What mums think matters: A mediating model of maternal perceptions of the impact of screen time on preschoolers' actual screen time

Trina Hinkley [a,*], Valerie Carson [b], Krystle Kalomakaefu [a], Helen Brown [a]

[a] Deakin University, Institute for Physical Activity and Nutrition (IPAN), School of Exercise and Nutrition Sciences, Geelong, Victoria, Australia
[b] Faculty of Physical Education and Recreation, University of Alberta, Edmonton, Alberta, Canada

ARTICLE INFO

ABSTRACT

Screen time during the preschool years is detrimental to wellbeing. The impact of parental perceptions on preschoolers' screen time is unknown. This paper explores the association between maternal perceptions of the impact of screen time on their preschoolers' wellbeing with their child's screen time and the potential mediating role of their perception of the appropriate amount of screen time. In 2013–2014, mothers of 575 preschoolers (2–5 years; metropolitan Melbourne and online sources) reported: their perceptions of the impact of screen time on 11 aspects of wellbeing, conceptually grouped to physical, social and cognitive well-being; their perceptions of the appropriate amount of screen time for preschoolers; and their child's actual screen time. Regression analyses investigated associations between perceptions and children's screen time. Mediation by perception of the appropriate amount of screen time was examined using indirect effects. Mothers' perceptions of the impact of screen time on social and cognitive wellbeing had a significant indirect effect on children's actual screen time through mothers' perception of the appropriate amount of screen time for their child. Findings illustrate the potential impact of parents' perceptions on their children's behaviors. Although a significant indirect effect was identified, direction of causality cannot be implied. Further exploration of the direction of association to determine causality, and interventions targeting parental perceptions, are warranted.

1. Introduction

The preschool years (ages two-five years) are a critical period for the development of health behaviors, such as regular physical activity and minimal sedentary behavior (Leblanc et al., 2012). A predominant form of sedentary behavior in this age group is screen time, which includes use of television, DVD/video, computer, electronic games and portable smart media devices. Recent systematic reviews have reported adverse health outcomes associated with total volume of screen time across a variety of physical, cognitive, and psychosocial indicators (Leblanc et al., 2012; Carson et al., 2015; Hinkley et al., 2014a). For example, a higher duration of screen time has been associated with poorer weight status, blood pressure, bone mineral content and social competence, and increased behavioral problems (Leblanc et al., 2012; Carson et al., 2015; Hinkley et al., 2014a). Evidence also shows that screen time behaviors formed during the preschool years are stable and track into late childhood (Jones et al., 2013).

Given the adverse health indicators and stability of screen time, there are recommendations to limit screen time during early childhood (Department of Health, 2014; American Academy of Pediatrics Committee on Public Education, 2001; Tremblay et al., 2012). Nonetheless, the majority of preschoolers still exceed recommended levels (Hinkley et al., 2012a; Colley et al., 2013). Therefore, it is important to identify factors associated with preschoolers' screen time to inform the development of behavior reduction strategies. Parents play a major role in children's socialization and development and exert the most influence over their preschoolers' behavior (Davison et al., 2011). Particular attention to parents' beliefs, practices and behaviors, and how those might influence their child's behaviors, is warranted. A recent systematic review specifically integrated findings from studies reporting associations of parental influences with preschoolers' screen time and found inconclusive evidence supporting associations across five studies (Xu et al., 2015). None of the studies included perception of different aspects of children's health/development. Such exploration is necessary to adequately identify potential causal pathways as associations may vary for different outcomes.

Evidence of significant links between parental perceptions of the benefits of physical activity for their child and children's physical activity, suggest exploration of parental beliefs on the potential impacts of screen time on their child may be valuable (Dempsey et al., 1993;

* Corresponding author at: Deakin University, Institute for Physical Activity and Nutrition Research, School of Exercise and Nutrition Sciences (B), 221 Burwood Hwy, Burwood, Victoria 3125, Australia.
E-mail address: trina.hinkley@deakin.edu.au (T. Hinkley).

Kimiecik and Horn, 1998; Kimiecik et al., 1996). The Health Belief Model (Rosenstock, 1990; Strecher et al., 1997) proposes that individuals may alter health-related behaviors if they perceive a health-related risk. This model may be useful to explain how parents' perceptions of the potential risk from screen time for their preschoolers' health and development might subsequently impact children's actual screen time behaviors.

A potential pathway for this association may be through perceptions of the appropriate amount of screen time for children. For instance, if parents believe more strongly in the adverse effects of screen time, they may limit their child's screen time more than parents who do not hold the same belief. No studies have previously explored such associations. Additionally, previous studies have largely failed to explore any potential mediators of associations between parental practices or beliefs and children's screen time. Investigating potential mediators can help identify mechanisms and aids in future intervention development to direct behavior change strategies.

Therefore, the aims of this study are to: 1) explore perceptions of the potential impact of screen time on preschool children's health; and 2) determine if an association between perceptions of the potential impacts of screen time with preschool children's screen time is mediated by perceptions of the appropriate amount of screen time.

