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Urban green spaces for children: A cross-sectional study of associations with distance, physical activity, screen time, general health, and overweight

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ABSTRACT

This study investigates the associations between: (i) urban green spaces (UGSs), children's frequency and duration of physical activity (PA), and screen time (TV viewing and computer use) and (ii) children's frequency and duration of PA and their general health and overweight. In this study, 'children' includes both younger children and adolescents, ages 1–18. Parent-reported data (n = 422) collected though face-to-face personal interviews between April 1 and May 31, 2015 in the city of Aydin, Turkey were used in the study. Multivariate regression analyses were conducted to examine the associations controlling for children's sex, age, and parents' monthly income. Stratified analyses were also conducted to determine differences between sex (boys and girls) and age (1–6, 7–12, and 13–18 years old) groups of children. The findings showed that UGS closeness to home was positively associated with higher frequency of children's PA ($b = -.22$, $p \leq .001$) and less screen time ($b = .18$, $p \leq .001$). Results also revealed that children's frequency of PA positively correlated with children's general health ($b = .08$, $p \leq .05$), whereas overweight was associated with only age. In stratified analyses, nearest distance to UGSs was positively associated with both boys' and girls' frequency of PA. On the other hand, longer distance to UGS was associated with longer screen time for only girls. In regard to age groups, nearest distance to UGSs was related to higher frequency of PA for 1–6 and 7–12 years old, while nearest distance to UGS was associated with longer duration of PA and less screen time for only children ages 7–12. In age groups 13–18, no significant differences between variables of UGSs, PA and health were documented. No sex and age groups showed any significant associations with general health and overweight. The findings of this study suggest that distance to UGSs is important for children's PA, screen time, and general health. This study implies that UGSs do not seem to be associated with PA and general health in older age groups and needs further investigations.

1. Introduction

Physical inactivity poses serious health risks not only for adults but also for children (The Ministry of Health, 2014). Research indicates that physical inactivity is a main factor leading to serious health problems like chronic diseases, breast and colon cancers, type 2 diabetes, coronary heart disease, psychological disorders, obesity, and shortens life expectancy (The Ministry of Health, 2014; Lee et al., 2012; Sallis et al., 2012). Today, most of the chronic diseases observed at later ages started to emerge during childhood periods (The Ministry of Health, 2014). Despite the negative effect of physical inactivity, declining and/or low levels of physical activity (PA) have been reported among children (Dollman et al., 2005; Knuth and Hallal, 2009). In Turkey, for instance, 58.4% of children aged 6–11, 57% of children aged 12–18 do not perform any PA (Sağlık Bakanlığı, 2014). Screen time (TV viewing/computer use) also contributes to a sedentary lifestyle of children (Klitsie, et al., 2013; Olds et al., 2010). In Turkey, screen times of children aged 2–5, 6–11, and 12–18 per day are 3.46 h, 4.4 h, and 3.85 h, respectively (Sağlık Bakanlığı, 2014).

PA has been recognized internationally as an important contributor to better human health (Floriani and Kennedy, 2008; Andersen et al., 2011; Biddle and Asare, 2011). PA during childhood is also associated with many health benefits, including reducing obesity (Trost et al., 2001; Steinbeck, 2001; The Ministry of Health, 2014), lower symptoms of depression and anxiety (Strong et al., 2005; Motl et al., 2004; The Ministry of Health, 2014), improving cardiovascular health (Janssen and LeBlanc, 2010; Timmons et al., 2012; The Ministry of Health, 2014), better cognitive functioning (Sibley and Etnier, 2003; Timmons et al., 2012), bone and skeletal health (Gunter et al., 2012; Timmons et al., 2012), and motor skill development and psychosocial health (Timmons et al., 2012). Likelihood that adults will develop healthy lifestyles is increased by PA during childhood (Hallal et al., 2006), including early childhood (e.g. 0–5 years) (CEECD, 2011).

A growing body of research investigates the potential environmen-

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tal factors that affect the levels of children's PA (Davison and Lawson, 2006; Ferreira et al., 2007; Pouliou et al., 2015). One of the potential environmental factors is urban green spaces (UGSs) (Lachowycz et al., 2012). Roemmich et al. (2006) conducted a study to determine the associations between neighborhood parks and television watching with young children's PA, ages 4–7. The authors found that greater neighborhood parks were associated with greater PA indicating the importance of green space on children's PA. On the other hand, Roemmich et al. (2006) did not find any relationship between children's PA and TV watching. Bjørgen (2016) examined the effects of different outdoor environments in kindergarten children's PA level, ages 3–5. The findings revealed that children's PA level higher in natural green environments than in the kindergarten's outdoor environment, which indicates green environments offer better opportunities for children to do PA.

