



Does parental support moderate the effect of children's motivation and self-efficacy on physical activity and sedentary behaviour?



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ABSTRACT

Objectives: 1) To test whether parental support moderates the direct effects of children's motivation and self-efficacy on objectively measured moderate-vigorous physical activity (MVPA) and sedentary time. 2) To explore differences in the relationships between boys and girls.

Design: Cross-sectional observational study.

Method: Data were collected from 430 9–11 year old UK children and their parents; parents self-reported on the support they provided to their children to be active (through providing transport, encouragement, watching, or taking part with their child), and children self-reported their motivation and self-efficacy towards exercise. MVPA and sedentary time were measured using accelerometers.

Results: Both parent- and child-level factors were largely positively associated with children's MVPA and negatively related to sedentary time. There was no evidence of a moderation effect of parental support on MVPA or sedentary time in boys. Parental provision of transport moderated the effect of girls' motivation on week-day MVPA; more motivated girls were less active when transport was provided. Transport and exercising with one's child moderated the effect of motivation and self-efficacy on girls' sedentary time at weekends; more motivated girls, and those with higher self-efficacy were less sedentary when parents provided more frequent transportation or took part in physical activity with them.

Conclusions: The results largely supported a model of the independent effects of parent and child determinants for moderate-to-vigorous physical activity, but there was evidence that some types of parent support can moderate sedentary time in girls. Further research is needed to explore the causal pathways between the observed cross-sectional results.

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1. Introduction

The lack of physical activity in childhood is associated with obesity, precursors of chronic disease (Ekelund et al., 2004), and threats to future health and wellbeing such as diabetes and cardiovascular disease in adulthood (Barton, 2012). Physical activity is, however, a complex set of behaviours with multiple determinants operating at numerous levels as is predicted by a socio-ecological model (Butland et al., 2007); for example, cultural (e.g., expectations of children and opportunities for active play), neighbourhood (e.g., safety, and urban/rural setting), school (e.g., resources, and

scheduling) and individual differences (e.g., preferences and ability) have all been significantly associated with physical activity behaviour in childhood (Sallis, Prochaska, & Taylor, 2000). Most research compares the effects of these different influences either individually or in parallel, rarely considering how these factors may interact. The aim of this study is to consider the interaction between two sets of factors that have been consistently shown to predict children's physical activity behaviour; 1) a child's motivation and self-efficacy towards physical activity, and 2) the support children receive from parents. Specifically, we aim to determine whether parental support moderates the relationship between child-level factors and physical activity behaviour.

Past work from a self-determination theory (SDT; Ryan & Deci, 2017) perspective has shown children's autonomous motivation to be consistently and positively associated with physical activity

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and exercise (Lonsdale, Sabiston, Raedeke, Ha, & Sum, 2009; Sebire, Jago, Fox, Edwards, & Thompson, 2013; Standage, Gillison, Ntoumanis, & Treasure, 2012). SDT differentiates between motivational regulations that are autonomous or controlled (Deci & Ryan, 2008). Autonomous motivation refers to when people engage in activities for reasons such as enjoyment (termed intrinsic motivation) or as they have personal meaning and relevance (termed identified regulation). Controlled motivation refer to when activities are undertaken purely to gain rewards or avoid punishment (termed external regulation), or to gain approval or avoid feeling guilt or shame (termed introjected regulation) (Deci & Ryan, 2008). In contrast to the positive impact of autonomous motivation, controlled motivation has been shown to have weak negative associations with physical activity (Owen, Smith, Lubans, Ng, & Lonsdale, 2014). Thus, it is the quality rather than absolute quantity of motivation that is important to consider.

While SDT takes account of the influence of a person's assessment of their capability to carry out an activity, and to demonstrate one's competence while undertaking it (i.e., the satisfaction of their need for competence), people's expectation of their capability prior to taking part (i.e., self-efficacy) can also have a strong influence on whether or not they choose to do so. Self-efficacy is also frequently studied as a predictor of physical activity behaviour (Sterdt, Liersch, & Walter, 2014), and high self-efficacy is consistently associated with higher levels of participation (Sallis et al., 2000). It is a key component of many behaviour change theories, including social-cognitive theory (SCT; Bandura, 1998), and the transtheoretical model and the theory of planned behaviour (Prochaska & Diclemente, 1984). Applications of such theories suggest that children who feel more able to complete an activity are more likely to seek out opportunities to do so, and to take part for longer (Bauman et al., 2012; Trost, Kerr, Ward, & Pate, 2001).