2. Methods

The 'Mums, Dads and Kids activity and screen time study' (MDK) is a cross-sectional study investigating various aspects of preschool children's (2–5 years, not yet in formal schooling) physical activity and screen time behaviors. Participant recruitment and data collection occurred between September 2013 and March 2014. The study received ethical approval from Deakin University, Faculty of Health, Human Ethics Advisory Group (HEAG-H 138-2012) and the Victorian Department of Education and Early Childhood Development. Participants were recruited from six randomly selected local government areas (LGAs) within metropolitan Melbourne. LGAs were divided into socio-economic quintiles based on the Australian Bureau of Statistics Socioeconomic Index for Areas Index of Advantage and Disadvantage (Australian Bureau of Statistics, 2011). Two LGAs from each of high-, medium- and low-socioeconomic position areas were randomly selected. In total, 408 facilities were identified; 191 were contacted. Fifty nine preschools/childcare centers (30.9%) and 81 other facilities (e.g. swim schools; 42.4%) distributed information to their families. Online advertising was simultaneously undertaken through blogs and Facebook pages related to parenting, child education and family-lifestyle. In total, 30 Facebook profile administrators and 36 blog authors were contacted; 15 Facebook profile administrators (50%) and 10 blogs (27.8%) agreed to post information.

Potential participants were directed to a website with information about MDK where they provided their consent and completed a short screening survey to ensure they met the inclusion criteria: parent/care-giver to at least one child aged 2–5 years who had not yet commenced formal schooling. If more than one child met these criteria within a family, parents were directed to complete the survey for the child with the next birthday.

In total, 1238 parents completed the screening survey; 958 were eligible. Eligible families were provided with links to male and female versions of the survey and asked to complete the one relevant to them and forward the other to their partner/spouse. Only data from the mothers' survey are included in this study as there were an insufficient number of completed fathers' surveys to undertake these analyses. In total, 679 participants commenced the mother's survey. Of those, 24 were excluded (duplicate identification number (n = 8); child age outside age range (n = 13); self-report as being male (n = 1); and maternal date of birth invalid (n = 2)). Where age/date of birth was invalid, contact with participants to clarify was attempted and data were only removed if clarification could not be achieved. Therefore, 655 cases were

available for inclusion. Of those, 80 cases had missing data on the variables of interest. Analyses were undertaken on data from 575 families: 311 boys (54%) and 264 girls.

2.1. Measures and data management

2.1.1. Dependent variable

Mothers reported their child's usual weekday and weekend day TV/DVD/video viewing and computer/electronic game/hand held device use in 30 min increments from 0 to 12 or more hours. Data were converted to continuous variables using the mid-point: 1–30 min = 15 min; 31–60 min = 45 min, etc., consistent with previous studies where data were collected in a similar format (Cespedes et al., 2014; Hinkley et al., 2014b; Loprinzi and Davis, 2016; Fletcher et al., 2014; Wijtzes et al., 2013). Data from each of the variables were combined and weighted for week (multiplied by five) and weekend (multiplied by two) days and divided by seven to represent average daily screen time. As young children typically spend about 13 h awake each day, data were truncated at 12 h/day (Hinkley et al., 2012b). Test-retest reliability of this variable has previously been shown to be acceptable (ICC = 0.68, 95% CI 0.52, 0.83) (Hinkley et al., 2012c).

2.1.2. Independent variables

Mothers reported their perceptions of the impact of more screen time on 11 aspects of their child's health and development using a three point scale: positive influence (-1), no influence (0), or negative influence (1). Responses for individual variables were summed to form conceptually-similar constructs for the purposes of analyses where higher scores represented greater perception of negative influence. Those constructs were: physical wellbeing (heart health, muscle and bone health, maintaining a healthy weight, motor skill development); cognitive wellbeing (academic achievement, cognitive development and functioning, ability to concentrate, language development); and social wellbeing (school readiness, social competence, self-esteem). Internal reliability was shown to be high for each of the constructs: Cronbach's α = 0.88, 0.90 and 0.72, respectively. Each of the 11 individual items was assessed for test-retest reliability in a sub-sample using Kappa and percent agreement. Items were considered reliable if $\kappa \geq$ 0.6 and/or agreement ≥60% (Sim and Wright, 2000) all items met these criteria (see Table 2).

2.1.3. Mediator variable

Mothers reported what they believed to be the ideal daily amount of screen time on a four point scale: none, less than 1 h, less than 2 h or any amount is ok. Data were dichotomized in accordance with international recommendations: 1 h or less and more than 1 h. This item had acceptable test-retest reliability (κ = 0.57, % agreement = 76.6%).

2.1.4. Covariates

Mothers reported their family demographic characteristics including their child's date of birth (from which child age was calculated) and sex. Mothers reported their own participation in screen time in the same manner they reported their child's screen time (see dependent variable above) and their highest level of education. Mothers' screen time data were managed in the same way as child screen time data to create an average daily screen time variable and truncated at 15 h as values greater than that were considered improbable. Mother's education level was used to determine family socioeconomic position (SEP; low SEP: year 10 or less; mid-SEP: year 12, diploma, trade; high SEP: university or higher qualification). These variables were chosen as covariates based on previous studies showing that child behaviors vary by age (Carson et al., 2014a), and parental education (Carson and Janssen, 2012; Wijtzes et al., 2012), and are likely to be associated with their parents' behaviors (Xu et al., 2015; Carson and Janssen, 2012). Further, health literacy may be associated with education level (Chen et al., 2014). Additionally, characteristics of child socialization by parents have been shown to vary