Studies also indicate that access to UGS is associated with many health benefits for children. Grahn (1996) investigated whether living in greener surroundings or having views of and access to green environments affect children's health. He found that those children who have access to green outdoor environments are healthier, concentrate better, and have better motor function than those children who do not have access to green outdoor environments. Wells (2000) conducted a longitudinal study to explore the effects of nature on the cognitive functioning of children aged between 7 and 12 years. The findings showed that those children whose homes improved the most in terms of greenness after relocation also have better focused attention. Another study conducted by Faber Taylor et al. (2002) investigated the relationship between near-home greenness and self-discipline of 7–12 year old children. The results showed that more greenness lead more effective and self-disciplined lives for girls. Studies also indicate that green space has mental health benefits for children. Wells and Evans (2003), for instance, explored whether green space might buffer or lessen the impact of stressful life events on children's psychological well-being. Children were in grades 3 through 5 (mean age = 9.2 - years). The authors found that the influence of life stress was lower among children who have more nearby greenness than among those with less nearby greenness. Similarly, Chawla et al. (2014) investigated how greenness in schoolyards can reduce stress and promote protective factors for resilience in elementary and high school students, aged between 6–19 years. The authors revealed that when children have natural landscapes, they show positive moods and reduce stress, anger, depression, anxiety, and inattention and problem behavior.

There are also some studies investigated the relationships between proximity to green spaces and children's play time and TV watching. Aggio et al. (2015), for instance, examined the relationship between mothers' perception of distance from home to green spaces and children's screen time (TV viewing time/computer use), mental and general health at age 5.9 years. The authors found that farther distance from green space to children's home is associated with more screen time and worse mental and general health. In addition, some studies investigated the relationship between mothers' proximity and safety perception of green space and children's outdoor play time, TV watching, and obesity. While Xu et al. (2014) found mothers' perception of a safe outdoor play environment is associated with higher outdoor play time of 2 years old children, Burdette and Whitaker (2005) found mothers' perception of safe environment is associated with children's TV watching time but not with their outdoor play time or risk for obesity with 3 years old children.

While risks of physical inactivity and benefits of UGS for children are known, the association between UGS features like distance to UGS from home, sedentary behaviors of children, and their general health are not well known (Aggio et al., 2015) and studies which are mostly conducted in developed countries are limited. Today, children are experiencing a disconnection from green environment and loss of contact with green environment. These deprivations have important negative impacts on children's well-being and health. In addition, recent studies about UGS and PA recommend more investigations addressing young user groups such as children and teenagers (Akpinar, 2016a). Accordingly, the aim of this study was to investigate the relationships between distance to UGS from home and children's PA, screen time, and general health and overweight. The following questions were explored in this study:

1. How is distance to UGS from home related to children's frequency and duration PA and screen time?
2. How are children's frequency and duration of PA associated with their general health and overweight?
3. Are there differences among these relationships for various children's sex and age groups?

2. Methods

2.1. Study area

Data were collected in Aydın, a metropolitan city having 1.38 m^2 active green space per capita (Department of Parks and Gardens, 2014) in Turkey with a population of 265,234 (Turkish Statistical Institute, 2013). This city has a typical Mediterranean climate with hot, dry summer and cool, wet winters. Urban Green Space (UGS) in this article is defined in accordance with Turkish zoning laws that identify publicly owned and publicly accessible open spaces having a high degree of cover by vegetation, e.g. parks, playground areas, and play fields. Physical activity (PA) in this article is defined as children's participation in outdoor organized or unorganized play, sport or exercise activities, as reported and described by their parents.

2.2. Data collection-questionnaire

The sample was collected through face-to-face personal interviews between April 1 and May 31, 2015 in a public open space and UGSs with parents (mother or father) who gave information about the child's levels of PA, general health status, and screen time. In total, 580 potential informants were approached of which 420 (72.4%) agreed to answer the questionnaire. Among 420 informants, 288 parents (68.57%) collectively having kid(s) ages 1–18 were chosen to complete the questionnaire. Potentially, these kids could access seven different UGSs (Fig. 1) that were included in this study. Selected UGSs included a public open space, an urban park, neighborhood parks, and urban greenways. These seven UGSs were selected based on their usage rates, locations, and neighborhoods' SES, employing information provided by mukhtars (elected heads of neighborhoods). Data were gathered during visits to UGSs lasting 2–3 h on both weekdays and weekends during the following time periods: morning (7–9 a.m.), evening (5–8 p.m., and midday (12–2 p.m.). Parents who agreed to participate in the survey were asked to complete the questionnaire onsite. Each parent took approximately 6 min to complete the questionnaire.

Several other studies were considered in development of the questionnaire (Aggio et al., 2015; Xu et al., 2014). It consisted of three categories, each defined by child background (e.g. age, sex etc.) and parents' monthly income. Children were categorized as "boys" and "girls" and "1–6", "7–12", and "13–18" years old in terms of sex and age, respectively for the stratified analyses. Parents having more than one child also involved in the survey. Each parent answered questions for every child who was ≤ 18 years old. In the second part, parents reported walking distance from their home to the nearest UGS and their children's PA level. Distances were broken into: less than 100 m; 100–250 m; 250–500 m; 500m–1 km; 1–3 km; 3–5 km; and more than 5 km. Parents were asked "how frequently does your child go to the UGS to play, do sports or exercise activities?" and "how long does your child spend time in the UGS to play, do sports or exercise activities?" on a 5-point Likert scale (Allen and Seaman, 2007). Questions in the final category asked parents for children's screen time, general health, and overweight status: