



How is high school greenness related to students' restoration and health?



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ABSTRACT

This study investigates the association between perceived restorativeness of high school greenness and students' perceived restoration and health. A total of 223 high school students' aged 12–20 participated in the study. Measures included Attention Restoration Theory components (i.e. being away, fascination, coherence, and compatibility), naturalness of school greenness, and health indicators (i.e. stress, mental health, physical health, and quality of life). Bivariate correlations and multivariate regression analysis controlling for sex, age, accommodation, and income showed that perceived restorativeness (i.e. being away ($b = .29, p \leq .001$), fascination ($b = .35, p \leq .001$), coherence ($b = .09, p \leq .041$), and compatibility ($b = .35, p \leq .001$)) is predicted by the green space present in the high school campus. For health, none of the health indicators was correlated with high school greenness. Stratified analyses showed that boys reported better perceived restorativeness (i.e. being away, fascination, and compatibility) and less stress ($b = .19, p \leq .037$) compared to girls. Younger students reported better health (i.e. physical health ($b = .27, p \leq .034$) and quality of life ($b = .45, p \leq .027$)), whereas older students reported stronger perceived restorativeness than younger students. Commuter students reported positive perceived restorativeness (i.e. being away, fascination, and compatibility), while boarder students reported negative perceived restorativeness. Findings indicate that high school greenness could be an effective resource in contributing to students' perceived restoration. However, for health benefits students' perception and preferences for certain qualities and features of green space in schools should be provided.

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1. Introduction

Today, high school students face unprecedented levels of school-related stress and mental health issues (Marin and Brown, 2008). The competition that students have to deal with in university entrance exams, for example, has increased to significant levels in recent years in Turkey (Student Selection and Placement Center, 2014). According to the Student Selection and Placement Center, known as ÖSYM, more than 1.9 million students took the university entrance exam in 2014 and only 38% of those students could attain universities and two year colleges in Turkey (Student Selection and Placement Center, 2014). Researchers have demonstrated that the university entrance exam is the leading source of stress and mental health issues among high school students (Özbaş et al., 2012; Sonay, 2012). In addition, many researches have shown that in this age group school-related issues are the main reasons for stress and mental health problems (Kaiser Family Foundation, 2005; Stuart,

2006; Marin and Brown, 2008). Furthermore, while stress and anxiety levels are increasing among young people (Twenge et al., 2010; Collishaw et al., 2010; Murphy and Fonagy, 2012), young people are at high risk for mental disorders and other health co-morbidities due to high levels of stress and anxiety (McNamara, 2000; Murphy and Fonagy, 2012).

A growing body of research has investigated the restorative effects of green space on human health (Kaplan and Kaplan, 1989; Hartig et al., 1991; Laumann et al., 2003; Hartig and Staats, 2006; Berman et al., 2008; Roe and Aspinnall, 2011a; Wells and Rollings, 2012). A restorative environment is a place that “promotes, and not merely permits, restoration” (Hartig, 2004, p. 273). Two main theories explain the restorative effects of green space: The Psycho-evolutionary Theory (Ulrich, 1983) and the Attention Restoration Theory (ART; Kaplan and Kaplan, 1989). According to the Psycho-evolutionary Theory, humans are biologically linked to safe, natural settings possessing trees, water, and other vegetation for immediate positive responses. The Psycho-evolutionary Theory posits that natural settings possess a calming and stress-reducing effect on humans. Therefore, in natural settings not only a sense of restoration is experienced on purpose with the emotions, but

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involuntary physiological reactions are triggered that provide rapid short-term recovery from stress (Ulrich, 1983; Ulrich et al., 1991). According to the ART, many activities require effortful attention and when the capacity to focus or concentrate is decreased by overuse, people experience mental fatigue. The ART posits that contact with nature has the potential to restore an individual's directed attention capabilities. Therefore, an individual's capacity for attention is recovered in natural environments, which provide qualities of "fascination," "being away," "extent," and "compatibility" (Kaplan and Kaplan, 1989; Kaplan, 1995). These constructs are self-reported measures and have been described as measures of perceived restorativeness (Hartig, 2011).

