



What matters, parental or child perceptions of physical activity facilities? A prospective parent-child study explaining physical activity and body fat among children



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ABSTRACT

Objectives: Research explaining childhood obesity has been usually focused on cognitive and behavioral predictors assessed in parents only or in children only. In contrast, the dyadic approach allows to evaluate how parental and child predictors operate together to explain child physical activity (PA) and body fat. This study investigated relationships among: (1) parental and child perceptions of accessibility and safety of exercise facilities for children, (2) parental and child PA, and (3) parental and child body fat percentage.

Design: A prospective and dyadic study with two measurement points was conducted. The follow up (Time 2) took place at 7–8-month after the baseline (Time 1).

Methods: Data were collected among 922 dyads of parents (mean age 35.97 years old; 83.9% women) and children (aged 6–11; $M = 8.42$, 52% girls). Parents and children reported safety and accessibility perceptions (Time 1) and PA (Time 1 and 2). Parental and child body fat were measured objectively (Time 1 and 2).

Results: Path analysis showed that parental perceptions of accessibility of PA facilities for children (Time 1) predicted child body fat and PA (Time 2). The associations were significant in a model accounting for longitudinal and cross-sectional associations between parental and child body fat and PA, controlling for age and gender of parents and children. Similar patterns of associations were found in the subsamples of dyads with children with normal body weight and with children with overweight/obesity.

Conclusions: Parental, not child perceptions of accessibility of PA facilities predicted child PA and body fat.

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1. Introduction

Low levels of physical activity (PA) and unhealthy nutrition are the key determinants of overweight and obesity in children and

their parents (U.S. Department of Health and Human Services, 2008). Recognizing the evidence for PA as a factor preventing excessive weight gain, the World Health Organization (WHO, 2003) recommended that children should accumulate at least 60 min of moderate-to-vigorous PA per day. Importantly, light-intensity PA is also assumed to protect children from obesity (Kwon, Janz, Burns, & Levy, 2011).

An investigation of behavioral and cognitive predictors of obesity among children may focus on body mass index or on other indicators of body composition, such as body fat percentage (Laurson, Eisenmann, & Welke, 2011). Child body fat may be

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predicted by child PA, but also by parental PA (for review see Cislak, Safron, Pratt, Gaspar, & Luszczynska, 2012). This is particularly true for children aged 11 years old or younger, whereas significant associations between parental and adolescent weight-related perceptions and PA are less likely to occur (Cislak et al., 2012). There are significant associations between child body fat and child PA (Duncan, Schofield, & Duncan, 2006; Jiménez-Pavón, Kelly, & Reilly, 2010), parental PA and child PA levels (Edwardson & Gorely, 2010), as well as parental and child body fat levels (Cislak et al., 2012). Parental and child overweight indices form moderate-to-strong associations (Mech, Hooley, Skouteris, & Williams, 2016). Thus, a thorough examination of determinants of child body fat requires accounting for parental and child PA levels, as well as parental obesity indices (e.g., parental body fat percentage). The present study will investigate parental and child predictors of child body fat and PA (among children aged 6–11). The predictors will include behavioral factors such as parental PA and parental body fat. Furthermore, two cognitive factors will be included: perceived accessibility, which refers to the physical PA environment, and perceived safety, which is a characteristic of the social environment determining PA in childhood (Carroll-Scott et al., 2013).

Several theoretical models attempt to explain PA and obesity. The ecological model of four domains of active living (domains of: active transport, occupation, active recreation, and household; Sallis et al., 2006) assumes that PA is predicted by the perceptions of the physical and social environment. Perceptions of the physical environment refer to accessibility to PA facilities, but also to comfort, convenience, or attractiveness of PA facilities (Sallis et al., 2006). Perceptions of the social environment refer to safety of PA facilities. The model (Sallis et al., 2006) was developed to explain PA among children and adults. In contrast, the ecological model of predictors of child obesity (Davison & Birch, 2001) focuses solely on predictors that operate in childhood. (Davison & Birch, 2001). In line with the model proposed by Sallis et al. (2006), Davison and Birch's (2001) model includes such predictors of childhood obesity as perceptions of accessibility and safety, but it also accounts for indicators of the socioeconomic status and the built environment. Additionally, the ecological model of predictors of child obesity (Davison & Birch, 2001) highlights the role of parent-related predictors, such as parental PA and parental obesity.

