2015) was used to perform all analyses. Linear regression using generalized estimating equations was used to determine whether associations exist between media parenting practices (parental modeling, mealtime screen use, use of screens in bedroom, use of screens to control behaviour, parental monitoring of screen time, and limit setting) and children's screen time (weekend and weekday) while adjusting for correlations among study participants. Analyses were stratified by parent gender and by weekday/weekend day of child screen time. All models included household income, number of children in the family, child sex, and child age. Significance was determined as $p < 0.05$.

Results

Sample

Participant demographic information is presented in Table 2. Children had a mean age of 3.65 (1.36) years and 57% of the children were male. Parents had a mean age of 37.56 (5.55) years, 61% were female, and 54% of families had a yearly household income of over \$100,000. Approximately 87% of children, and 91% of parents identified as Caucasian. Participant children had mean BMI z score of 0.7, and parents had a mean BMI of 28 kg/ m². For children, mean

weekday and weekend day screen time measured in hours was 1.24 (0.75) and 1.88 (1.27), respectively. Parents had a mean screen time of 2.03 (1.31) hours during the weekday and 2.34 (1.19) hours during the weekend.

Associations between maternal and paternal media parenting practices and children's total screen time

Mother media parenting practices

When examining children's weekday screen time, mothers' own use of screens (modeling) ($\beta = 0.42$; 95% CI, 0.09 to 0.76; $p = 0.013$), mealtime screen use ($\beta = 0.21$; 95% CI, 0.09 to 0.04; $p = 0.017$), and use of screens to control behaviour ($\beta = 0.15$; 95% CI, 0.01 to 0.29; $p = 0.038$) were positively associated with children's weekday screen time. Mothers' practices of monitoring screen time ($\beta = -0.34$; 95% CI, -0.53 to -0.15; $p < 0.001$), and limiting screen time ($\beta = -0.31$; 95% CI, -0.47 to -0.15; $p < 0.001$) were inversely associated with young children's weekday screen time [Table 3]. Results for children's weekend screen time yielded similar results for mothers' media parenting practices with two exceptions. Mothers' own use of screens (modeling) and mealtime screen use were not significantly associated with children's weekend screen time [Table 4].

Father media parenting practices

Fathers' practice of using screens during mealtime ($\beta = 0.21$; 95% CI, 0.03 to 0.40; $p = 0.023$) was positively associated with children's weekday screen time. Fathers' practice of monitoring screen time ($\beta = -0.40$; 95% CI, -0.62 to -0.19; $p < 0.001$), and limit setting ($\beta = -0.44$; 95% CI, -0.61 to -0.27; $p < 0.001$) were inversely associated with children's weekday screen time. Fathers' own use of screens (modeling), and using screens to control behaviour were not significantly

associated with children's weekday screen time [Table 3]. Results for children's weekend screen time yielded similar results for fathers' media parenting practices with two exceptions. Fathers' practice of mealtime screen use was not significantly associated with children's total weekend screen time, but fathers' use of screens to control behaviour ($\beta = 0.31$; 95% CI, 0.04 to 0.57; $p = 0.024$) was positively associated with children's weekend screen time [Table 4].

Discussion

This study examined the associations between media parenting practices and young children's screen time among a sample of Canadian families with children aged 1.5-5 years. The results show that the media parenting practices of both mothers and fathers influence the amount of time children spend in front of screens.

Modelling of screen time for mothers, but not fathers, was positively associated with children's weekday and weekend screen time. These results supported those of Materma et al. (2016) who found that television time of mothers, but not fathers, was positively associated with the television time of their preschool aged children. They also supported those of Birken (2011) who found that maternal screen time viewing was significantly associated with an increase of children's total television time. This could potentially be because although there has been a shift in the diversity of family structures, mothers remain the primary caregiver in the majority of families (Statistics Canada, 2015) and are therefore spending more time with their children. Thus, it is reasonable to believe that mothers would exert more influence on their children

through modeling behaviours when compared to fathers. Additional research that explores fathers' influence on children's screen time is needed to confirm our findings.

The parenting practice of mealtime screen use for both mothers and fathers resulted in children spending more time during the weekdays in front of a screen based device. These results support previous research from the Canadian TARGet Kids! study, which found that one of the factors significantly associated with increased total daily screen time was television viewing during meals (Birken et al., 2011). Taken together, these findings suggest that interventions focused on reducing mealtime screen use has the potential to reduce children's overall screen time.

Both mother's and fathers' use of screens to control behaviour was positively associated with children's screen time. These results mirror what has been found in research examining parental influences on children's physical activity and dietary intake. Research has shown that when parents use food to control behaviour, children have a greater dietary intake of those same foods (Lu et al., 2015). This is also true for physical activity. A study by Vaughn et al. (2013) found that the use of physical activity as a reward for good behaviour was positively associated with physical activity. Taken together, these results suggest that using physical activity, food, or screen time to control children's behaviours may lead to higher levels of those same behaviours. Alternatively, it may be that when parents are trying to control their children's behaviour, they choose a reward or punishment that they know their child values, i.e., they only select screen time as a reward when their child really values screen time. Children who really value screen time may watch more screen time, in general. Thus, this association between parental control and

screen time may be partly due to reverse causation. Longitudinal research is needed to help determine temporal order of parenting practices and children's screen time.

The association between father's use of screens to control child behaviour and child screen time was significant only for children's weekend screen time. This may be due to the greater availability and involvement of fathers with their children on weekends as compared to weekdays. This increase in weekend involvement is described in a study by Yeung et al. (2001), who found that fathers of intact families have 6.5 hours of involvement time with their children on a weekend day, compared to 2.5 hours on a weekday. However, as mentioned previously, more studies that include fathers are needed to validate this result as there is only one other study that has examined this parenting practice; among their sample of parents (93% mothers) Vaughn and colleagues found that removing television time as a punishment and using television to control a child's behaviour was positively associated with children's overall TV time (Vaughn et al., 2013).

This study was the first to investigate the association between the media parenting practice of monitoring screen time and children's total screen time. For both mothers and fathers, monitoring the amount of screen time was inversely associated with children's weekday and weekend total screen time. These results demonstrate that parental monitoring of screen time could potentially change screen time viewing behaviour among young children and may be an important target for interventions.