Parents also play a key role in determining children's physical activity levels (Sallis et al., 2000). Positive associations of a medium effect size (Adkins, Sherwood, Story, & Davis, 2004; Sallis, Calfas, Alcaraz, Gehrman, & Johnson, 1999) have been consistently reported between parental support and leisure-time physical activity through the provision of both direct, tangible support (e.g., providing transport, enrolling children in sports clubs, watching children take part), and intangible support (e.g., through verbal encouragement, and attitudes towards physical activity) (Beets, Cardinal, & Alderman, 2010; Edwardson & Gorely, 2010). Recent systematic reviews also suggest that the involvement of family may lead to greater efficacy of school-based interventions (Vasques, Magalhães, Cortinhas, Mota, Leitão, & Lopes, 2014), suggesting that parents' influence reaches beyond the home environment and may be important wherever interventions are based. However, we know very little about how parental influences operate; none of the studies included in the available systematic reviews of children's physical activity interventions consider the interactive effects of children's psychosocial determinants alongside parental support (Adkins et al., 2004; Sallis et al., 1999), and thus the relative importance of parent- versus child-level influences on children's physical activity levels, and the potential interactive or moderating effects are unknown. A clearer understanding of whether parental support and children's own motivation act in parallel, or whether they have an interactive effect could greatly help us to better specify and target childhood physical activity interventions, to maximize their efficacy.

There are two additional limitations of past work that the present study seeks to address. First, in terms of measurement as the use of objective versus subjective (self-report) measures has been shown to be related to study outcomes (Yao & Rhodes, 2015). That is, far fewer studies report on objectively assessed physical activity

outcomes than do self-report (Edwardson & Gorely, 2010), and thus the confirmation of previous findings using objective means is warranted. The second limitation of past research relates to the degree to which children's broad activity profile is considered, rather solely focusing on moderate-to-vigorous activity levels. The time that children spend being sedentary has been linked to health risks independently of moderate to vigorous physical activity levels (Owen et al., 2014) and as such is not simply the opposite end of the physical activity continuum but a behaviour in its own right (Pate, O'Neill, & Lobelo, 2008). The use of objective measurement tools such as accelerometers, allows for the more accurate assessment of sedentary time alongside time spent in physical activity of different levels of intensity. In an era in which attractive sedentary pursuits including the use of computers, on-demand television, tablets and smart phones are increasingly available to young children, an understanding of whether and how the factors influencing physical activity can influence, or fail to influence, sedentary time is important, yet there is little reliable information about the correlates of sedentary behaviour in children (Van der Horst, Paw, Twisk, & Van Mechelen, 2007).

Thus, this study aimed to address the limitations of past work incurred by using objective measures of physical activity and sedentary time, and assessing the interaction between parental and child influences on motivation. In *Hypothesis 1*, we predicted that autonomous motivation and self-efficacy would be positively associated with objectively measured moderate-to-vigorous physical activity (MVPA) and negatively associated with sedentary time; controlled motivation was predicted to have a negative association with MVPA and a positive association with sedentary time. In *Hypothesis 2*, we predicted that parents' social support for physical activity would be positively associated with MVPA and negatively with sedentary time. In *Hypothesis 3*, we predicted that parental social support would moderate the relationship between a child's self-efficacy and motivation towards exercise and the time spent in MVPA and sedentary behaviour. Specifically, we hypothesised that a) children with high autonomous motivation and self-efficacy but unsupportive parents will be less physically active and more sedentary than equally motivated children with supportive parents (i.e., less able to enact their natural tendencies towards activity), and b) that children with low autonomous motivation and self-efficacy but highly supportive parents will be more physically active and less sedentary than children with similarly low motivation but less supportive parents.

In order to control for additional factors known to influence children's physical activity levels and/or parental support, we included the covariates of gender, BMI, and biological maturation (Beets, Vogel, Chapman, Pitetti, & Cardinal, 2007). Previous research has consistently reported girls to be less active (Biddle, Atkin, Cavill, & Foster, 2011; Sterdt et al., 2014) and to receive less parental encouragement (Fredricks & Eccles, 2005) than boys. A higher body weight is associated with lower activity levels in both genders (Ekelund et al., 2004). Biological maturity is consistently associated with physical activity levels, with early maturing girls engaging in less physical activity than their on-time or late maturing peers, and an association in the opposite direction for boys (Cumming, Standage, Gillison, & Malina, 2008; Ekelund et al., 2004). While most children in primary school have yet to reach puberty, as girls reach maturity ahead of boys, early maturing girls may have already begun to experience the changes associated with reduced physical activity levels. Finally, as children have different opportunities to be active and spend time with parents during the week compared with weekends, we considered week days and weekend days separately in line with past work (Beets et al., 2007).

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