THE ROLE OF NATURE ON SELF-REGULATION AND ADJUSTMENT OF CHILDREN

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BY

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I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

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Signature :
Previous studies revealed that nearby natural environment is important for physical, cognitive, socio-emotional, and self-development as well as mental health of children. However, in terms of self-development of children, self-regulation has not been widely examined. The current study examined the relationship between the nearby natural environment, perceptual sensitivity of children, nature connectedness, self-regulation skills, and mental health. 299 mother-child pairs participated in the study. Children ranged between 8-11 years of age. Structural equation modeling (SEM) was used to examine the relationships, and the final model fit the data well. Our results indicated that connectedness with nature was not related to behavioral and cognitive regulation of children. However, it led to an increase in children’s emotional regulation skills. Prosocial behaviors, hyperactivity/inattention, emotional symptoms, and conduct problems were also predicted by emotional regulation of children.
However, the latent factor of greenery was not related to the connection to nature levels in children. Only children’s perception of levels of nature around their home led to an increase in connection to nature of children. The interaction of perceptual sensitivity and children’s views about the levels of nature around their home was also found. Findings of the study were interpreted in the light of the relevant literature.

**Keywords:** natural environment, nature connectedness, perceptual sensitivity, self-regulation, mental health
ÖZ

DOĞAL ÇEVRENİN ÇOCUKLARIN ÖZ DÜZENLEME BECERİSİ VE UYUMLARI ÜZERİNDEKİ ROLÜ

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Anahtar Kelimeler: doğal çevreme, doğa ile kurulan bağ, algısal hassasiyet, öz-düzenleme becerisi, akıl sağlığı
To my lovely family &

my significant other
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CHAPTER 1

INTRODUCTION

In this chapter, firstly, the importance of natural environment for physical, cognitive, social, emotional, and self development, and psychological adjustment of children will be explained. Then, emotional, cognitive, and behavioral self-regulation will be reviewed in detail. Definitions of self-regulation, importance of self-regulation skills on children’s lives, individual and environmental factors that have an impact on self-regulation will be explained. Further, possible mediator role of nature connectedness in the relationship between surrounding natural environment and self-regulation skills, and expected moderator role of perceptual sensitivity of children in the association between natural environment and connection to nature will be discussed. Finally, hypothesis of the current study and the proposed model will be indicated.

1.1 Effects of Nature on Children

The more urbanized their environment, the less time children spend in a natural environment. However, a sizable body of research showed that interacting with the natural environment is essential for the development of children. Specifically, since mid-1990s researchers have demonstrated that mental health, physical, cognitive, socio-emotional, and self-development of children are affected by nearby natural environment (e.g., Burdette & Whitaker, 2005; Kuo, 2011; Kuo & Taylor, 2004; Taylor, Kuo, & Sullivan, 2001; Wells, 2000).

1.1.1 Nature and Physical Development of Children

Within the scope of physical development of children, previous studies emphasized the relationship between overweight/obesity and residential
greenness level. To illustrate, Bell, Wilson, and Liu (2008) displayed that children and youth who were living in high greenness neighborhoods had lower Body Mass Index (BMI) scores since they spent more time outdoors doing physical activities. This finding indicated that greenness of the environment might be important to prevent childhood obesity. Similarly, in a cross-sectional study Dadvand et al. (2014) found that greenness level of the surrounding neighborhood was negatively associated with BMI scores of the children aged 9 to 12 years old. In parallel with these findings, a longitudinal study that followed children for eight years also demonstrated that children who resided in neighborhood, which were closer to parks, were less likely to experience an increase in BMI over time (Wolch et al., 2011).

A number of studies also focused on the relationship between natural environment and physical activity levels of children. De Vries, Bakker, Van Mechelen, and Hopman-Rock (2007) found that the proportion of green space in neighborhood was associated with the time spent in physical activity of children aged between 6 and 11 years old. Moreover, researchers who examined the association between physical activity and school grounds at elementary schools in Canada, displayed that green school grounds played a significant role in enhancing light physical activity such as picking fruits and vegetables, hide and seek, and moving objects like toys and moderate physical activity such as climbing and exploring nature (Bell & Dyment, 2006). Furthermore, results of a quasi-experimental study demonstrated that children aged 5 and 7 years who played in the natural environment were better in motor fitness, balance, and coordination abilities than children who played in traditional barren environment (Fjørtoft, 2004). Researchers also found that the time spent outdoors on weekends and weekdays was associated with higher levels of physical activity among elementary school children (Cleland et al., 2008). In addition, the quasi-systematic review of 16 articles indicated that playing in the natural environment supported motor fitness of preschoolers (Gill, 2011).
In addition to the gross motor activities of children, American Academy of Ophthalmology (2011) stated that the amount of time children and adolescents spent in outdoors were associated with the reduced rates of nearsightedness, also known as myopia. It was suggested that spending more time looking at remote objects and/or exposure to natural light more may be important facilitators to figure out this finding. Similarly, with a population-based sample Rose et al. (2008) stated that higher levels of average time spent on outdoor activities, including walking, playing, having a picnic, and doing outdoor sports, was associated with the lower prevalence of myopia among children who were 6 and 12 years old.