Our findings support previous research, which has shown that the media parenting practice of limit setting is successful in reducing children's total screen time (Johnson et al., 2015; Rutherford et al., 2015; Lloyd et al., 2014). The majority of existing studies examined mother's parenting practices only. One study that examined the parenting practices of mothers and fathers among 70 Australian families of school aged children found that the media parenting practice of limit setting for fathers, but not mothers, was inversely associated with children's screen time (Lloyd et al., 2014). This study builds on previous research that examined fathers' influence and found that limit setting by both mothers and fathers is inversely associated with screen time. Thus, intervention approaches aiming to reduce children's screen time should address limit setting practices among both mothers and fathers.

Only one out of 64 parents endorsed screen use in the bedroom, and therefore we were unable to move forward with analysis of this variable. A potential explanation for the low practice of using screens in the bedroom could be due to the relatively high SES of participants in this study, as this parenting practice not be as common among families with higher SES (Tandon et al., 2012). It also may not be as common for Canadian children to have a screen based device in their bedroom, when compared to in the United States (U.S.), where over half of American children have a television in their bedroom (Pitrowski et al., 2015). This may point to a potential cultural difference related to the parenting practice of using screens in the bedroom between the U.S. and Canada.

Strengths of our study included the inclusion of mobile media devices such as tablets and smartphones in our assessment of children's screen time. This allowed us to investigate how media parenting practices influence children's screen based sedentary behaviours in a way that represents the current media environment. Second, this study included the practice of monitoring screen time and use of screens to control behaviour, parenting practices that are limited in the current research. This allowed for better understanding of the role a range of parenting practices have on total screen time in young children. Lastly, the exploration of the impact of fathers' parenting practices helps address a key gap in our understanding of influences on children's screen time behaviours.

The results of this study provide a more complete understanding of the influence media parenting practices have on young children's screen time. It is important that children's screen time recommendations are met, as exceeding screen time recommendations can negatively affect young children's cognitive and emotional development, attention span, and future academic performance (Christakis & Zimmerman, 2009; Canadian Pediatric Society, 2017) and increase the risk of childhood obesity (Levin et al., 2004; Robinson, 1999). Results from this study can be used to guide parents in meeting screen time recommendations that promote positive health and development among their young children.

This study had some limitations that should be considered when interpreting our results. First, both parenting practices and children's screen time were based on parent report. This may result in social-desirability bias or errors in estimating children's daily average screen time. A second

limitation is the relatively high socioeconomic status and that most of the participants identify as Caucasian. Therefore, results may not be generalizable to ethnically diverse families or families with lower SES. Future research should examine these associations within more ethnically and racially diverse populations.

Conclusion

Overall, media parenting practices used by both mothers and fathers was associated with young children's total screen time. Given that parents play a key role in the development of their young children's screen time behaviours, and that research shows exceeding screen time recommendations may have negative physical, developmental, and psychosocial affects on young children (Christakis & Zimmerman, 2009; Canadian Pediatric Society, 2017), fully understanding the influence of both mother and father media parenting practices has on children's screen time in the current media environment is needed. This knowledge will guide parents toward media parenting practices that work to achieve the current screen time recommendations. This study furthers that understanding by highlighting the importance of targeting both mothers' and fathers' media parenting practices. Further study is needed that includes mobile media devices in the assessment of children's screen time, examines the relatively understudied media parenting practices of monitoring screen time and using screens to control behaviour, and that includes a more ethnically diverse population. Research that further explores the role of fathers' media parenting practices on children's screen time is also needed.

5.1 Tables

Table 1: Mean scores of mothers' and fathers' media parenting practices and their Cronbach's α values

Parenting Practice	Mother Mean (SD)	Father Mean (SD)	Cronbach's α Mother	Cronbach's α Father
Screen Time Modeling	2.68 (0.59)	2.55 (0.78)	n/a	n/a
Mealtime Screen use	1.45 (0.58)	1.58 (0.61)	0.72	0.76
Screens to Control Behaviour	1.90 (0.80)	2.00 (0.97)	0.79	0.95
Monitoring Screen Time	2.94 (0.93)	2.95 (0.91)	0.95	0.95
Limiting Screen Time	3.44 (0.56)	3.48 (0.51)	0.85	0.81

Table 2: Characteristics of mothers, fathers, and their preschool-aged children in the Guelph Family Health Study Pilot 2.

Variable	Children	Parents
	N = 62	N = 64
Total number of children in family. %*		
1	17.94	-
2	53.85	-
3 or more	28.21	-
Sex %		
Male	56.45	39.06
Female	43.55	60.94
Age, y, Mean (SD)	3.65 (1.36)	37.56 (5.55)
Ethnicity. %		
Caucasian	87.10	90.62
Other	12.90	9.38
Screen Time. Hours		
Weekday Mean (SD)	1.24 (0.75)	2.03 (1.31)
Weekend Mean (SD)	1.88 (1.27)	2.34 (1.19)
Weight status. BMI***: Mean (SD)	0.66 (1.04)	27.72 (6.49)
Household Income. %** of families		
< \$40 000	-	7.69
\$40 000 - \$69 999	-	12.82
\$70 000 - \$99 999	-	23.08
\$1000 000 - \$149 999	-	30.77
> \$150 000	-	23.08
Did not Answer	-	2.56

*N=38; one family did not disclose household income.

**N = 39; sample based on Parent One response to household income

***BMI (N = 60) was used for adult weight status, 4 women were omitted d/t pregnancy;

BMI z score (N = 60) was used for child weight status to account for age and sex, two children omitted as unable to obtain height measurement.

Table 3: Results of linear regression modeling using generalized estimating equations for investigating the effects of mother and father media parenting practices on children’s weekday screen time.

Parenting Practice	Parent	Child Screen Time Weekday	
		Adjusted estimate* (95% CI)	P-value
Screen Time Modeling	Mother	$\beta = 0.42 (0.09, 0.76)$	0.01
	Father	$\beta = -0.05 (-0.43, 0.33)$	0.81
Mealtime Screen Use	Mother	$\beta = 0.21 (0.09, 0.04)$	0.02
	Father	$\beta = 0.21 (0.03, 0.40)$	0.02
Screens to Control Behaviour	Mother	$\beta = 0.15 (0.01, 0.29)$	0.04
	Father	$\beta = 0.09 (-0.04, 0.23)$	0.17
Monitoring Screen Time	Mother	$\beta = -0.34 (-0.53, -0.15)$	<0.01
	Father	$\beta = -0.40 (-0.62, -0.19)$	<0.01
Limiting Screen Time	Mother	$\beta = -0.31 (-0.47, -0.15)$	<0.01
	Father	$\beta = -0.44 (-0.61, -0.27)$	<0.01

*Adjusted for total number of children in the family, family income, child sex, and child age.

