



The relationship between children's physical activity and family income in rural settings: A cross-sectional study

Lesley Cottrell^{a,*}, Jennifer Zatezalo^a, Adriana Bonasso^a, John Lattin^a, Samantha Shawley^b, Emily Murphy^c, Christa Lilly^b, William A. Neal^a

^a West Virginia University, School of Medicine, USA

^b West Virginia University, School of Public Health, USA

^c West Virginia University, Extension Services, USA

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ABSTRACT

Objective. To examine potential differences in children's physical activity and parent support of their children's physical activity based on family income within the rural setting.

Methods. A cross-sectional survey of 566 parents of children (5–15 years-old; mean = 7.7 years; standard deviation = 2.4) living in rural West Virginia from 2010 to 2011 was conducted. Children were recruited and had participated in a school-based health screening program.

Results. Overall, parents from a rural setting reported that their children engaged in an average of five days of physical activity for at least 60 min. Upon closer examination, children from lower-income families engaged in more physical activity, on average, than children from higher income families per parent report (mean = 6.6 days, confidence interval 95% = 4.9–6.0 vs. middle-income mean = 5.0, confidence interval 95% = 4.4–5.3 and highest-income mean = 4.5, confidence interval 95% = 4.1–4.7; $p = .01$). Rural parents supported their children's physical activity in numerous ways. Parents with the lowest incomes were more likely than parents from higher income families to encourage their children to be active and use their immediate environment for play and to be directly involved in physical activity with their children. More affluent parents were more likely to transport their children to other activity opportunities than parents from the lower income brackets.

Conclusions. Lower income families may utilize their immediate environment and encourage activity among their children whereas more affluent families focus on organized opportunity more often than lower income families. These findings emphasize the need to conceptualize the role family income plays in physical activity patterns and the potential benefit it provides to some families.

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Introduction

In 2010, one in five children lived in poverty in the United States (Humes et al., 2011). A greater incidence of poverty is found in rural settings (i.e., sparsely populated small towns and open countryside) throughout the Southeast and Appalachian regions of the country where more than 35% of families in completely rural areas live in high-poverty regions; 4% of this population lives in “persistent-poverty” (i.e., 20% of population or more has lived in poverty over the last 30 years; USDA, 2014). Living in poverty has been shown to impact children's lifestyle behaviors and health outcomes. Specifically, children living in poverty are more likely to be less active than other children (Singh et al., 2010; Milteer et al., 2012).

Many studies have examined the association between family income and children's physical activity (PA) and have demonstrated that children living in poverty have limited access to resources and areas for play and PA than children whose families are producing higher incomes (Romero et al., 2001; Tandon et al., 2012). Findings, particularly from the inner city and suburban areas, have also shown that when children in poverty are exposed to resources and safe play areas, the areas are often perceived to be unsafe or not enriched (Goodway and Smith, 2005; Weir et al., 2006). Thus, disadvantaged children do not engage in PA and are not encouraged by their parents to utilize play environments for safety concerns.

Despite the alarming incidence of poverty in rural settings, there have been no investigations of the effect of family income on children's PA in these areas. Studies have shown a greater prevalence of obesity among rural children compared to urban and suburban children (Liu et al., 2012), but potential PA differences have not been investigated. Children living in rural poverty may not face the same safety concerns as their inner city counterparts, but may have limited PA for other

* Corresponding author at: West Virginia University, School of Medicine, Department of Pediatrics, WV Prevention Research Center, PO Box 9214, RCBHSC, Morgantown, WV 26506-9214, USA.

E-mail address: lcottrell@hsc.wvu.edu (L. Cottrell).

reasons. Furthermore, parents of children in the rural setting may support their children's PA differently.

The purpose of this study was to investigate potential differences in children's PA based on family income within the rural setting. We also examined potential means for explaining these differences, if found, through parental support of their children's PA. We hypothesized that within the rural setting, children living in poverty would experience limited resources and opportunities for PA and would subsequently engage in PA less often than children from more affluent family environments. Potential differences in parental support of PA based on family income within the rural setting were exploratory by nature, thus, we had no *a priori* hypotheses. An exploration of geographical factors associated with children's PA behaviors and parents' PA support within the rural setting based on family income is important and timely given the high prevalence of poverty and sedentary behaviors in rural areas compared to urban settings (Liu et al., 2008; Davis et al., 2010).