Numerous studies have demonstrated that green space is associated with providing restorative effects (Laumann et al., 2001; Herzog et al., 2003; Korpela et al., 2008; Berman et al., 2008). Studies reported that green space is related to positive physiological effects (Herzog and Strevey, 2008; Park et al., 2010), reductions in the risk of psychosocial and psychological stress-related diseases (Grahn and Stigsdotter, 2003; Morita et al., 2007; Francis et al., 2012) and quicker recovery from stress (Nielsen and Hansen, 2007; Laforteza et al., 2009; van den Berg et al., 2010; Ward Thompson et al., 2012). In addition, researchers found green space positively related to health, quality of life, and well-being (van Dillen et al., 2011; McFarland et al., 2008; de Vries et al., 2003; Mitchell and Popham, 2008; Ward Thompson et al., 2012).

Studies demonstrated that green space in a schoolyard has a higher positive effect on children's perceived restoration (Bagot, 2004; Corraliza et al., 2012; Bagot et al., 2015) and that greening of the schoolyard significantly improves students' physiological well-being and reduces physiological stress (Kelz et al., 2015). In addition, studies show that adolescent students who spent a day in a forest school versus a day inside a classroom reported less anger and stress, and a greater sense of happiness and energy (Roe and Aspinall, 2011b). Likewise, research indicates that contact with nature could improve academic achievement (Williams and Dixon, 2013; Smith and Sobel, 2010) reported that higher test scores are associated with nature based restoration (Heschong, 2003). For instance, Matsuoka (2010) found that high school students who have views of trees and shrubbery versus built features or large empty lawns from windows have more merit awards, higher graduation rates, more plans to attend college, and less criminal behavior. Similarly, Tennessen and Cimprich (1995) revealed that university students with more natural views from their windows score higher than those with less natural views on tests of directed attention.

Although many studies addressed students and green space, few considered the school context. High school students spend at least 8000 h during their adolescence in schools (Rutter et al., 1979). Therefore, the education community could benefit from more studies of perceived restorativeness of school greenness and the relationship between high school greenness and students' stress, mental and physical health, and quality of life (Matsuoka, 2010; Chawla et al., 2014). In addition, although the ART is well examined with adults, the application of ART to young people's environments remains understudied (Bagot et al., 2015). Hence, we know very little about how the presence of high school greenness is associated with students' perceived restoration. Students are an extremely important population, at a time in their improvement when their academic performance will set them on a life-course. In this respect, the main purpose of this study was to determine the association between perceived restorativeness of high school greenness and students' perceived restoration. The secondary aim of this study was to explore the relationship between high school greenness and students' stress, mental and physical health, and quality of life. Based on the ART (Kaplan and Kaplan, 1989), the Psycho-evolutionary Theory (Ulrich, 1983), and previous studies



Fig. 1. The campus boundary of Aydin Social Sciences High School.

(Bagot, 2004; Corraliza et al., 2012; Kelz et al., 2015; Bagot et al., 2015), the following hypotheses are proposed:

- Perceived restorativeness of high school greenness is positively associated with students' perceived restoration (H1),
- There are positive associations between high school greenness and students' stress, mental health, physical health, and quality of life (H2).

2. Methods

2.1. The study site and participants

The data used in this study were collected in Aydin Social Sciences High School (Aydin Sosyal Bilimler Lisesi) located in the city of Aydin, Turkey. Aydin Social Sciences High School was selected for this study it has dormitory and green space on campus (Fig. 1). Of its 9400 m² campus, 28.4% (1670 m²) consists of trees, shrubs, and other vegetation (Fig. 2). The school has 265 students. 198 students reside in the dormitory. Participants in this study provided their demographic information such as details of gender, age, grade, accommodation (dormitory or home), and monthly household income level.

To carry out this study, first the ethics approval from the Ethics Committee of Adnan Menderes University was acquired (Protocol Number: 2015/654). Then, the school principal granted permission. Students were informed about the study and requested they talk to their parents for permission to participate in the study. Only those students who were willing to participate in the study and got permission from parents were surveyed. After parental permission, 223 (84% of total students) students completed the questionnaire. The questionnaire was read aloud twice and students had enough time to answer. The mentor teacher of each class collected data in the school during normal school hours.

2.2. The perceived restorativeness, naturalness, and health indicators

The perceived restorativeness of school greenness was measured with the 'Perceived Restorative Scale' (PRS) developed by Hartig et al. (1997). This measure consists of 26 items which form

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