Table 4: Results of linear regression modeling using generalized estimating equations for investigating the effects of mother and father media parenting practices on children’s weekend screen time

Parenting Practice	Parent	Child Screen Time Weekend	
		Adjusted estimate* (95% CI)	P-value
Screen Time Modeling	Mother	$\beta = 0.47 (-0.06, 0.10)$	0.08
	Father	$\beta = -0.03 (-0.77, 0.72)$	0.94
Mealtime Screen use	Mother	$\beta = 0.24 (-0.01, 0.50)$	0.06
	Father	$\beta = 0.07 (-0.25, 0.38)$	0.70
Screens to Control Behaviour	Mother	$\beta = 0.37 (0.12, 0.61)$	<0.01
	Father	$\beta = 0.31 (0.04, 0.57)$	0.02
Monitoring Screen Time	Mother	$\beta = -0.44 (-0.86, -0.01)$	0.045
	Father	$\beta = -0.48 (-0.89, -0.08)$	0.02
Limiting Screen Time	Mother	$\beta = -0.41 (-0.72, -0.10)$	0.01
	Father	$\beta = -0.58 (-1.02, -0.13)$	0.01

*Adjusted for total number of children in the family, family income, child sex, and child age.

5.2 References

- Aftosmes-Tobio, Alyssa., Ganter, Claudia., Gicevic, Selma., Newlan, Sami., Simon, Christine L., Davidson, Kirsten K., Manganello, Jennifer A. (2016). A systematic review of media parenting in the context of childhood obesity research. *BioMed Central Public Health*, 16 (320).
- Birken, Catherine S., Maguire, Jonathon., Mekky, Magda., Manlhiot, Cedric., Beck, Carolyn E., Jacobson, Sheila., Peer, Michael., Taylor, Carolyn., McCrindle, Brian W., Parkin, Patricia C. (2011). Parental factors associated with screen time in pre-school children in primary-care practice: a TARGeT Kids! study. *Public Health Nutrition*, 14(12), 2134-2138.
- Canadian Pediatric Society, Digital Health Taskforce. (2017). Screen time and young children: Promoting health and development in a digital world. Retrieved from: <http://www.cps.ca/en/documents/position/screen-time-and-young-children>.
- Christakis, Dimitri A., & Zimmerman, Frederick J. (2009). Young children and media: limitations of current knowledge and future directions for research. *American Behavioral Scientist*, 52, 8, 1177-1185.
- Coombs, Ngaire A., & Stamatakis, Emmanuel. (2015). Associations between objectively assessed and questionnaire-based sedentary behaviour with BMI-defined obesity among general population children and adolescents living in England. *BMJ Open*, 5, e007172.
- Freeman E., Fletcher, R., Collins, C.E., Morgan, P.J., Burrows, T., Callister, R. (2012). Preventing and treating childhood obesity: time to target fathers. *International Journal of Obesity*, 36, 12-15.
- He, Meizi., Piché, Leonard., Beynon, Charlene., Harris, Steward. (2010). Screen-related sedentary behaviors: children's and parents' attitudes, motivations, and practices. *Journal of Nutrition Education and Behavior*, 42(1), 17-25.
- Johnson, Lauren., Chen, Tzu-An., Hughes, Sheryl O., O'Connor, Teresia M. (2015). The association of parent's outcome expectations for child TV viewing with parenting practices and child TV viewing: an examination using path analysis. *International Journal of Behavioral Nutrition and Physical Activity*, 12(70).
- Larios, Sandra E., Ayala, Guadalupe X., Arredondo, Elva M., Baquero, Barbara., Elder, John P. (2009) Development and validation of a scale to measure Latino parenting strategies related to children's obesigenic behaviors. The parenting strategies for eating and activity scale (PEAS). *Appetite*. 52(1),166-72.
- Levin, Sarah., Martin, Maurice W., Riner, William F. (2004). TV viewing habits and body mass index among South Carolina Head Start children. *Ethnicity & Disease*, 14, 336-339.
- Lloyd, Adam B., Lubans, David R., Plotnikoff, Ronald C., Collins, Clare E., Morgan, Philip J. (2014). Maternal and paternal parenting practices and their influence on children's adiposity, screen time, diet and physical activity. *Appetite*, 79, 149-157.

- Lu, Ji., Xiong, Suhong., Arora, Narendra., Dubé, Laurette. (2015). Using food as reinforcer to shape children's non-food behaviour: the adverse nutritional effect doubly moderated by reward sensitivity and gender. *Eating Behaviour, 19*, 94-97.
- Matarma, Tanja., Koski, Pasi., Löyttyniemi, Eliisa., Langström, Hanna. (2016). The factors associated with toddlers' screen time change in the STEPS Study: a two-year follow up. *Preventive Medicine, 84*, 27-33.
- Piotrowski, Jessica Taylor., Jordan, Amy B., Bleakley, Amy., Hennessy, Michael. (2015). Identifying family television practices to reduce children's television time. *Journal of Family Communication, 15*, 159-174.
- Rideout, Victoria., Saphir, Melissa., Pai, Seeta., Rudd, Allison., and Pritchett, Jenny. (2013). Zero to eight: children's media use in America 2013. Retrieved from: <https://www.common sense media.org/research/zero-to-eight-childrens-media-use-in-america-2013>
- Robinson, Thomas N. (1999). Reducing children's television viewing to prevent obesity: a randomized controlled trial. *JAMA, 282(16)*, 1561-1567.
- Rutherford, Leonie., Brown, Judith E., Skouteris, Helen., Fuller-Tyszkiewicz, Matthew., Bittman, Michael. (2015). Screen media, parenting practices, and the family environment in Australia: a longitudinal study of young children's media use, lifestyles, and outcomes for healthy weight. *Journal of Children and Media, 9(1)*, 22-39.
- SAS Institute Inc. 2015. SAS/IML® 14.1 User's Guide. Cary, NC: SAS Institute Inc. (n.d.).
- Shields, Margaret. (2008). Measured Obesity: Overweight Canadian children and adolescents. *Nutrition: Findings from the Canadian Community Health Survey, Statistics Canada, 82(620)*.
- Sigmundová, Dagmar., Sigmund, Erik., Badura, Petr., Vokáčová, Jana., Trhlíková, Lucie., Bucksch, Jens. (2016). Weekday-weekend patterns of physical activity and screen time in parents and their pre-schoolers. *BMC Public Health, 16(1)*, 898.
- Statistics Canada. (2015). Family caregiving: What are the consequences? Retrieved from: <http://www.statcan.gc.ca/pub/75-006-x/2013001/article/11858-eng.htm>
- Tandon, Pooja S., Zhou, Chuan., Sallis, James F., Cain, Kelli L., Frank, Lawrence D., Saelens, Brian E. (2012). Home environment relationships with children's physical activity, sedentary time, and screen time by socioeconomic status. *International Journal of Behavioral Nutrition and Physical Activity, 9*:88.
- Tremblay, Mark S., Chaput, Jean-Philippe., Adamo, Kristi B., Aubert, Salomé., Barnes, Joel D., Choquette, Louise., Duggan, Mary., Faulkner, Guy., Goldfield, Gary S., Gray, Casey E., Gruber, Reut., Janson, Katherine., Jassen, Ian., Janssen, Xanne., Garcia, Alejandra Jaramillo., Kuzik, Nicholas., LeBlanc, Claire., MacLean, Joanna., Okely, Anthony D., Poitras, Veronica J., Rayner, Mary-Ellen., Reilly, John J., Sampson, Margaret., Spence,

