

Physical Activity Patterns

Subjects: Sport Sciences

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Although “physical activity pattern” (PAP) is a widely used expression, its precise meaning remains vague. Indeed, PAP is sometimes used to describe physical activity (PA) levels/intensities, however the term is also applied to express how PA averages differ among group, between different days (i.e., week and weekend days), across seasons (e.g., summer, winter), and between school and vacation time. A lack of a formal definition for PAP has not prevented researchers from using a vast array of instruments to measure PA (accelerometers, pedometers, questionnaires, direct observations, and heart rate monitors) in an attempt to capture PAP. Discrepancies also exist in how PAP has been expressed with researchers using daily mean PA, heart rate frequency, number of daily steps, time engaged in certain types of activity, and/or engagement in sports activities. Researchers have also used numerous statistical procedures in their attempts to capture PAP. Notwithstanding this diversity, we suggest that PAP should be used to jointly capture similarities/dissimilarities as well as stabilities/changes in children’s PA at an intra-personal level. PAP should be used to best describe individual streams of behaviours, and not exclusively PA levels/intensities. A formal and clear definition of PAP would support important, systematic, and coherent lines of empirical enquiry.

Keywords: physical activity pattern ; children ; health

1. Introduction

It is well-acknowledged that organized and systematic physical activity (PA) engagement provides numerous health benefits to the paediatric population^{[1][2]}. Notwithstanding such evidence, epidemiological data show an apparent non-random decline in youth PA levels. Further, a large amount of children/adolescents do not comply with the international recommendations^[3]. Since children do not engage in PA in a similar manner^{[4][5][6][7][8][9]}, a large number of studies not only dedicate their efforts to trying to understand PA patterns, but also on trying to explain differences in PA conditioned on their manifold predictors, and linked them to health benefits^{[10][11]}.

2. Precise Definition of PAP

To date, there is no consensus regarding a precise definition of PAP. Yet, this has not prevented researchers from using different instruments, procedures, and protocols in an attempt to capture PAP^{[7][8][11][12]}, nor from relying on a variety of statistical procedures to analyse their data. It is evident from the extant literature that researchers have yet to conceptualise, capture, assess, and operationalise PAP in a manner that will allow systematic lines of research and practice to develop^{[8][11][12][13][14][15]}.

Therefore, we conducted a systematic review on studies involving children aged 6-11 years. Our focus was on: (1) definitions of PAP; (2) instruments and techniques used to describe PAP; (3) statistical procedures used to analyse PAP; and (4) implications of PAP to children’s health.

From reviewing the available papers (n=76), it is evident that authors do not use a common definition of PAP in their studies, with no paper providing a formal definition of PAP. Yet, this did not prevent authors from attempting to research PAP by considering children’s involvement in different PA intensities (sedentary, light, moderate, vigorous, very vigorous), the type of activity children performed, or even their sports participation, for example. Further, most papers considered the compliance with PA guidelines as an indicator of PAP. We also identified studies that explored PA averages, and their differences into distinct daily segments across week and weekend days, or even across different seasons suggesting that this way PAP could be identified and comprehensively described.

A wide range of instruments were also used to measure PAP, including accelerometers^{[8][9][12][16][17][18][19][20][21][22][23][24][25][26][27][28][29][30][31][32][33][34][35][36][37][38][39][40][41][42][43][44]}, pedometers^{[45][46][47][48][49][50][51]}, heart rate monitors^{[52][53][54][55][56][57][58][59][60]}, questionnaires/diaries^{[10][11][61][62][63][64][65][66][67][68][69][70][71][72][73]}, observational methods^{[74][75]}, and GPS^[6]. Yet, most of them did not explicitly describe a formal statistical method/model to determine children’s PAP. This absence

and/or difficulty did not prevent researchers from linking their putative PAP with health indicators. It is important to note that papers (n=24) were seemingly more interested in studying the relationship between PA levels and health (or health indicators), rather than PAP *per se*. This is the main reason behind the use of PA markers such as moderate to vigorous PA, different PA intensities children are engaged with, and the compliance with PA guidelines with health indicators. Notwithstanding this commendable effort, it is important to highlight that we are still void of robust data, as well as putative explanatory mechanisms on how PAP influence children's physical and psychological health and well-being.

A pattern can be generically defined as “the regular way in which something happens, develops, or is done”^[76], and as such children's PAP should be examined at an intra-personal level beyond a thorough description of their PA levels. We contend that it is important to present a formal and clear definition of PAP to guide future research in children and adolescents. Further, we suggest that PAP may also search for streams of activity/sedentary behaviours to identify differences, or not, across a variety of conditions that rule children and adolescents' lives, meaning that PAP should be used to best describe individual streams of personal behaviours, not only PA intensities. In addition, it is of relevance that researchers working with PA to probably focus on providing more extensive answers to issues relating to the relationship between different PAP manifestations and health (risk and benefits) in children. For example, is it better to (1) be engaged in 60 min of continuous MVPA or in various time fractions alongside the day or (2) to have a more erratic PAP profile (i.e., with random bursts of MVPA)? These and other questions could be answered if a consensual definition of PAP would exist, which in all likelihood would guide research in a more enriching and impactful way, aiming to provide children opportunities to be safely active, during different moments of their days.

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