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## Original Research

# Correlates and moderators of physical activity in parent-tween dyads: a socio-ecological perspective



A. Bélanger-Gravel <sup>a,b,\*</sup>, L. Gauvin <sup>a,b</sup>, F. Lagarde <sup>c</sup>, M. Laferté <sup>d</sup>

<sup>a</sup> Research Center of the Centre de Recherche du Centre Hospitalier de l'Université de Montréal (CRCHUM), Pavillon St-Antoine, 850, St-Denis Street, Montréal, H2X 0A9, Canada

<sup>b</sup> School of Public Health, Department of Social and Preventive Medicine, Université de Montréal, 7101, Ave du Parc, Montréal, H3N 1X7, Canada

<sup>c</sup> Fondation Lucie et André Chagnon, 2001 McGill Collège, Montréal, H3A 1G1, Canada

<sup>d</sup> Québec en Forme, 1075 Champflour Street, Trois-Rivières, G9A 3T2, Canada

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## ABSTRACT

**Objectives:** The identification of correlates and moderators of physical activity (PA) among parents and their children can support the development of more effective interventions. The aims of this study were to identify individual- and family-level predictors of PA among parent-tween dyads and to examine the moderating role of socio-economic status (SES) on these associations.

**Study design:** As part of a larger investigation, a cross-sectional telephone survey was conducted in 2012 among 1000 parent-child dyads.

**Methods:** Children were aged between nine and 13 years (tweens). Frequency of participation in PA was self-reported by means of questionnaires. Multilevel modelling was used. Individual predictors included body mass index and sedentary lifestyles whereas family-level predictors included parents' cognitions, family co-participation in PA, and socio-economic characteristics.

**Results:** Significant between-dyad variability in PA was observed among parent-daughter dyads ( $n = 470$ ,  $ICC = 0.17$ ,  $P < 0.001$ ) but not parent-son dyads ( $n = 520$ ,  $ICC = 0.01$ ,  $P = 0.37$ ). Sedentary activity ( $ps < 0.001$ ) and co-participation in PA ( $ps < 0.001$ ) were associated with greater PA. Positive parental perceptions of facilitating factors and greater self-efficacy were associated with PA among parent-daughter dyads ( $ps < 0.04$ ) while parents' outcomes expectancies were associated with PA among parent-son dyads ( $P = 0.04$ ). The relationship between facilitating factors and PA was moderated by SES (education) among parent-daughter dyads ( $P = 0.009$ ).

**Conclusions:** Promoting co-participation in PA and less sedentary activities appear as useful targets for increasing PA among parents and tweens. Additional strategies might be considered according to the sex of the children and family SES. Future research addressing socio-economic inequalities in the correlates of PA among families with tween girls is required.

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\* Corresponding author. Department of Information and Communication, Laval University, 1055, Ave du Séminaire, Room 5419, Québec, G1V 0A6, Canada. Tel.: +1 418 665 2131x3435.

E-mail address: [Ariane.belanger-gravel@com.ulaval.ca](mailto:Ariane.belanger-gravel@com.ulaval.ca) (A. Bélanger-Gravel).

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## Introduction

Regular participation in physical activity (PA) is associated with numerous short- and long-term health benefits among children.<sup>1</sup> However, few children are meeting PA recommendations worldwide and interventions have shown modest impacts.<sup>2,3</sup> According to the mediated model of behaviour change,<sup>4</sup> key steps to developing effective interventions include the identification of variables associated with the behaviour of interest. Although a significant number of studies have examined determinants of PA from a socio-cognitive psychology perspective,<sup>5</sup> the adoption of a socio-ecological perspective may further broaden our understanding of this behaviour.<sup>6</sup> According to the ecological model, an overarching understanding of health-related behaviours must include complex interactions between personal characteristics, perception of the environment, family and social networks, and built and policy environments.

