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Urban and rural differences in sedentary behavior among American and Canadian youth

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ABSTRACT

We examined relationships between urban–rural status and three screen time behaviors (television, computer, video games), and the potential mediating effect of parent and peer support on these relationships. Findings are based on American (n=8563) and Canadian (n=8990) youth in grades 6–10 from the 2005/06 Health Behavior in School-Aged Children Survey. Weekly hours of individual screen time behaviors were calculated. Urban–rural status was defined using the Beale coding system. Parent and peer support variables were derived from principal component analysis. In comparison to the referent group (non-metro adjacent), American youth in the most rural areas were more likely to be high television users and less likely to be high computer users. Conversely, Canadian youth in medium and large metropolitan areas were less likely to be high television users and more likely to be high computer users. Parent and peer support did not strongly mediate the relationships between urban–rural status and screen time. These findings suggest that interventions aiming to reduce screen time may be most effective if they consider residential location and the specific screen time behavior.

1. Introduction

Sedentary behavior has only recently been recognized as an important determinant of health. Sedentary behavior is not simply the opposite of moderate-to-vigorous intensity physical activity; rather, it is the engagement in activities that involve minimal body movement with little energy expenditure (Salmon et al., 2008; Must and Tybor, 2005). Americans spend 55% of their waking time (7.7 h/day) in sedentary behavior, and adolescents are one of the population groups with the highest sedentary behavior levels (Matthews et al., 2008). Excessive sedentary behavior in adolescents is of concern as it may be an independent risk factor for obesity and related cardiovascular and metabolic abnormalities (Mark and Janssen, 2008; Ekelund et al., 2006; Demattia et al., 2007). A major source of sedentary behavior in youth is screen time, or time spent watching television and movies, playing video games, and using computers (Must and Tybor, 2005). To illustrate, the average 11–15 year old in Canada and the United States accumulates more than 4.5 h of screen time in a typical day (Mark et al., 2006; Iannotti et al., 2009).

Screen time levels vary between different subgroups of the adolescent population. Boys have higher daily screen time than girls and older youth also have notably high levels than younger youth (Iannotti et al., 2009; Mark et al., 2006). A comparison of screen time levels in youth across urban–rural geographic groups also warrants consideration as youth living in extreme urban and rural environments experience increased health risks (Place et al., 2004; Eberhardt and Pamuk, 2004; Cherry et al., 2007). Existing research on this comparison has produced mixed results. Some studies have found no differences in screen time between urban and rural youth (Bathrellou et al., 2007; Davis et al., 2008), while others have found greater daily screen time in urban (Bruner et al., 2008; Springer et al., 2006) and rural populations (Springer et al., 2009). The inconsistencies may be due to the different screen time measures used across studies. For example, some studies have used a summary screen time measure (e.g., television+computer+video games) (Bruner et al., 2008; Bathrellou et al., 2007; Davis et al., 2008), while others have examined individual screen time activities (Springer et al., 2009; Springer et al., 2006). In addition, the inconsistencies may be due to the crude categorization of urban–rural geographic status employed in most studies, despite the fact there may be a marked urban–rural gradient (Parker, 2010; Du Plessis et al., 2002; Vinodrai, 2001). These limitations are problematic since access to certain screen time activities, such as computer and internet, may differ

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along this gradient (Stenberg et al., 2009). Only one study has considered a multi-point ordinal scale to measure urban–rural geographic status, and it observed a trend of decreasing prevalence of high screen time use when moving from the most urban to most rural group (Bruner et al., 2008). However, this study used a summary screen time measure that might mask relationships with more specific measures of screen time use; thus, it is unknown if this relationship is consistent among individual screen time activities.

Furthermore, to our knowledge no existing study has examined factors that could mediate or explain urban–rural differences in screen time levels among youth. If psychosocial factors account for urban–rural differences, the focus of public health efforts could be on modifying these psychosocial factors; otherwise, the focus would need to be on identifying and modifying structural or environmental urban–rural characteristics that might account for urban–rural differences. Parent and peer support are two potential psychosocial mediators to consider. Traditionally, overall social support has been higher in smaller communities in comparison to large urban areas (House et al., 1988). This may be explained by the social disorganization theory which posits that crime, residential mobility, and ethnic heterogeneity in large urban areas reduces social cohesion (Markowitz et al., 2001) and the quality of social relationships (House et al., 1988; Amato, 2003). Sources of social support may also differ between urban and rural areas. For example, rural populations tend to have close family-based relationships, whereas urban populations tend to have more nonrelative or friend-based relationships (House et al., 1988). This may partly be explained by differing parenting styles between urban and rural parents. Specifically, urban parents tend to place a greater emphasis on the social development of their children to help them foster friendships with peers (Coleman et al., 1989).