- John C., Timmons, Brian W., Carson, Valerie. (2017). Canadian 24 hour movement guidelines for the early years (0-4 Years): an integration of physical activity, sedentary behaviour, and sleep. *BMC Public Health*. 17(suppl 5):874.
- Vale, S., Trost, S., Ruiz, J.J., Moreira, P., Mota, J. (2013). Physical activity guidelines and preschooler's obesity status. *International Journal of Obesity*, 37, 1352-1355.
- Vaughn AE, Hales D, & Ward DS. (2013). Measuring the physical activity practices used by parents of preschool children. *Medicine and Science in Sports and Exercise*. 45(12):2369-2377.
- West, Felicity., Sanders, Matthew R., Cleghorn, Geoffrey., Davies, Peter SW. (2010). Randomized clinical trial of a family-based lifestyle intervention for childhood obesity involving parents as the exclusive agents of change. *Behaviour Research and Therapy*, 48, 1170-1179.
- World Health Organization. (2016). Report of the commission on ending childhood obesity. Retrieved from:
http://apps.who.int/iris/bitstream/10665/204176/1/9789241510066_eng.pdf.
- Yeung, W. Jean., Sandberg, John F., Davis-Kean, Pamela E., Hofferth, Sandra L. (2001). Children's time with fathers in intact families. *Journal of Marriage and Family*, 63, 136-154.

6.0 Summary

Screen based sedentary behaviour is a major contributor to the growing obesity crisis among young children (He et al., 2010; Vale et al., 2013; & Coombs & Stamatakis., 2014). Currently, only 15% of Canadian preschoolers are meeting the Canadian Sedentary Behaviour Guidelines for the Early Years of less than one hour of screen time per day (Tremblay et al., 2017). By comparison, baseline data from Pilot 2 of the Guelph Family Health Study shows 68% of children are meeting screen time recommendations during the weekday, but only 39% of children are meeting screen time recommendations on the weekend. It is especially important for young children to meet screen time recommendations as research has found that not only are television habits formed in childhood, but that screen viewing at this age may impact their physical health and development (Christakis & Zimmerman, 2009; Canadian Pediatric Society, 2017). Thus, in order to address this growing concern of screen based sedentary behaviour among young children, identifying effective strategies to reduce young children's screen time is needed.

This study examined the associations between both mothers' and fathers' parenting practices (screen time modeling, mealtime screen use, use of screens in the bedroom, limit setting, use of screens to control behaviour, and screen time monitoring) and weekend/weekday screen time (television, computers, videogames, tablets and smartphones) among young children aged 1.5 to 5 years.

When examining mother's parenting practices and children's weekday screen time, significant findings included modeling screen time, mealtime screen use, and use of screens to control behaviour, which were positively associated with children's weekday screen time. Mothers' practice of monitoring screen time, and limiting screen were inversely associated with young children's weekday screen time. When examining fathers' parenting practices and children's weekday screen time, significant findings included using screens during mealtime, which was associated with higher children's weekday screen time. Fathers' practice of monitoring screen time, and limit setting, were inversely associated with children's weekday screen time. Analyses exploring parental influences on children's weekend screen time yielded similar results, with some exceptions. For mothers, the parenting practice of modeling and mealtime screen use were not significantly associated with children's weekend screen time. For fathers, the parenting practice of mealtime screen use was not significantly associated with children's weekend screen time, but fathers' use of screens to control behaviour was positively associated with children's weekend screen time.

This study helped to further the understanding of the role both mothers and fathers play, through their parenting practices, in influencing their young children's screen based sedentary behaviours. This was achieved by including both traditional and newer types of mobile media devices, examining the understudied parenting practices of monitoring screen time and using screen time to control behaviour, as well as including fathers in the study.

A key limitation to this study that should be addressed in future studies was the high number of participants (91%) who identified themselves as Caucasian, and the high number of families (54%) with a yearly family income of over \$100 000. A next step would be a study that examines these same measures, with a population that includes more ethnically diverse families, and a wider range in SES.

A study by Boase and Ling (2013) compared the self-report and log data of mobile phone use among 426 participants, and found significant differences among the two measures. Given that a key limitation to this study was the parents' self-report of their children's screen time, it would be interesting if future research used a phone app, similar to that used in a study by Zhu et al. (2018), adapted to include tablet use that measures active time on a mobile media device. This, in conjunction with television and computer monitoring systems such as those used in the study by Epstein et al. (2008), would allow for a more accurate assessment of children's weekday and weekend screen time.

The parenting practices of monitoring screen time and using screen time to control behaviour, remains relatively understudied. Although it was addressed in this study, it would be interesting to see these two parenting practices further examined in studies that include screen based monitoring devices and a broader population.

Research related to parenting practices and children's screen time that includes child temperament as a variable would be interesting to explore. Although limited, there is some

research to support the idea that child temperament may influence maternal feeding practices (Boles, Reiter-Purtill & Zeller, 2013), i.e., using food to calm an upset child (McMeekin et al., 2013). Therefore, it is reasonable to believe that the potential exists for child temperament to influence media parenting practices as well. This would be important information to consider when developing strategies to help parents implement media parenting practices that support the goal of meeting screen time recommendations.

