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Review

The home physical environment and its relationship with physical activity and sedentary behavior: A systematic review

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ABSTRACT

Reviews of neighborhood (macro) environment characteristics such as the presence of sidewalks and esthetics have shown significant correlations with resident physical activity (PA) and sedentary (SD) behavior. Currently, no comprehensive review has appraised and collected available evidence on the home (micro) physical environment. The purpose of this review was to examine how the home physical environment relates to adult and child PA and SD behaviors. Articles were searched during May 2014 using Medline, PsycINFO, PubMed, Scopus, and SPORTDiscus databases which yielded 3265 potential studies. Papers were considered eligible if they investigated the presence of PA (ie. exercise equipment, exergaming devices) or SD (ie. television, videogames) equipment and PA or SD behavior. After, screening and manual cross-referencing, 49 studies (20 experimental and 29 observational designs) were found to meet the eligibility criteria. Interventions that reduced sedentary time by using TV limiting devices were shown to be effective for children but the results were limited for adults. Overall, large exercise equipment (ie. treadmills), and prominent exergaming materials (exergaming bike, dance mats) were found to be more effective than smaller devices. Observational studies revealed that location and quantity of televisions correlated with SD behavior with the latter having a greater effect on girls. This was similarly found for the quantity of PA equipment which also correlated with behavior in females. Given the large market for exercise equipment, videos and exergaming, the limited work performed on its effectiveness in homes is alarming. Future research should focus on developing stronger randomized controlled trials, investigate the location of PA equipment, and examine mediators of the gender discrepancy found in contemporary studies.

Contents

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Context

Regular physical activity has been associated with the prevention of at least 25 chronic diseases (Warburton et al., 2007). Despite these findings, physical activity (PA) remains low and consequently obesity and the comorbidities associated with low PA levels have increased (Shields et al., 2010; Tremblay et al., 2010). Researchers have identified several correlates of PA behavior which can be broadly defined into categories of: demographic, biological, intra-individual/psychological, behavioral, social/inter-individual, environmental and policy (Bauman et al., 2012; Ferreira et al., 2007; Trost et al., 2002). More recently, understanding the correlates of sedentary (SD) behaviors has become an important and emerging issue. Sedentary behavior is defined as energy expenditure at ≤1.5 METs (Pate et al., 2008) (Metabolic Equivalent of Task). Despite meeting PA guidelines, excessive sedentary lifestyle can deteriorate health over time (Owen et al., 2010; Proper et al., 2011). These findings have prompted the creation of sedentary behavior guidelines for Canadian and Australian children (AGDH, 2013; CSEP, 2012).

The importance of the environment on PA and SD behaviors is reflected in social ecological models (Sallis et al., 1998; Spence and Lee, 2003; Wachs, 1992). The physical environment can represent a discriminate stimulus (Skinner, 1954) which can prompt predictable human behavior (Spence and Lee, 2003). Ecological models also posit that individuals adapt or alter their behaviors in response to the resources in the extra-individual environment. Research on how the neighborhood environment predicts PA behavior has seen noticeable growth in the past decade; it has been shown to represent approximately 30% of all published research in PA (Rhodes and Nasuti, 2011). While this evidence clearly demonstrates the importance of the neighborhood environment on PA, some researchers have suggested that understanding the effects of the home, or micro environment also deserves attention (Sirard et al., 2010). Individuals are likely to receive higher exposure to stimuli in their homes compared to their neighborhood environment. For instance, the home environment has been shown to be a determining factor in understanding nutritional choices (Campbell et al., 2007; Hendrie et al., 2013; MacFarlane et al., 2009) and smoking behavior (Hiemstra et al., 2014; Rushton, 2004). With regard to active lifestyle, the convenience and advancements of technology (ie. laptops, video game consoles, tablets, etc.) are likely factors that prompt sitting. An average American spends 8 h/day being sedentary (Matthews et al., 2008) and children spend on average 7.5 h/day using various entertainment media (ie computers, televisions, cell phones) (Prevention CfDCa, 2014). The home provides personal comfort which makes it an ideal environment to engage in common sedentary activities. However, exercise equipment such as treadmills and exergaming can also provide a convenient method for staying active at home. Both of these types of equipment would seem essential to consider for children and adults. Despite this rationale, only one review has been conducted on the home environment (Maitland et al., 2013). The results generally supported the premise that the home environment is reliably linked to PA and SD, but it was limited to children, and thematic analyses were constrained to broad classifications (e.g., equipment vs. no equipment, placement of equipment).

Thus, the purpose of this paper was to create a systematic review (Moher et al., 2010) which would complement the prior review (Maitland et al., 2013) by including adults and updating the contemporary literature on how the home physical environment relates to adult and child PA and SD. It was hypothesized that the physical components of PA and SD equipment (ie. quantity and location) and variables within these components (type, and individual factors) would correlate with SD time and PA time respectively.

Evidence acquisition

Eligibility criteria

Studies that were published in English peer-reviewed journals were considered for this review. The journal articles were considered eligible if they investigated: i) the presence of PA (e.g. treadmill) or SD (e.g. television) equipment, and ii) an outcome of PA or SD behavior.

Exclusion criteria

Studies were excluded if the setting was other than a family home (ie. nursing homes, schools, and recreation facilities); the authors wanted to examine a setting in which the individuals have the autonomy to manipulate their surroundings.

Search strategy

Articles were searched during May 2014 using Medline, PsycINFO, PubMed, Scopus, and SPORTDiscus databases. A combination of the following terms was used to search in the title, abstract, and key-terms which included: *home*, *home environment*, *physical activity*, *sedentary*, *television*, *screen-time*, *obesogenic*, *obesogenic environment*, *home-based intervention*, *exercise video*, *exercise program*, *exercise dvd*, *treadmill*, *bike*, *exercise bike*, *cues*, *stimulus control*, *exergaming*, *exercise gaming*, *eyetoy*, *dance mat*, and *playstation*.

Screening

The screening process of articles by title, abstract and full article was performed based on the eligibility criteria. Fig. 1 displays the screening process of the articles.