With regard to children's PA, sex, self-efficacy, neighbourhood walkability, and proximity to recreation facilities have frequently been associated with this behaviour.<sup>7</sup> Family support is among the most consistently observed familial sources of influence, although overall evidence regarding the role of families remains inconclusive.<sup>7</sup> In line with these findings, the limited effects of family-based interventions on children's PA support the need to develop models explaining how families impact on PA.<sup>8</sup> One major limitation of previous research is the adoption of an approach that independently examined perspectives of parents or children,<sup>9</sup> thereby neglecting the known parent-child interactions within families.<sup>10</sup> According to family systems theory,<sup>11</sup> families can be viewed as a unique social system showing complex interactions between its members and hierarchical structures for goal pursuit. Indeed, it has recently been suggested that further developments in childhood obesity research would benefit from examining parent-child relationships as a significant part of children's environment.<sup>9</sup> Another limitation of previous studies is the use of classical statistical procedures to investigate characteristics within nested datasets. This may lead to underestimation of standard errors and consequently lead to erroneous interpretations of findings.<sup>12</sup> To our knowledge, few studies have adopted a dyadic perspective to investigate individual- and family-level correlates of PA<sup>13,14</sup> and no study has employed a statistical multilevel approach that accounts for shared variance within families. Thus, the first aim was to identify individual- and family-level correlates of PA using a dyadic analysis approach.

From a public health perspective, socio-economic status (SES) is a significant social determinant of health.<sup>15</sup> Although direct associations between SES and children's PA are less clear, some inequalities in PA have been reported for adolescents.<sup>16</sup> Moreover, it was reported that children may have different PA perceptions or beliefs according to their SES and that variations in cognitions according to SES may partially explain the relationship between SES and health-related behaviours.<sup>17–19</sup> To date, the influence of SES on correlates of PA in both parents and their children has been seldom explored. Therefore, the second aim of the study was to examine the moderating role of SES on correlates of PA.

## Methods

This study is a secondary analysis using baseline assessment data from a larger study aimed at ascertaining the impact of a multimedia communication campaign (the WIXX campaign) aimed at promoting PA among 9–13 year-old children.<sup>20,21</sup> This cross-sectional survey was conducted among a representative sample of 1000 parents and their children. Data were collected during the spring of 2012 using a random digit dialing telephone procedure. Sampling was stratified according to the seventeen administrative regions of Québec, Canada. Overall, 36,164 households were successfully contacted and screened for eligibility criteria. The eligibility criteria were to reside in Quebec, to be responsible for a child aged 9–13 years, to be able to answer survey questions in French or English, and to have a landline telephone. Among households screened, 24,041 were not eligible and 1000 parent-child dyads of the remaining 12,123 eligible families completed the survey questionnaire. The overall response rate was 69.2%. The survey was conducted by a polling firm and the questionnaire was administered by trained interviewers as follows: after providing consent, parents responded to the questionnaire; following this 15-min interview, children for which parents provided consent were asked to agree to participate and complete the questionnaire (15 min). The study was approved by the Human Research Ethics committee of the Centre Hospitalier de l'Université de Montréal (CHUM).

Participation in PA among children was self-reported using a version of the SHAPE questionnaire which was modified for telephone interviews.<sup>21</sup> This questionnaire was previously validated against accelerometers among Canadian youth ( $r = 0.44$ ,  $P < 0.01$ ).<sup>20</sup> Children were asked to report separately the number of days they usually participated in moderate and vigorous PA on week days and weekend days. The children PA score was based on the frequency of participation in moderate-to-vigorous PA [MVPA] (sessions/week [s/wk]). Parents self-reported their PA behaviour by means of the short version of the International Physical Activity Questionnaire (IPAQ).<sup>22</sup> To obtain comparable scores for participation in MVPA within the dyads, only the frequency dimension was used (s/wk) for the parent PA score.

For the multilevel analysis, body mass index (BMI) and sedentary behaviours were the individual (level-1) variables. Parents' BMI ( $\text{kg}/\text{m}^2$ ) was estimated from self-reported weight and height. Anthropometric information about the children were obtained through parental reports and the children's height and weight was converted into percentiles using WHO growth curves.<sup>23</sup> Sedentary behaviours of parents were assessed through the IPAQ item regarding daily sitting time: 'During the last seven days, how much time (minutes or hours) did you usually spend sitting on a week day?'.<sup>22</sup> Among children, parents estimated, in one open-ended question, the average number of minutes their children spent playing video games, using the computer, and watching television or movies daily.

Family (level-2) variables included shared exposures of parents and children, represented by proxy indicators of family context. Thus, parental marital status (single parent family [1] vs. the other types of families [0]), education (high school or less [0] vs. college/university degrees [1]), annual

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