Future studies that explore media parenting practices would benefit from investigating parental co-viewing, as research has shown that the parenting practice of co-viewing is positively associated with children's television time (Vaughn et al., 2013; Cillero, Jago & Sebire, 2011). However, research related to parental co-viewing and children's screen time has two major gaps. The first is the lack of research that includes mobile media devices and the second is research that includes the role of fathers related to the media parenting practice of co-viewing. It would be interesting to understand first, the prevalence of parental co-viewing using mobile media devices, and whether both mothers' and fathers' practice of co-viewing influences children's screen time.

Lastly, it would be interesting to investigate the impact of parenting stress or household stress on children's screen viewing time. A qualitative study by Parks, Kazak, Kumanyika, Lewis and Barg (2016) examined the perception of stress and its impact on screen time use in self-identified black families in the United States. This study identified that parents and grandparents endorsed children's television viewing as an opportunity for the parent/grandparent to "collect

themselves” as to not take out potential stress on their children (Parks et al., 2016). A quantitative study that examines parenting stress and its influences on children’s weekday and weekend screen time would help to better understand the potential environmental factors that influence the media parenting practices employed by parents.

A next step to further research in the area of media parenting practices would be the creation of knowledge translation tools that guide parents in recommended media parenting practices. It would be interesting to measure the results of an intervention study that compared the measured screen time of children whose parents received education regarding recommended media parenting practices, and those who did not. Findings from an intervention study related to parenting practices and children’s screen time could provide health care providers with effective guidelines and strategies to support parents in reducing their children’s screen time to meet current recommendations.

7.0 References

- Abbott, G., Hnatiuk, Jill., Timperio, Anna., Salmon, Jo., Best, Keren., Hesketh, Kylie D. (2016). Cross-sectional and longitudinal associations between parents' and preschoolers' physical activity and television viewing: The HAPPY Study. *Journal of Physical Activity and Health*, 13, 269-274.
- Aftosmes-Tobio, Alyssa., Ganter, Claudia., Gicevic, Selma., Newlan, Sami., Simon, Christine L., Davidson, Kirsten K., Manganello, Jennifer A. (2016). A systematic review of media parenting in the context of childhood obesity research. *BioMed Central Public Health*, 16 (320).
- Baranowski, Tom., Anderson, Cheryl., Carmack, Cindy. (1998). Mediating variable framework in physical activity interventions. How are we doing? How might we do better? *American Journal of Preventative Medicine*, 15(4), 266-297.
- Baranowski, Tom., Chen, Tzu-An., O'Connor, Teresia., Hugnes, Sheryl., Beltran, Alicia., Frankel, Leslie., Diep, Cassandra., Baranowski, Janice C. (2013). Dimensions of vegetable parenting practices among preschoolers. *Appetite*, 69, 89-93.
- Birken, Catherine S., Maguire, Jonathon., Mekky, Magda., Manlhiot, Cedric., Beck, Carolyn E., Jacobson, Sheila., Peer, Michael., Taylor, Carolyn., McCrindle, Brian W., Parkin, Patricia C. (2011). Parental factors associated with screen time in pre-school children in primary-care practice: a TARGeT Kids! study. *Public Health Nutrition*, 14(12), 2134-2138.
- Boles, Richard., Reiter-Purtill, Jennifer., Zeller, Meg. (2013). Persistently obese youth: interactions between parenting styles and feeding practices with child temperament. *Clinical Pediatrics*, 52(12), 1098-1106.
- Canadian Pediatric Society, Digital Health Taskforce. (2017). Screen time and young children: promoting health and development in a digital world. Retrieved from: <http://www.cps.ca/en/documents/position/screen-time-and-young-children>.
- Carson, Valerie., Rosu, Andrei., Janssen, Ian. (2014). A cross-sectional study of the environment, physical activity, and screen time among young children and their parents. *BMC Public Health*, 14:61.
- Carson, Valerie., Spence, John C., Cutumisu, Nicoleta., Cargill, Lindsey. (2010). Association between neighborhood socioeconomic status and screen time among pre-school children: a cross sectional study. *BMC Public Health*, 10:367.
- Centre for Disease Control and Prevention. (December 15, 2016). Childhood obesity causes and consequences. Retrieved from: <https://www.cdc.gov/obesity/childhood/causes.html>
- Certain, Laura K., Kahn, Robert S. (2002). Prevalence, correlates, and trajectory of television viewing among infants and toddlers. *Pediatrics*, 109(4), 634-642.

- Cillero, Itziar Hoyos., Jago, Russell., Sebire, Simon. (2011). Individual and social predictors of screen-viewing among Spanish school children. *European Journal of Pediatrics*, 170(1), 93-102.
- Cillero, Itziar Hoyos., Jago, Russell. (2010). Systematic review of correlates of screen-viewing among young children. *Preventive Medicine*, 51, 3-10.
- Christakis, Dimitri A., & Zimmerman, Frederick J. (2009). Young children and media: limitations of current knowledge and future directions for research. *American Behavioral Scientist*, 52, 8, 1177-1185.
- Coombs, Ngaire A., & Stamatakis, Emmanuel. (2015). Associations between objectively assessed and questionnaire-based sedentary behaviour with BMI-defined obesity among general population children and adolescents living in England. *BMJ Open*, 5, e007172.
- Dennison, Barbara A., Erb, Tara A., Jenkins, Paul L. (2002). Television viewing and television in bedroom associated with overweight risk among low-income preschool children. *Pediatrics*, 109, 1028-1035.
- Downing, Katherine L., Hinkley, Trina., Hesketh, Kylie D. (2015). Associations of parental rules and socioeconomic position with preschool children's sedentary behaviour and screen time. *Journal of Physical Activity and Health*, 12, 515-521.
- Duch, Helena., Fisher, Elisa M., Ensari, Ipek., Harrington, Alison. (2013). Screen time use in children under 3 years old: a systematic review of correlates. *International Journal of Behavioral Nutrition*, 10:102.
- Epstein, Leonard H., Roemmich, James N., Robinson, Jodie L., Paluch, Rocco A., Winiewicz, Dana D., Fuerch, Janene H., Robinson, Thomas N. (2008). A randomized trial of the effects of reducing television viewing and computer use on body mass index in young children. *Arch Pediatr Adolesc Med*, 162(3), 239-245.
- Falbe, Jennifer., Rosner, Bernard., Willett, Walter C., Sonnevile, Kendrin R., Hu, Frank B., Field, Alison E. (2013). Adiposity and different types of screen time. *Pediatrics*, 132 (6), e1497-e1505.
- Freeman E., Fletcher, R., Collins, C.E., Morgan, P.J., Burrows, T., Callister, R. (2012). Preventing and treating childhood obesity: time to target fathers. *International Journal of Obesity*, 36, 12-15.
- Garriguet, Didier., Carson, Valerie., Colley, Rachel C., Janssen, Ian., Timmons, Brian W., Tremblay, Mark S. (2016). Physical activity and sedentary behaviour of Canadian children aged 3 to 5. *Statistics Canada*, 82-003, 1209-1367.
- Gordon-Larsen, Penny., The, Natalie S., Adair, Linda S. (2010). Longitudinal trends in obesity in the United States from adolescence to the third decade of life. *Obesity*, 18, 1801-1804.

