



Review Essay

The influence of the neighborhood physical environment on early child health and development: A review and call for research



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ABSTRACT

This review examines evidence of the association between the neighborhood built environment, green spaces and outdoor home area, and early (0–7 years) child health and development. There was evidence that the presence of child relevant neighborhood destinations and services were positively associated with early child development domains of physical health and wellbeing and social competence. Parents' perceptions of neighborhood safety were positively associated with children's social-emotional development and general health. Population representative studies using objective measures of the built environment and valid measures of early child development are warranted to understand the impact of the built environment on early child health and development.

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1. Introduction

Healthy child development is an enabler of human capability allowing children to reach maturity and participate in economic, social and civic life (Zubrick et al., 2005, 2009). Child development

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involves the biological, psychological and emotional changes that occur between birth and adolescence (UNICEF et al., 2010). The main areas of development include cognitive, social and emotional, speech and language, and fine and gross motor skills (Irwin et al., 2007; Dunn, 2012; Doherty, 1997; Janus and Offord, 2007). Neural pathways in the brain are established in early childhood through movement and sensory stimulation (Shonkoff and Phillips, 2000), highlighting the importance of play, social interaction and physical activity for children's cognitive, social-emotional, physical and language development (Fjortoft, 2004; Hannaford, 1995; Pellegrini and Smith, 1998; Frost et al., 2001; Elkind, 2007; Ginsburg, 2007).

The early years is a critical stage of development for children because it is the time when the foundations for health, emotional well-being and life success are laid (Hertzman and Williams, 2009). National progress measures of early child development are increasingly being used by countries such as Canada and Australia to track key developmental domains in the early years (Goldfeld et al., 2009; Janus and Offord, 2000; Janus et al., 2011). Results from the Australian Early Development census (AEDC) showed that communities (suburbs) vary significantly in the proportion of children who are developmentally vulnerable (defined as children who score below the 10th percentile of the national AEDC population) (Brinkman et al., 2014). Addressing these disparities in developmental vulnerability requires a better understanding of the determinants of such variability (Lynch et al., 2010).

There is considerable evidence and current research activity around the genetic, biological, familial and physiological influences on early child development (Irwin et al., 2007; Shonkoff and Phillips, 2000; Hertzman and Keating, 1999). However, the influence of the physical environment on young children's development is less well understood (Brooks-Gunn et al., 1993; Ling Hin, 2009; Leventhal and Brooks-Gunn, 2000). The ecological model of development acknowledges that individuals should be studied within the contexts of which development occurs (Bronfenbrenner, 1979). These contexts include family and friends, childcare/school, and the community/neighborhood (Leventhal and Brooks-Gunn, 2000). The outdoor home and neighborhood physical environments are important components of the neighborhood environment and to date have received the least research focus and inquiry in the field of child development research.

The family home is the most proximate environmental influence on a young child's development and where they spend a large amount of time. While the negative impact of poor or overcrowded housing conditions on children's health is well documented (Harker, 2006; Gifford, 2007), much less is understood about the impact of the home outdoor space on early child health and development (Kelty et al., 2008). For instance, a yard provides young children with space to play, be active, explore and be stimulated, all of which are important for healthy child development (Bradley et al., 1990; Wachs and Gruen, 1982). In contrast, children living in higher density housing have limited access to private open space, thus the accessibility and design of public open space is particularly important (Giles-Corti et al., 2012; Min and Lee, 2006). Beyond the immediate home, the characteristics of the surrounding natural and built environments (i.e., places and spaces created or modified by people), can provide important resources and exposures relevant for early child health and development (Dunn, 2012). The physical design and characteristics of the neighborhood environment are well established influences on a range of social and health outcomes among adult populations (Transportation Research Board, 2005; Brown et al., 2009; Pereira et al., 2012; Wood et al., 2008; Green et al., 2003; Ewing et al., 2003). Potential developmentally salient physical characteristics of neighborhoods include access to and the quality

of local facilities and services (e.g., recreation centers and libraries), retail (e.g., food outlets), recreational opportunities (e.g., parks and nature), street traffic, public transportation, and the physical quality of child-related care, educational and health care facilities (Center on the Developing Child, 2010; Goldfeld et al., 2015).

Moreover, the relationship between the neighborhood and outdoor home physical environment and early child health and development may be mediated by 'behaviors' that facilitate early child health and development (e.g., play, physical activity, social interaction and exploration and stimulation). Reviews of the correlates of children's physical activity and outdoor play indicate that built environment features such as walk/bicycle paths, presence of cul-de-sac roads, access to parks, recreational facilities, other local destinations and public transport are positively associated with children's physical activity, while high traffic exposure and crime are negatively associated with children's physical activity (Davison and Lawson, 2006; Pont et al., 2009; Ferreira et al., 2007; Heath et al., 2009). However very few studies focus on young children (i.e., ≤ 7 years) or consider the effect of the outdoor home environment on young children's physical activity. Nevertheless, they provide guidance as to the pathways through which the built environment influences early child development. For example, neighborhoods characterized by high street traffic and a lack of local attractive parks may restrict children's opportunities for play and interaction with other children in common play spaces such as the front yard and local park. A reduction in young children's opportunities for play and social interaction negatively impacts on their social-emotional competence (Frost et al., 2001; Ginsburg, 2007; Pellegrini, 2009). Fig. 1 depicts the theoretical pathway through which the neighborhood and outdoor home physical environment can facilitate or constrain opportunities for play, physical activity, social interaction and exploration and stimulation which are important 'behaviors' for domains of early child health and development.

This paper reviews evidence of the relationship between early (0–7 years) child development domains of physical health, social competence, emotional maturity, and language and cognitive skills and (1) the neighborhood built environment (e.g., residential density, safety from traffic and access to goods and services); (2) neighborhood green spaces (e.g., nature access, parks); and (3) the home outdoor area (e.g., presence of yard). The evidence is summarized to provide explanatory context to population trends in early child health and development (as measured by indices such as the Early Development Index). This paper provides recommendations to guide future empirical research of the impact of the neighbourhood environment on early child health and development (Muhajarine et al., 2006; Woolcock et al., 2010).

2. Methods

The literature was searched for articles focused exclusively on young children (≤ 7 years) and the home outdoor and neighbourhood physical environment. A number of electronic data bases were searched for relevant published articles including: Medline; PubMed; ProQuest social science journals; ScienceDirect; Google Scholar; and PsychInfo (Fig. 2). The search strategy consisted of a key word search using 'child' AND either 'development', 'cognitive', 'social', 'emotion', 'communication', 'language', 'physical', 'play', 'physical activity', 'wellbeing' AND either 'built environment', 'neighbourhood', 'environment' 'urban environment', 'city', 'place', 'traffic', 'safety', 'land use', 'street connectivity', 'density', 'destination', 'facilities'. To find articles on the home outdoor area and green spaces, and child development the search was repeated using the same keywords listed above, in the same order using

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