In sum, the ecological model of predictors of child overweight (Davison & Birch, 2001) and the ecological model of four domains of active living (Sallis et al., 2006) have two common cognitive predictors of child overweight: child perceptions of safety and accessibility. Importantly, these two models propose that respective perceptions may be directly associated with child PA (Davison & Birch, 2001; Sallis et al., 2006) and that child perceptions directly predict child overweight (Davison & Birch, 2001). Finally, as suggested in ecological model of predictors of child overweight (Davison & Birch, 2001) parental perceptions and behaviors are also direct predictors of child body fat. Thus, the present study examined if parental and child PA as well as parental and child perceptions of accessibility and safety of the PA environment were direct predictors of body fat in children.

Evidence for perceptions of environment—PA associations was gathered mostly in cross-sectional studies (Bauer, Neumark-Sztainer, Fulkerson, Hannan, & Story, 2011; Bélanger-Gravel, Gauvin, Lagarde, & Laferté, 2015; Forthofer, Dowda, McIver, Barr-Anderson, & Pate, 2016). Similarly, the associations between PA and obesity among children and parents were usually tested in cross-sectional studies (for review see: Jiménez-Pavón et al., 2010). Furthermore, research on relationships between child PA and perceptions of accessibility or safety usually accounted for child

perceptions only (e.g., Carroll-Scott et al., 2013) or parental perceptions only (e.g. Bauer et al., 2011). Some of these shortcomings were addressed in recent research. For example, perceptions of the environment (measured in parents) correlated with PA and body composition (measured in children) (Bauer et al., 2011) whereas perceptions of support for PA (measured in parents) were associated with child PA (Loprinzi & Trost, 2010). Parental perceptions were associated with child and parental PA, but child and parental BMI did not moderate these associations (Bélanger-Gravel et al., 2015). Unfortunately, joint effects of child and parental perceptions of social and physical PA environment were usually not considered. To date, dyadic research focused on cross-sectional associations (Bauer et al., 2011; Bélanger-Gravel et al., 2015; Forthofer et al., 2016). In sum, there is a lack of dyadic prospective studies explaining how parental and child variables (perceptions, PA, and body fat) operate together.

Identifying modifiable psychological variables which predict PA among children with overweight is crucial for developing effective psychological interventions. Furthermore, it is relevant to evaluate if the same effects may be observed among children with overweight/obesity and in those with normal body weight, because this would allow to combine prevention and treatment efforts into one intervention, targeting general population (Cislak et al., 2012). To our knowledge, only one study (Bélanger-Gravel et al., 2015) tested if the associations between child and parental perceptions and PA are similar across two types of dyads, that is dyads with overweight children and in those with children with normal body weight.

In sum, we aimed at explaining child body fat and PA in a prospective study accounting for data from parent-child dyads. In particular, we hypothesized that perceptions of accessibility and safety of PA facilities for children (measured in children and parents at Time 1) as well as PA and body fat (measured in children and parents at Time 1) would directly predict child PA and body fat, measured at the follow-up (Time 2). This hypothesis was tested for the total sample of the participants. Next, using a two-group model we explored if the time-lagged associations assumed in the model would be similar across two subgroups: (1) dyads with a child with overweight/obesity and (2) dyads with a child with normal body weight.

2. Method

2.1. Participants

Dyads of children and their parents (or legal guardians in case there was no parent) were invited to participate. At Time 1 (T1) 922 dyads (1844 individuals) were enrolled. At Time 2 (T2), which took place 7–8 months later, data from 525 (57%) full parent-child dyads were collected. Participants were enrolled in schools or general practitioners' offices in 26 villages, towns and cities of 6 administrative regions of Poland. In each location, the research team visited primary schools providing education for children aged 6–11 years old. The team also visited nurse/general practitioners' offices (conducting check-ups for all children, registered with a respective general practitioner) and discussed the possibility of data collection in a respective location. Two schools (out of 27) and two practitioners' offices (out of 12) did not agree to data collection. Among potential respondents one in ten dyads declined to participate (either parent or child did not provide their consent).

Children ($N = 922$) were 52.2% girls and 47.8% boys. They were 6–11 years old ($M = 8.42$, $SD = 1.26$). At T1 23.8% ($n = 219$) of children had their body mass percentile above 85, indicating overweight/obesity. The remaining children had normal body

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