- He, Meizi., Piché, Leonard., Beynon, Charlene., Harris, Steward. (2010). Screen-related sedentary behaviors: children's and parents' attitudes, motivations, and practices. *Journal of Nutrition Education and Behavior*, 42(1), 17-25.
- Hinkley, Trina., Salmon, Jo., Okely, Anthony D., Trost, Stewart G. (2010). Correlates of sedentary behaviours in preschool children: a review. *International Journal of Behavioral Nutrition and Physical Activity*, 7:66. <http://www.ijbnpa.org/content/7/1/66>.
- Horodynski, Mildred A., Stommel, Manfred., Brophy-Herb, Holly E., Weatherspoon, Lorraine. (2010). Mealtime television viewing and dietary quality in low-income African American and Caucasian mother-toddler dyads. *Maternal Child Health J*, 14, 548-556.
- Jago, Russell., Stematakis, Emmanuel., Gama, Augusta., Carvalhal, Isabel Mourão., Nogueira, Helena., Rosado, Vítor., Padez, Cristina. (2012). Parent and child screen-viewing time and home media environment. *American Journal of Preventive Medicine*, 43(2), 150-158.
- Johnson, Lauren., Chen, Tzu-An., Hughes, Sheryl O., O'Connor, Teresia M. (2015). The association of parent's outcome expectations for child TV viewing with parenting practices and child TV viewing: an examination using path analysis. *International Journal of Behavioral Nutrition and Physical Activity*, 12(70).
- Kesten, Joanna M., Sebire, Simon J., Turner, Katrina M., Stewart-Brown, Sarah., Bentley, Georgina., Jago, Russell. (2015). Associations between rule-based parenting practices and child screen viewing: a cross-sectional study. *Preventative Medicine Reports*, 2, 84-89.
- Knowles, Ann-Marie., Kirk, Alison F., Hughes, Adrienne, R. (2015). Parents' perceptions of their children's sedentary behaviour. *Qualitative Research in Sport, Exercise and Health*, 7(4), 449-465.
- Larios, Sandra E., Ayala, Guadalupe X., Arredondo, Elva M., Baquero, Barbara., Elder, John P. (2009) Development and validation of a scale to measure Latino parenting strategies related to children's obesogenic behaviors. The parenting strategies for eating and activity scale (PEAS). *Appetite*. 52(1),166-72.
- Lauricella, Alexis R., Wartella, Ellen., Rideout, Victoria J. (2015). Young children's screen time: the complex role of parent and child factors. *Journal of Applied Developmental Psychology*, 36, 11-17.
- Levin, Sarah., Martin, Maurice W., Riner, William F. (2004). TV viewing habits and body mass index among South Carolina Head Start children. *Ethnicity & Disease*, 14, 336-339.
- Lin, Ling-Yi., Cherg, Rong-Ju., Chen, Yung-Jung., Chen, Yi-Jen., Yang, Hei-Mei. (2015). Effects of television exposure on developmental skills among young children. *Infant Behavior and Development*, 38, 20-26.
- Lipnowski, S., Leblanc, CMA. (2012). Healthy active living: physical activity guidelines for children and adolescents. *Canadian Paediatric Society Healthy Active Living and Sports*

- Medicine Committee*. Retrieved from: <http://www.cps.ca/documents/position/physical-activity-guidelines>.
- Lloyd, Adam B., Lubans, David R., Plotnikoff, Ronald C., Collins, Clare E., Morgan, Philip J. (2014). Maternal and paternal parenting practices and their influence on children's adiposity, screen time, diet and physical activity. *Appetite*, 79, 149-157.
- Lu, Ji., Xiong, Suhong., Arora, Narendra., Dubé, Laurette. (2015). Using food as reinforcer to shape children's non-food behaviour: the adverse nutritional effect doubly moderated by reward sensitivity and gender. *Eating Behaviour*, 19, 94-97.
- Matarma, Tanja., Koski, Pasi., Löyttyniemi, Eliisa., Langström, Hanna. (2016). The factors associated with toddlers' screen time change in the STEPS Study: a two-year follow up. *Preventive Medicine*, 84, 27-33.
- McMeekin, Sascha., Jansen, Elena., Mallan, Kimberley., Nicholson, Jan., Magarey, Anthea., Daniels, Lynne. (2013). Associations between infant temperament and early feeding practices: a cross-sectional study of Australian mother-infant dyads from the NOURISH randomised controlled trial. *Appetite*, 60, 239-245.
- Parks, Elizabeth P., Kazak, Anne., Kumanyika, Shiriki., Lewis, Lisa., Barg, Frances K. (2016). Perspectives on stress, parenting, and children's obesity-related behaviours in black families. *Health Education & Behaviour*, 43(6), 632-640.
- Piotrowski, Jessica Taylor., Jordan, Amy B., Bleakley, Amy., Hennessy, Michael. (2015). Identifying family television practices to reduce children's television time. *Journal of Family Communication*, 15, 159-174.
- Public Health Agency of Canada. (2011). Obesity in Canada: health and economic implications. Retrieved From: <http://www.phac-aspc.gc.ca/hp-ps/hl-mvs/oic-oac/econo-eng.php>
- Rideout, Victoria., Saphir, Melissa., Pai, Seeta., Rudd, Allison., and Pritchett, Jenny. (2013). Zero to eight: children's media use in America 2013. Retrieved from: <https://www.common sense media.org/research/zero-to-eight-childrens-media-use-in-america-2013>
- Robinson, Thomas N. (1999). Reducing children's television viewing to prevent obesity: a randomized controlled trial. *JAMA*, 282(16), 1561-1567.
- Rutherford, Leonie., Brown, Judith E., Skouteris, Helen., Fuller-Tyszkiewicz, Matthew., Bittman, Michael. (2015). Screen media, parenting practices, and the family environment in Australia: a longitudinal study of young children's media use, lifestyles, and outcomes for healthy weight. *Journal of Children and Media*, 9(1), 22-39.
- SAS Institute Inc. 2015. SAS/IML® 14.1 User's Guide. Cary, NC: SAS Institute Inc. (n.d.).
- Schrepft, Stephanie., van Jarrsveld, Cornelia H M., Fisher, Abigail., Wardle, Jane. (2015). The obesogenic quality of the home environment: associations with diet, physical activity, TV viewing, and BMI in preschool children. *PLOS ONE*, DOI:10.1371/journal.pone.0134490

