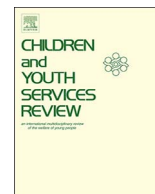




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Structural model of parenting dimension, media usage type and body mass index in Korean preschool children

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1. Introduction

Childhood obesity is one of the most serious public health problems of the 21st century. The prevalence of childhood obesity is rising around the world. Globally, the number of overweight children under the age of five is estimated to be about 41 million in 2014 (WHO, 2016). Obesity in childhood can negatively affect their immediate health, but also is likely to lead to adult obesity that often develops chronic illnesses including diabetes, hypertension, hyperlipidemia, and cardiovascular disease even at a younger age (Bridger, 2009; Flynn et al., 2006). Subsequently, it causes considerable socioeconomic costs such as medical costs and job absenteeism (Cawley, 2010). Prevention of childhood obesity is important from an early age.

The role of media playing in childhood obesity has been examined from a variety of perspectives ranging from the reduced physical activities (e.g., Roberts, 2000), the exposure to food ads on TV which resulted in unhealthy food choices (e.g., Halford, Gillespie, Brown, Pontin, & Dovey, 2004), and the exposure to cross-promotions between food products and popular TV and movie characters which result in children buying and eating more high-calories foods (e.g., Chou, Rashad, & Grossman, 2008). While there are growing efforts to examine the association between the daily media usage time and obesity in childhood (Arora et al., 2013; Barnett et al., 2010; Casiano, Kinley, Katz, Chartier, & Sareen, 2012; Cox, Skouteris, Rutherford, Fullertyszkiwicz, & Hardy, 2012; Fitzpatrick, Pagani, & Barnett, 2012; Pagani, Fitzpatrick, Barnett, & Dubow, 2010), the role of parents in this rapidly changing media environment is yet to be studied extensively in order to better understand children's media usage time and types under parental monitoring. Using a national representative Panel Study on Korean Children (PSKC), this present study seeks to examine the relationship between parental dimensions (warmth vs. control), children's media usage, and children's weight status. It is hypothesized that children's media usage time and types are associated with childhood obesity. Media usage time and types are hypothesized to be influenced by parenting based on either educational vs. entertainment purposes of using the media. As Heim and colleagues (Heim, Brandtzaeg, Kaare, Endstad, & Torgersen, 2007, p. 440) distinguished the *educational* or

positive media usage involves “doing school work on the computer” and “looking for information on internet for school work.” On the other hand, *entertainment* usage is referred to “watching TV, playing console games on TV or watching video cassette recorders (VCRs) or digital video discs (DVDs).”

1.1. Media usage and childhood obesity

A study of Australian children aged 5–13 years found that child body mass index (BMI) was related to times of television viewing, but not video game/computer usage times (Wake, Hesketh, & Waters, 2003). A study of Canadian students found that watching television excessively in early childhood predicted decreased leg strength and increased waist circumference by middle childhood (Fitzpatrick et al., 2012). A study of Dutch children aged 4–8 years old revealed > 1.5 h of daily TV viewing predicted obesity adjusted for all potential confounders. But interestingly, the amount of time in computer use was not significantly associated with overweight (de Jong et al., 2013). On the other hand, in the sample of children living in Switzerland, the amount of time in playing electronic games and daily TV viewing predicted obesity based on increased BMI scores (Stettler, Signer, & Suter, 2004). Although television watching has been continuously related to obesity, it is still not clear whether video games, computer, and internet use are related to obesity in preschool children. In particular, previous studies only assessed daily media usage time with television, DVDs, video games, computer, and internet, do not assess the types of that media usage time. The usage types of media by young children are considered more important than simply the amount of time (Rutherford, Bittman, & Biron, 2010). Nevertheless, most studies have overlooked the association between media usage types and overweight among young children. Especially in consideration of the ever-increasing use of digital media for early childhood education (Vandewater et al., 2007), it is time to better understand the association between usage types (education or entertainment) of the media and the obesity of preschooler.

In the first study to disaggregate the types of television viewing, Zimmerman and Bell (2010) showed that among children aged 0 to

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6 years in 1997, commercial viewing was associated significantly with BMI five years later controlling for children's gender and age, and mother's education level. By contrast, viewing of non-commercial television (i.e., educational television presented without in-program commercials or videos or DVDs) was not significantly associated with BMI. This study, however, studied only the impact of TV/Video/DVD content. Also, the media environment for early childhood education has been changed greatly since 1997 when this first study was conducted. Nowadays the number of preschoolers who are using TV/Video/DVD as well as video games, computers, and smartphones for both education and entertainment, are widely and rapidly increasing (Rosen et al., 2014; Vandewater et al., 2007).

