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Review

Early childhood physical activity, sedentary behaviors and psychosocial well-being: A systematic review

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ABSTRACT

Objectives. Little is known about how health behaviors such as physical activity (PA) and sedentary behaviors (SB) may be associated with psychosocial well-being during the crucial early childhood period. The aim of this study was to undertake a systematic review of associations between PA, SB and psychosocial well-being during early childhood.

Methods. In February 2013, MEDLINE, PsycINFO, SPORTDiscus and Embase electronic databases were searched. Inclusion criteria were: 1. peer-reviewed publication since 1980 in English; 2. children aged birth–5 years; 3. PA or SB measured during early childhood; 4. an indicator of child psychosocial well-being; and 5. association between PA/SB and psychosocial well-being reported. Studies could be observational or interventions. Data were extracted by one author and entered into a standardized form in February and March 2013.

Results. 19 studies were identified: four examined PA, 13 examined SB and two examined PA and SB. No interventions met the inclusion criteria; all included studies were observational. In total, 21 indicators of psychosocial well-being were examined, 13 only once with the remaining eight reported in more than one study. Some dose–response evidence was identified suggesting that PA is positively, and SB inversely, associated with psychosocial well-being.

Conclusions. Too few studies exist to draw conclusions regarding associations. Future high-quality cohort and intervention studies are warranted particularly investigating dose–response associations.

Contents

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Introduction

Early childhood (i.e., birth through five years) is a crucial developmental period, during which foundations for health behaviors, such as physical activity (PA) and sedentary behaviors (SB) including television viewing, are formed (Birch and Fisher, 1998). Participation in PA and SB during early childhood is associated with biomedical health outcomes such as weight, bone health and CVD risk factors (Leblanc et al., 2012; Timmons et al., 2012), cognitive development, mental function, academic achievement (Singh et al., 2012; Tomporowski et al., 2008, 2011) and psychosocial well-being (Lotan et al., 2005; Lubans et al., 2012) in young and older children and adolescents such that higher PA and lower SB support healthier outcomes.

Several countries now have PA and SB recommendations for early childhood. For instance, Canadian, Australian, UK and USA guidelines recommend children younger than school age capable of walking should accumulate 3 h of PA each day (Department of Health and Aging (DoHA), 2010; Department of Health Physical Activity Health Improvement and Protection, 2011; Tremblay et al., 2012a; Institute of Medicine, 2011). With respect to SB, children younger than 2 years are recommended to participate in no screen time (Canada/Australia/USA), while recommendations for children older than 2 who have not yet started school vary between less than 1 h (Canada/Australia) (Department of Health and Aging (DoHA), 2010; Tremblay et al., 2012b) and less than 2 h (USA) (American Academy of Pediatrics, 2011; American Academy of Pediatrics Committee on Public Education, 2001) per day. However, there is a lack of dose–response evidence available in the extant literature (Leblanc et al., 2012; Timmons et al., 2012).

Participation in recommended levels of PA and SB may also support psychosocial well-being in young children (Leblanc et al., 2012; Timmons et al., 2012). PA is bodily movement produced from the contraction of skeletal muscles which results in energy expenditure raised above the resting level (Caspersen et al., 1985). SB is any behavior performed in a sitting or lying position with energy expenditure $\leq$1.5 times resting levels (Sedentary Behaviour Research Network, 2012). Subjective well-being, primarily used in the psychological literature, includes the presence of positive and the absence of negative affect (Diener, 1984). However, well-being is a multifaceted construct in the broader health literature, yet lacks a clear definition or agreement upon its constructs or interpretation (de Chavez et al., 2005; Guerin, 2012). It has been used to capture constructs such as positive and negative affect, satisfaction with life, subjective well-being, and psychological well-being, as well as being used interchangeably with the terms quality of life and vitality (Guerin, 2012). For the purposes of this review, psychosocial well-being is considered to be the presence of higher levels of positive, and lower levels of adverse, psychological and social attributes and behaviors (e.g. social skills, physical aggression and attention problems; see psychosocial well-being search string in Table 1 for a complete list of terms used). The purpose of this definition is to assess a continuum of psychosocial well-being experienced by young children rather than identify clinical symptoms. More positive psychosocial well-being indicators in early childhood have been shown to be inversely associated with later depression, hostile behavior and aggressive interpersonal behavior (Jones et al., 2011; Meagher et al., 2009; Toumbourou et al., 2011), and may also support children's positive behavioral, social and academic outcomes during later childhood (McCabe and Altamura, 2011; Sanson et al., 2009). Therefore, supporting the development of healthy psychosocial well-being during early childhood is important for children's later development and mental health.