- Shields, Margaret. (2008). Measured obesity: overweight Canadian children and adolescents. *Nutrition: Findings from the Canadian Community Health Survey, Statistics Canada*, 82(620).
- Sigmundová, Dagmar., Sigmund, Erik., Badura, Petr., Vokáčová, Jana., Trhlíková, Lucie., Bucksch, Jens. (2016). Weekday-weekend patterns of physical activity and screen time in parents and their pre-schoolers. *BMC Public Health*, 16(1), 898.
- Sijtsma, Anna., Koller, Marjory., Sauer, Pieter J J., Corpeleijn, Eva. (2014). Television, sleep, outdoor play and BMI in young children: the GECKO Drenthe cohort. *Eur J Pediatr*, 174, 631-639.
- Stamatakis, Emmanuel., Coombs, Ngaire., Jago, Russell., Gama, Augusta., Mourão, Isabel., Nogueira, Helena., Rosado, Vítor., Padez, Cristina. (2013). Associations between indicators of screen time and adiposity indices in Portuguese children. *Preventive Medicine*, 56, 299-303.
- Statistics Canada. (2015). Family caregiving: What are the consequences? Retrieved from: <http://www.statcan.gc.ca/pub/75-006-x/2013001/article/11858-eng.htm>
- TARGet Kids! (2017). TARGet Kids! The Applied Research Group. Retrieved From: www.targetkids.ca
- Tandon, Pooja S., Zhou, Chuan., Sallis, James F., Cain, Kelli L., Frank, Lawrence D., Saelens, Brian E. (2012). Home environment relationships with children's physical activity, sedentary time, and screen time by socioeconomic status. *International Journal of Behavioral Nutrition and Physical Activity*, 9:88.
- Tremblay, Mark S., Leblanc, Allana G., Carson, Valerie., Choquette, Louise., Connor-Gorber, Sarah., Dillman, Carrie., Duggan, Mary., Gordon, Mary Jane., Hicks, Audrey., Janssen, Ian., Kho, Michelle E., Latimer-Cheung, Amy E., Leblanc, Claire., Murumets, Kelly., Okely, Anthony D., Reilly, John J., Stearns, Jodie A., Timmons, Brian W., Spence, John C. (2012). Canadian sedentary behaviour guidelines for the early years (aged 0-4 years). *Applied Physiology, Nutrition and Metabolism*, 37(2), 370-380.
- Tudor-Locke, Catrine., Craig, Cora L., Cameron, Christine., Griffiths, Joseph M. (2011). Canadian children's and youth's pedometer-determined steps/day, parent reported TV watching time, and overweight/obesity: The CANPLAY Surveillance Study. *International Journal of Behavioural Nutrition and Physical Activity*, 8(66).
- Twarog, John P. (2015). Daily television viewing time and associated risk of obesity among U.S. preschool aged children: An analysis of NHANES 2009-2012. *Obesity Research and Clinical Practice*, 9, 636-638.
- Vale, S., Trost, S., Ruiz, J.J., Moreira, P., Mota, J. (2013). Physical activity guidelines and preschooler's obesity status. *International Journal of Obesity*, 37, 1352-1355.

- Vandebosch, Heidi., Van Cleemput, Katrien. (2007). Television viewing and obesity among pre-school children: The role of parents. *Communications*, 32, 417-446.
- Vandewater, Elizabeth A., Rideout, Victoria J., Wartella, Ellen A., Xuan Huang, June H Lee., Misuk, Shim. (2007). Digital childhood: electronic media and technology use among infants, toddlers, and preschoolers. *Pediatrics*, 119, 5
- Vaughn, Amber., Hales, Derek., and Ward, Diane S. (2013). Measuring the physical activity practices used by parents of preschool aged children. *Medicine and Science in Sports and Exercise*, 45(12), 2369-2377.
- West, Felicity., Sanders, Matthew R., Cleghorn, Geoffrey., Davies, Peter SW. (2010). Randomized clinical trial of a family-based lifestyle intervention for childhood obesity involving parents as the exclusive agents of change. *Behaviour Research and Therapy*, 48, 1170-1179.
- World Health Organization. (2016). Report of the commission on ending childhood obesity. Retrieved from:
http://apps.who.int/iris/bitstream/10665/204176/1/9789241510066_eng.pdf.
- Yeung, W. Jean., Sandberg, John F., Davis-Kean, Pamela E., Hofferth, Sandra L. (2001). Children's time with fathers in intact families. *Journal of Marriage and Family*, 63, 136-154.

8.0 Appendices

Appendix A: Unadjusted and adjusted results of linear regression modeling using generalized estimating equations for investigating the effects of mother and father media parenting practices on children's weekday and weekend day screen time

Table 5: Unadjusted and adjusted results of linear regression modeling using generalized estimating equations for investigating the effects of mother and father media parenting practices on children's weekday screen time.