Methods

Sample recruitment and procedures

The study was conducted in 2010–2011 among children in kindergarten, and second, and fifth grade classrooms who were enrolled in the Coronary Artery Risk Detection in Appalachian Communities (CARDIAC) Project. The parents of children who had participated in the CARDIAC health screening at their schools received the behavior survey with their children's screening results in the regular mail with a postage-paid envelope for return to study investigators. Only one parent from a household was invited to participate. Details about the CARDIAC screening and survey methodology have been provided elsewhere (Cottrell et al., 2013). All study materials and procedures were approved by the West Virginia University Institutional Review Board.

Measures

In this study, we collected parent reports of their children's average PA throughout the academic year (September to June). Parents were also asked to report the frequency with which they support their children's PA in various ways.

Family income

Family income was assessed from parent-report of total family annual income after taxes were removed. Participating parents were asked to choose one of nine categories based on the U.S. Census collection method \$14,999 or lower, \$15,000 to \$24,999, \$25,000 to \$34,999, \$35,000 to \$49,999, \$50,000 to \$74,999, \$75,000 to \$99,999, \$100,000 to \$149,999, \$150,000 to \$199,999, and \$200,000 and over.

Children's physical activity (PA)

Children's physical activity (PA) was assessed by asking parents to report the number of days, in the past seven days, when their children exercised or were engaged in PA for at least 60 min each day. This item was modified from the Behavioral Risk Factor Surveillance System (BRFSS; CDC, 2013) for parent report on behalf of their small children. PA was defined in the survey instructions as any activity that, on a scale of 0 to 10 would be moderate (a 5 or 6) or vigorous (7 or 8) intensity using CDC approved descriptions. Parent report of their children's PA in a given time period using this BRFSS item has previously been associated with pedometer and accelerometer readings of children's activity in the same time period (CDC, 2014).

Parent support for their children's physical activity

Parent support for their children's physical activity was assessed using five items for PA support developed and originally explored by Trost and colleagues (Trost et al., 2003) and five additional items identified as commonly used support methods in the rural setting based on parent focus groups. The five items used by Trost and colleagues assessed the frequency by which parents supported their children's PA by: encouraging their children to do physical activities or play sports, encouraging their children to engage in PA or play sports with their children, providing transportation so their child could go to a place where he/she could do physical activities or play sports, watching their children participate in PA or sport, and telling their children that PA is good for their health. The five remaining parent support items used the same question format to ask parents how often they send their children outside to play, give their children PA options, praise their children for being physically active, use PA as a reward, and use PA as a punishment (see Table 1 for other items). Parents were able to respond in a range of 1 "never or almost never" to 5 "daily". The internal consistency of this modified parent support scale among this sample was measured by Cronbach's alpha at 0.85.

Statistical analyses

Descriptive statistics (mean, standard deviation) were calculated for sample characteristics including child age, gender, and family income. We explored potential differences in parent report of child's physical activity (0–7 scale), children's daily PA engagement (per parent report), and the forms of parent support of their children's PA with child age (4), gender (2), and grade (4) as the fixed factors within separate univariate analyses of variance (ANOVAs). Child age, gender, and grade were also entered into separate ANOVA models as covariate factors to examine the potential effects of family income on children's PA and parent support of their children's PA. Statistical significance was denoted at $p \leq .05$. Statistical analyses were performed using SPSS 20.0 in the spring of 2014.

Results

Sample characteristics

566 parents of 2477 (22.9%) eligible children enrolled in kindergarten ($n = 232$; 46.4%), and second ($n = 156$; 31.2%), fifth ($n = 84$; 16.8%), and eighth ($n = 28$; 5.6%) grade classrooms (5–15 years-old; mean = 7.7 years; SD = 2.4) completed the survey for inclusion in this study. Most of the parent respondents were mothers (89.1%). Slightly more than 30% of the represented children were either overweight (14.8%) or obese (16.2%) based on their body mass index percentiles (BMI%) from the CARDIAC Project health screening. Forty-six percent of the children were female. Family income was distributed across the census divisions with 16.2% of families reporting $\leq \$14,999$ annually, 20.2% reporting incomes between \$15,000 and \$34,999, 28.9% of families reporting incomes between \$35,000 and \$74,999, and the remaining 34.5% of families reporting incomes $\geq \$75,000$.

Parent reports of children's physical activity and parent support

On average, parents perceived their children as being highly active (mean 5.7 on a scale of 1 to 7). Overall, parents also reported that their children engaged in PA for 60 min or more, a total of five days in an average week. While parent report of children's PA using either measure did not significantly differ by child age, gender, or grade (see Table 1), parents of older and female children reported less PA.

Ways in which parents reportedly supported their children's PA varied in this sample. The most commonly endorsed forms of parent

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