1.2. Media usage and parental warmth/control

An important aspect in investigating the association between media usage and childhood obesity is to look at parental control in children's media usage and their parenting dimensions of warmth and control. One would expect that parental control would be associated with supervising children's media usage in length and types. In the context of media, parents may limit the amount of time that their child can use media, restrict media usage for entertainment, or endorse media usage for education. However, study findings are somewhat mixed. A sample of 10–11 years old children living in United Kingdom found that the risk of longer daily TV watching such as 2 to 4 h compared to < 2 h was 2.2 times higher for children in low-restriction (low-control) families. Additionally, the risk of 4 h or more daily TV watching compared to < 2 h was 3.3 times higher for children in low-restriction families (Jago et al., 2011). A study of American Indian kindergarten students showed that parental control in children's TV watching was associated with less media usage time of children (Barr-Anderson et al., 2011). In particular, a study of Norwegian school children between 10 and 12 years old found that parental monitoring predicted increased educational media usage (Heim et al., 2007). Similarly, a recent study of American 6–12 years old children found that restrictive parental control was significantly negatively associated with children's TV watching on weekdays, but not weekends (Johnson, Chen, Hughes, & O'Connor, 2015). In contrast, in a sample of fourth-sixth grade Korean children, parental restrictions on time was not related of internet usage on games, education, and communication (Lee & Chae, 2007). A study of Australian children aged 3–5 years old showed that parental control in limiting child's TV viewing hours was not significantly associated with their older children's media usage time (Hinkley, Salmon, Okely, & Crawford, 2013).

In addition to parental control, parental warmth is also found to be associated with media usage. For instance, in a sample of the fifth and sixth grade children, parental warmth and control, as well as parent internet behavior (i.e., experience, attitude, usage) predicted positive internet usage of the child (Valcke, Bonte, De Wever, & Rots, 2010). A study of American parents with a preschool-aged child showed the authoritative parenting dimensions (high levels of both warmth and control) predicted significantly decreased media usage time on weekday and weekend (Schary, Cardinal, & Loprinzi, 2012). A study of Korean children found that the internet activity with children was associated with more educational types of internet usage and a larger share of positive online interactive behavior (Lee & Chae, 2007). But in a sample of 5- to 6-year-old children in United Kingdom, increased parental nurturance was significantly associated with decreased children's computer/laptop use except for TV viewing (Jago, Wood, Zahra, Thompson, & Sebire, 2015).

A recent study (Veldhuis, van Grieken, Renders, HiraSing, & Raat, 2014) hypothesized a model of relationships between parenting dimensions (warmth vs. control), home environment, 5-year-old children's screen time and weight. In the model, children's screen time was considered to be a mediator between parenting dimension and obesity, but in reality, only the relationship between parenting dimension, home

environment, and children's screen time was examined. Jago et al. (2015) examined whether parental control and nurturance predicts children's screen time under the assumption that children's screen time is associated with higher levels of childhood obesity. However, the study also didn't directly examine whether media use time mediates the relationship between and child obesity.

Although there are a small number of previous studies addressing the association between media usage types and early childhood obesity, yet, surprisingly, findings are inconsistent. Furthermore, while the importance of parental involvement in early childhood education has been sufficiently discussed elsewhere, it is unclear how parenting dimensions (warmth vs. control) are associated with media usage types. To the best of our knowledge, there were no studies fully examining the mediating effects of media usage type on the relationship parenting dimension and obesity. Using a path model, the aims of this study are therefore to examine whether parental involvement categorized by parental control or parental warmth are associated with media usage for education and entertainment, and then, media usage for education and entertainment are associated with BMI among a Korean nationally-representative sample of 5-year-old children.

2. Methods

2.1. Data

The data for this study were obtained from the Panel Study on Korean Children (PSKC), which was administered by the Korean Institute of Child Care and Education. As nationally representative longitudinal data, the PSKC sampled 2150 babies born in medical institutions nationwide from April to July 2008. The PSKC collected data comprehensively the characteristics of children, parents, families, child care services, local communities, and teachers, etc.

While the PSKC is longitudinal data, this present study is a cross-sectional study that utilized only the 6th wave of the PSKC, which took place from July to November 2013, when the children were aged 5 years. The primary caregivers completed an interview with the help of a trained assessor in the home. Approximately, 1662 families participated; and 96.9% of mothers responded to the interview. About 50.7% of the children in the sample were boys who were 62.68 months old on average. About 19.2% of parents had less than a high school education (vs., 80.8% had more than a college diploma); 3.3% of the families identified living below poverty line.

2.2. Measures

2.2.1. Media usage type

Media usage type was divided into two categories: education and entertainment. The parents were asked the following two questions: (1) about how many total hours per day, on average, does your child use audiovisual programs, and internet for education, (2) about how many total hours per day, on average, does your child use TV, internet, and electronic devices for entertainment. These two responses respectively created a variable for amount of education and entertainment time.

2.2.2. Body mass index

BMI was calculated as weight (kilograms) divided by the square of height (meters²). Weight and height were measured directly by the trained assessor of this study. We used BMI continuous variable in the analyses. Several expert groups have recommended BMI as the preferred measure for evaluating obesity among children and adolescents 2–19 years age (Dev et al., 2013).

2.2.3. Parenting dimension (warmth vs. control)

Parenting dimension was assessed by using the Korean Parenting Style Questionnaire (PSQ; Cho, Lee, Lee, & Kwon, 1999) developed based on Baumrind (1991) which was revised by the Korea Institute of

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