Parenting Practice	Parent	Child TV Weekday			
		Unadjusted	P-value	Adjusted	P-value
Screen Time Modeling	Mother	$\beta = 0.38 (0.09, 0.67)$	0.01	$\beta = 0.42 (0.09, 0.76)$	0.01
	Father	$\beta = -0.01 (-0.43, 0.42)$	0.98	$\beta = -0.05 (-0.43, 0.33)$	0.81
Mealtime Screen Use	Mother	$\beta = 0.19 (0.01, 0.38)$	0.04	$\beta = 0.21 (0.09, 0.04)$	0.02
	Father	$\beta = 0.23 (-0.02, 0.48)$	0.07	$\beta = 0.21 (0.03, 0.40)$	0.02
Use of Screens to Control Behaviour	Mother	$\beta = 0.16 (0.03, 0.30)$	0.02	$\beta = 0.15 (0.01, 0.29)$	0.04
	Father	$\beta = 0.15 (0.02, 0.27)$	0.02	$\beta = 0.09 (-0.04, 0.23)$	0.17
Monitoring Screen Time	Mother	$\beta = -0.31 (-0.52, -0.11)$	<0.01	$\beta = -0.34 (-0.53, -0.15)$	<0.01
	Father	$\beta = -0.45 (-0.74, -0.17)$	<0.01	$\beta = -0.40 (-0.62, -0.19)$	<0.01
Limiting Screen Time	Mother	$\beta = -0.34 (-0.51, -0.17)$	<0.01	$\beta = -0.31 (-0.47, -0.15)$	<0.01
	Father	$\beta = -0.47 (-0.68, -0.27)$	<0.01	$\beta = -0.44 (-0.61, -0.27)$	<0.01

*Adjusted for total number of children in the family, family income, child sex, and child age.

Table 6: Unadjusted and adjusted results of linear regression modeling using generalized estimating equations for investigating the effects of mother and father media parenting practices on children's weekend day screen time.

Parenting Practice	Parent	Child TV Weekend			
		Unadjusted	P-value	Adjusted	P-value
Screen Time Modeling	Mother	$\beta = 0.41 (-0.03, 0.85)$	0.07	$\beta = 0.47 (-0.06, 0.10)$	0.08
	Father	$\beta = -0.11 (-0.88, 0.66)$	0.78	$\beta = -0.03 (-0.77, 0.72)$	0.94
Mealtime Screen use	Mother	$\beta = 0.33 (0.06, 0.61)$	0.02	$\beta = 0.24 (-0.01, 0.50)$	0.06
	Father	$\beta = 0.12 (-0.26, 0.50)$	0.53	$\beta = 0.07 (-0.25, 0.38)$	0.70
Use of Screens to Control Behaviour	Mother	$\beta = 0.42 (0.17, 0.66)$	<0.01	$\beta = 0.37 (0.12, 0.61)$	<0.01
	Father	$\beta = 0.39 (0.14, 0.64)$	<0.01	$\beta = 0.31 (0.04, 0.57)$	0.02
Monitoring Screen Time	Mother	$\beta = -0.52 (-0.90, -0.15)$	0.01	$\beta = -0.44 (-0.86, -0.01)$	0.045
	Father	$\beta = -0.48 (-0.96, -0.003)$	0.048	$\beta = -0.49 (-0.89, -0.08)$	0.02
Limiting Screen Time	Mother	$\beta = -0.48 (-0.76, -0.19)$	<0.01	$\beta = -0.41 (-0.72, -0.10)$	0.01
	Father	$\beta = -0.67 (-1.14, -0.21)$	0.01	$\beta = -0.58 (-1.02, -0.13)$	0.01

*Adjusted for total number of children in the family, family income, child sex, and child age.

Appendix B: Guelph Family Health Study Baseline Questions used for Analysis



Q1 Please confirm how many children do you have in total:

- 1 (2)
 - 2 (3)
 - 3 (4)
 - 4 (5)
 - 5 (6)
-

Q2 Please confirm how many children you have between the ages of 18 months and 5 years old:

- 1 (1)
- 2 (2)
- 3 (3)

Q3 Please select the appropriate age for your child:

18-35 months (1)

3 years (2)

4 years (5)

5 years (6)

6 years (3)

7 years (4)

8 years or older (7)



Q4 How are you related to your child?

- Mother (1)
- Stepmother (2)
- Foster Mother (3)
- Father (4)
- Stepfather (5)
- Fosterfather (6)
- Grandmother (7)
- Grandfather (8)
- Other, please specify (9) _____
- I am not comfortable answering this question (10)

Q5 Below we ask questions about your family's behaviour around screen-time. Screen-time means any time spent on screens. Screens include televisions, laptops, cell phones, iPads/tablets, videogame systems (ex. Xbox, Playstation).

	Strongly disagree (1)	Disagree (2)	Agree (4)	Strongly Agree (5)	I am not comfortable answering this question (6)
I use a screen-based device (e.g. cell phone, laptop) when I am with my child (eg. playing at a park, outside in the yard, playing at home). (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I try to limit how much I use a screen-based device (e.g. cell phone, laptop) when I am with my child. (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I limit my child's screen-time during the week. (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I limit my child's screen time during the weekend. (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I encourage my child to do activities other than screen-time. (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I keep track of my child's screen-time during the week. (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I keep track of my child's screen-time during the weekend. (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I offer screen-time to my child as a reward for good behaviour. (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I take away screen-time from my child as a punishment for bad behaviour. (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Our family watches a screen (e.g. television, computer) during meals. (10)

Family members are allowed to use screen-based devices (e.g. cell phones) during meals. (11)

My child has access to a mobile screen-based device while in bed. (13)

My child falls asleep while using a screen-based device. (14)

A screen-based device (e.g., television, video) is usually playing in the room when my child goes to sleep at night. (15)

Q6 Does your child have any of the following in the room where he/she sleeps?

a) Television

- Yes (1)
- No 2)
- I am not comfortable answering this question. (3)



b) Videogame system (ex. Xbox, Playstation)

- Yes (1)
 - No (2)
 - I am not comfortable answering this question. (3)
-

c) Computer

- Yes (1)
 - No (2)
 - I am not comfortable answering this question. (3)
-

Q7 **NOT** including screen time for school/homework, how many hours does your child spend on screens on an average weekday?

- None (1)
 - Less than one hour per day (2)
 - 2-3 hours per day (4)
 - 4-6 hours per day (5)
 - 7 or more hours per day (6)
 - I am not comfortable answering this question (7)
-

Q8 **NOT** including screen time for school/homework, how many hours does your child spend on screens on an average week end day?

- None (1)
- Less than one hour per day (2)
- 2-3 hours per day (4)
- 4-6 hours per day (5)
- 7 or more hours per day (6)
- I am not comfortable answering this question (7)