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Prospective associations between toddler televiewing and subsequent lifestyle habits in adolescence☆

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ABSTRACT

Background: Watching television is a common pastime for very young children. High exposure may negatively influence physical and mental health outcomes. Not much is known about how early exposure relates to lifestyle choices in adolescence.

Objective: To estimate how toddler televiewing is subsequently associated with lifestyle indicators at adolescence.

Methods: Participants are 986 girls and 999 boys from the Quebec Longitudinal Study of Child Development birth cohort (Canada). Child self-reports lifestyle habits at age 13 that were linearly regressed on parent-reported televiewing at age 2 while adjusting for potential confounders.

Results: Every 1 h 13 m increase in daily televiewing was prospectively associated with a 8.2% increased risk of unhealthy eating habits (unstandardized $b = 0.05$; 95% CI, 0.02 to 0.07), 10.1% decrease in eating breakfast on weekdays (unstandardized $b = -0.06$; 95% CI, −0.09 to −0.04), 13.3% increase in BMI (unstandardized $b = 0.38$; 95% CI, 0.26 to 0.50), 4.7% decrease in student engagement (unstandardized $b = -0.07$; 95% CI, −0.14 to −0.004), and 5.8% increase in concurrent screen time (unstandardized $b = 0.06$; 95% CI, 0.02 to 0.11). Post hoc simulations of noncompliance with AAP recommendations support their implementation.

Conclusions: Excessive toddlerhood televiewing was prospectively associated with less optimal health and self-invested behavioral dispositions. Lifestyle habits not only affect metabolic risk but may also influence personal success outcomes. These independent relationships, observed more than a decade later, suggest a need for better parental awareness of the way children invest their limited waking hours could affect their long-term life course trajectories.

What's new? What this study adds?

Watching television is a common pastime for very young children. Many toddlers exceed the new recommended pediatric screen exposure guidelines. Less optimal lifestyle choices among youth have become a serious public health problem. Televiewing at age 2 was prospectively associated with subsequent increases in risk of being overweight, less optimal eating habits, skipping breakfast, and less school engagement at age 13, which represents a crucial time in adolescent development.

1. Introduction

For young children, watching too much television is associated with long-term physical and mental health risks (Sigman, 2012). The most compelling evidence is longitudinal, controls for pre-existing confounds, and uses multiple data sources (Fitzpatrick et al., 2012; Hancox et al., 2005; Hinkley et al., 2014; Pagani et al., 2013; Pagani et al., 2010a; Peck et al., 2015; Robertson et al., 2013; Tremblay et al., 2011; Viner and Cole, 2005; Zimmerman and Christakis, 2005). Consequently, viewing guidelines, which assume developmentally appropriate, educational content and parental presence have been recently decreased to 1 h for children between ages 2 and 5 (AAP Council on

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Communications and Media, 2016).

Televiewing represents a sedentary cognitive and physical behavior that does not require sustained effort (Christakis, 2009; Tremblay et al., 2017). Toddlerhood represents a critical period for exuberant brain growth (Christakis, 2009). Excessive exposure during childhood is associated with developmental risk in cortical regions which involve reward processing, inhibition, and prefrontal grey and white matter connectivity (Sigman, 2012; Sigman, 2017). It is also a time when humans learn basic skills and values that lead to behavioral dispositions (National Research Council, 2013). Noteworthy are the significant correlations between early televiewing and later more complex assortment of digital leisure activities in later childhood. This suggests developmental persistence in discretionary time investment choices (Pagani et al., 2010a; Pagani et al., 2016; Smith et al., 2015).

Habitually investing in large amounts of screen time likely creates a debt for other more enriching activities like imaginative play with toys and people, engaging in indoor or outdoor physical activity, or even partaking in social interaction (Sigman, 2012; Pagani et al., 2013; Christakis, 2009; Vandewater et al., 2006). In early childhood, such dispositions may not only be a personal choice but also a question of having other options, encouragement, and accompaniment for other leisurely activities. Time displacement favoring earlier televiewing likely encourages other less effortful lifestyle habits that may crystallize into risks related to growth and development (Council on Communication and Media, 2013).

It is known that toddler and preschool televiewing is associated with a higher long-term BMI and waist circumference (Fitzpatrick et al., 2012; Pagani et al., 2010a; Peck et al., 2015; Viner and Cole, 2005). The danger is that both BMI and girth in childhood predict metabolic risks into adulthood (Kumar and Kelly, 2017; Singh et al., 2008; World Health Organization). There are also links with calorie intake and eating habits, defined as what and when food is consumed (Ford et al., 2012; Miller et al., 2008; Pearson and Biddle, 2011). Regardless of age or sex, less televiewing is cross-sectionally associated with better eating habits based on American Dietary Guidelines (Miller et al., 2008; Pearson and Biddle, 2011; Sisson et al., 2012). Childhood televiewing also increases exposure to food advertising (Kelly et al., 2010). Food advertising exposure increases the intake of sweet snacking, during and after viewing (Harris et al., 2009). Skipping breakfast, which causes meal time misalignment, is also cross-sectionally related to televiewing (Lipsky and Iannotti, 2012; Vereecken et al., 2009). Skipping breakfast is strongly associated with metabolic and hormonal imbalances that, in turn, increase chances of obesity (Hutchison et al., 2017). It is plausible that less optimal eating habits are part of a less effortful lifestyle.

Lifestyle choices reflect self-regulation skills which are honed by cognitive self-control and reward processing, developed during early childhood and reinforced during formal schooling (Brown and Ryan, 2015). Schooling not only develops cognitive skills but also self-investment and perseverance in the face of difficulty. Behavioral dispositions characterized by less social interaction and cognitive effort in early childhood could have repercussions on later activities that require sustained self-regulation. Thus, too much early screen time might deflect the academic trajectory of a school age child.

In both American and Canadian children, increases in televiewing before age 3 predicts decreases in kindergarten cognitive skills (Pagani et al., 2013; Zimmerman and Christakis, 2005). Lags in kindergarten readiness skills forecast diminished academic achievement and engagement by the end of fourth grade (age 10) (Pagani et al., 2010b). As a behavioral disposition, classroom engagement represents the capacity to work cooperatively, complete work on time, listen attentively, work independently and neatly, show effort in work, participate, ask questions when uncertain, and follow directions, instructions, and rules. Less engaged students also participate less in extracurricular physical activity (Piché et al., 2014). Finally, student engagement evolves into academic adjustment and performance orientation by the early adolescent middle school transition and becomes crucial for dropout prevention (Archambault et al., 2009).

The few previous studies on associations between televiewing and lifestyle outcomes are not without limitations. First, most of studies with nutritional and metabolic outcomes are cross-sectional (Peck et al., 2015; Pearson and Biddle, 2011; De Jong et al., 2013; Cox et al., 2012), with several prospective exceptions (Fitzpatrick et al., 2012; Pagani et al., 2010a; Tremblay et al., 2011; Viner and Cole, 2005). Second, to our knowledge few longitudinal studies have examined early childhood televiewing and later lifestyle indicators. Third, research does not often control for competing explanations beyond sociodemographic and economic indicators such as child temperament or maternal depressive symptoms (Smith et al., 2015). Finally, studies have yet to verify the relative long-term repercussions associated with > 1 daily hour of televiewing, considering the new AAP guidelines.

Using a prospective design, this study specifically examines the degree to which televiewing at age 2 predicts dietary habits, BMI, overall screen time, and student engagement at age 13. The birth cohort design offers a natural observation at a time when television screens were the most common media, giving the estimations methodological strength by reducing other digital confounding factors. It also reduces parental behavior biases, as televiewing is measured at the millennium, when parents were yet to be made aware of the AAP guidelines and unfettered by today's digital innovations and dependency risks (such as texting, social media, and digital video). It is hypothesized that early televiewing time will forecast less optimal nutritional intake, body weight, screen time, and student engagement in early adolescence.

2. Methods

2.1. Participants

Participants are from the Quebec Longitudinal Study of Child Development coordinated by the *Institute de la Statistique du Québec* (QLSCD, http://www.jesuisjeserai.stat.gouv.qc.ca/); a randomly stratified cohort of 2837 newborns born between spring 1997 and 1998, of which: 93 were deemed ineligible; 172 were untraceable due to incorrect coordinates; 14 were unreachable; and 438 refused participation. The baseline sample, at 5 months, comprised 2120 infants. Of these, 39% were firstborn. Preschool follow-ups occurred annually and then biennially during school age. For each follow-up, informed consent was obtained from parents, teachers, and children when applicable. The predictor variable was collected at age 2 from a subsample of 1985 participants (986 girls and 999 boys), which represented 93.6% of the baseline sample. Outcome variables were collected at age 13 (n = 1234, 62% of the baseline sample).

2.2. Predictor: daily televiewing (age 2)

Parents answered questions about their child's daily televiewing. Scores reflect the total hours of daily television programs and dvd/video exposure during the week and weekend. This measure is comparable or like previous population-based assessments for this generation of non-digitalized children (Christakis et al., 2004; Mistry et al., 2007), including our own (Fitzpatrick et al., 2012; Pagani et al., 2013; Pagani et al., 2010a; Pagani et al., 2016; Watt et al., 2015).

2.3. Outcomes: lifestyle indicators (age 13)

2.3.1. Unhealthy eating

Children responded to a 10-item questionnaire about unhealthy food consumption such as French fries, prepared meats/cold cuts, white bread, commercial drinks (energy, fruit-flavoured, drinks, and soft drinks) salty and sweet snack-type foods or desserts. Each score ranged from 0 to 7 (where: 0 = never; 1 = 1 or 2 times a week; 2 = 3 or 4 times a week; 3 = 5 or 6 times a week; 4 = 1 time a day; 5 = 2 times a day; 6 = 3 times a day; and 7 = 4 times or more a day; $\alpha = 0.83$).