While urban–rural geographic status may influence parent and peer support, parent and peer support may in turn influence the engagement in screen time activities. For example, a recent study of American and Canadian youth reported that the quality of parent (negative) and peer (positive) relationships was associated with screen time use (Iannotti et al., 2009). Similarly, perceptions of parent and peer behaviors influence the engagement in other health behaviors among youth, including smoking, drug use, and alcohol consumption (Iannotti et al., 1996; Bush et al., 1994). Interestingly, perceptions of parents' behaviors and peer use mediate the relationship between the neighborhood environment and youths' smoking and alcohol consumption behaviors (Chuang et al., 2009). Thus, parent and peer support warrant study as potential mediators of the geographic relationship with screen time.

The purpose of this study was to comprehensively examine the relationships between urban–rural geographic status, parent and peer support, and screen time behaviors in representative samples of American and Canadian youth. The primary objectives were to (1) examine urban–rural differences in individual screen time behaviors using geographic measures that take into account population size and proximity to metropolitan settlements, and (2) examine whether parent and peer support variables mediate the relationship between urban–rural geographic status and individual screen time behaviors. A secondary objective was to determine whether the relationship between urban–rural geographic status and screen time is consistent across our two countries. Since screen time is negatively associated with a variety of health outcomes (Iannotti et al., 2009), geographic differences in screen time may help explain the increased health risk associated with living in extreme urban and rural environments. Thus, it is of public health importance to understand if and why geographic differences exist in screen time behaviors. This knowledge can help guide interventions and initiatives aiming to reduce screen time in an effort to improve the health of youth across geographic regions.

2. Methods

2.1. Study overview

This study was based on population-based samples of American and Canadian youth in grades 6–10 who participated in the *Health Behaviour in School-aged Children Survey* (HBSC). Responses from the HBSC questionnaire were used to measure three screen time behaviors (television, computer, video games), parent and peer support, and the potential confounders. Based on the location of the school, HBSC participants were placed into 7 different urban–rural geographic status groups according to the Beale continuum coding system (Du Plessis et al., 2002; Parker, 2010; Vinodrai, 2001). Regression models and a contemporary multiple mediation analysis approach (Hayes, 2009; Preacher and Hayes, 2008) were used to assess the 'total effect', 'direct effect', and 'indirect effect' of urban–rural geographic status on the screen time measures, as illustrated in Figs. 1 and 2. The 'total effect' represents the relationship between urban–rural geographic status and the screen time variables, without taking into account mediator variables. The 'direct effect' represents the relationship between urban–rural geographic status and the screen time variables after accounting for the parent and peer support mediator variables. The 'indirect effect' represents the relationship between urban–rural geographic status and the screen time measures that occur through the parent or peer support mediator variables.

2.2. Participants

The study is based on the American and Canadian records of the 2005/2006 HBSC. The HBSC is an ongoing World Health Organization sponsored cross-sectional survey and in 2005–2006 it was conducted in 44 countries (Currie et al., 2001). The survey consisted of a classroom-based questionnaire that requests information about health behaviors, lifestyle factors, and demographic information. The US and Canadian samples were designed

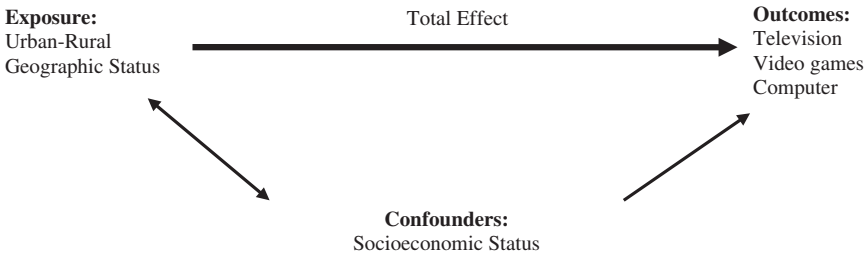

Fig. 1. The total effect of urban–rural geographic status on screen time behaviors (television, video games, and computers) (Hayes, 2009).