Previous reviews focusing on associations of PA and SB with aspects of psychosocial well-being have been reported for older children and adolescents (Costigan et al., 2013; Ekeland et al., 2004; Gapin et al., 2011) and adults (McAuley and Rudolph, 1995; Teychenne et al., 2008, 2010); however, none have been undertaken in the early childhood period. Associations of early childhood PA and SB with a broad range of health and developmental outcomes, including some indicators of psychosocial well-being, have previously been reviewed (Leblanc et al., 2012; Timmons et al., 2012). Those reviews reported a positive association between increased PA (Timmons et al., 2012), and an inverse association between increased TV viewing, and indicators of psychosocial health (Leblanc et al., 2012). However, the criteria for those reviews excluded cross-sectional investigations, which provide important epidemiological information particularly in an emerging field such as this. Additionally, those reviews included a very narrow range of psychosocial well-being terms. Specifically, the PA review (Timmons et al., 2012) included only six terms plus temperament, and the SB review (Leblanc et al., 2012) included only five terms plus personality, both of which are considered a trait rather than an indicator of psychosocial well-being. Therefore, those reviews potentially missed important outcomes (a total of 20 included in this review) as indicators of psychosocial well-being and subsequently included only a small number of studies (three PA (Timmons et al., 2012) and six SB (Leblanc et al., 2012)) from the wider body of literature in this field. By adopting a more inclusive definition of psychosocial well-being and a broader range of study designs, as this review does, a more comprehensive and thorough investigation of associations of PA and SB from a young age on this health outcome is possible. Additionally, those reviews incorporated various other health outcomes, such as obesity and bone health, limiting their ability to investigate psychosocial well-being outcomes in depth. Due to such limitations, those two reviews do not provide a comprehensive overview of the extant literature for studies focusing on PA, SB and psychosocial well-being. The purpose of this paper is to review both observational and intervention literature investigating potential associations between both PA and SB and children's psychosocial well-being during the early childhood period.

Table 1
Search strategy used in PsycINFO.

1. "physical* activ*" or exercis* or "motor activit*" or "locomotor activit*" or play
2. "sedentary behavio*" or sedentar* or television or TV or "screen time" or "electronic game*" or computer* or "small screen*" or e-game* or video* or "physical inactivity" or "screen based media" or gaming or "e-game"
3. infan* or pre-school* or preschool* or toddler* or "young child*" or "early childhood" or "early years"
4. ADD or ADHD or "antisocial behavi*" or "antisocial behavi*" or anxi* or attention or "behavi* problem" or depress* or "emotional health" or "emotional skill*" or hyperactivity or inattention or "mental health" or "prosocial behavi*" or "psychological health" or "psychosocial health" or "self regulat*" or "self-regulat*" or "social behavi*" or "social competence" or "social skill*" or "social-emotional competence" or "well being" or "well-being"
5. 1 or 2
6. 3 and 4 and 5
7. Limit 6 to years 1980–current and peer-reviewed and English language and age groups: childhood (birth to 12 years) and human

Methods

Search strategy & information sources

In February 2013 a systematic search for original research articles was conducted using MEDLINE, PsycINFO, SPORTDiscus and Embase electronic databases. Four separate search strings relating to 1. physical activity, 2. sedentary behaviors, 3. early childhood and 4. psychosocial well-being were utilized. Table 1 provides the full search strategy for PsycINFO which was modified where necessary for the remaining databases. Reference lists of relevant studies and reviews were further examined, as were links to related articles within databases. Studies from the authors' own collections were searched. The PRISMA Guidelines and recommendations for reporting of systematic reviews were followed (Moher et al., 2009). The search strategy was created and run by TH with the help of a library and information service expert. References were imported directly into Endnote X6 (Thompson Reuters, California, USA). Duplicate articles were removed using Endnote; any remaining duplicates were manually removed.

The review process included four steps: 1. The title of each article was examined by one author (TH) to identify those eligible for inclusion. 2. To assess the reliability of this author accurately identifying all titles which may be eligible for further review, the titles of a random selection of 10% of the total number of titles