Some other studies mainly focused on the prenatal environment of children with respect to greenery. One of the studies in the literature took the medical record of infant mortality that occurred between 2000 and 2009 in metropolitan area of France. They reported that residing close to green spaces diminished the rate of infant mortality (Kihal-Talantikite et al., 2013). A meta-analysis based on 8 studies that were published in the period 2011-2014 demonstrated that the levels of greenness in the residential environment of pregnant women were positively associated with the birthweight of their infants (Dzhambov, Dimitrova, & Dimitrakova, 2014). Additionally, the highest positive impact of greenery level on birthweight was found among the women with lower educational attainment (Dadvand et al. 2012; Markevych et al., 2014). They suggested that compared to highly educated women, women with lower education levels spend more time around home. Therefore, they have more opportunity to benefit from residential green spaces. Although the underlying mechanism behind this relationship was not clarified, researchers claimed that greenery might affect the birthweight of the infants by the way of diminishing the psychophysiological stress of pregnant women, and increasing their physical activity (Mitchell, Astell-Burt, & Richardson, 2011).
1.1.2 Nature and Cognitive Development of Children

In addition to the physical development, there is a substantial body of literature indicating the benefits of natural environment on cognitive development of children (e.g., Kaplan & Kaplan, 1989; Taylor, Kuo, & Sullivan, 2002; Wells, 2000). Kellert (2005) suggested that playing in the green areas is important for enhancing the problem-solving skills and creativity of children. American Institutes for Research (2005) also reported that students’ scores on math, language, arts, science, and social studies were higher in the schools which frequently used outdoor classrooms and supported their education with nature-based experiments. Specifically, they stated that students’ knowledge and understanding of science concepts were improved from pre-test to post-test by 27%.

Moreover, studies also revealed that attention capacity of children is affected by natural environment. The retrospective study, including children aged 7 to 12 with Attention Deficit Hyperactivity Disorder (ADHD), demonstrated that children’s attentional functioning was better if they had done activities in the natural settings than in built environment (e.g., playing football on an asphalt) and indoors (e.g., playing video games) (Taylor et al., 2001). Similarly, 7 to 12 years old children with ADHD displayed better concentration after individually guided 20 minutes walking in the green park than the neighborhood walk or the downtown walk (Taylor & Kuo, 2009). In addition, the internet-based study which only recruited parents of children with ADHD indicated that children who did outdoor and weekend activities in the nature had fewer ADHD symptoms. The benefit of nature was consistently found among children who resided in a range of environmental settings, from large city to rural areas, and among children from different household income range (Kuo & Taylor, 2004).

Since a substantial body of research demonstrated the benefit of greenness on the attention capacity of children with ADHD, researchers have been curious about whether the greenery would promote attention capacity of typically
developing children. The longitudinal study, which examined the impacts of nature on the cognitive functioning of low-income children, revealed that after 17 families were relocated to better housing environments in terms of nature, the cognitive functioning of children increased. In particular, children who lived in the homes which were surrounded by the least vegetation just before the relocation displayed the most improvement on attention capacity (Wells, 2000). Hyperactivity and inattention scores of typically developed children were also investigated within the study that emphasized the objective greenness level around the home and school environment. It was revealed that inattention scores of children whose ages ranged between 7 and 10 years were lower in the high greenness that surrounded home in a 100 m buffer. They also demonstrated that the average of home and school greenness index in a 100 m buffer was negatively associated with both hyperactivity and inattention scores of children (Amoly et al., 2014). Similarly, it was demonstrated that children who attended day care centers that were surrounded by tall buildings had lower attention capacities than children who attended day care centers surrounded by orchards and woodlands (Grahn, Mårtensson, Lindblad, Nilsson, & Ekman, as cited in Strife & Downey, 2009). In parallel with that finding, Carrus et al. (2012) revealed that the experience of contact with greenery enhanced the directed attention ability of children whose ages ranged between 18 and 36 months. All these findings showed that the exposure to vegetation enhanced attention performance not only in children with ADHD, but also children with typical attention spans.

### 1.1.3 Nature and Social and Emotional Development of Children

A growing body of research in the literature has demonstrated the positive impacts of the greenness on children’s socio-emotional development (e.g., Robinson & Zajicek, 2005; Waliczek, Bradley, & Zajicek, 2001). Researchers displayed that the amount of vegetation in the environment that surrounded children was associated with the amount of play that children engaged. Specifically, children in high vegetation outdoor spaces played more than
children in low vegetation (Taylor, Wiley, Kuo, & Sullivan, 1998). Similarly, it was indicated that green school grounds at elementary schools enhanced cooperative play that children engaged (Bell & Dyment, 2006). Many studies stated that play is an important facilitator of socio-emotional development of children since children have an opportunity to enhance perspective-taking, to practice prosocial behaviors and social roles, and to learn how to cope with interpersonal conflict and emotional crisis (Fisher, 1992; Bergen, 2002; Taylor et al., 1998).

Moreover, there were also intervention studies that emphasized the role of nature on socio-emotional development of children. A Garden Program that aimed to teach nutrition, horticulture, and environmental science to 3rd to 5th grade students in school yards revealed that although children within control group had significantly higher scores on the ability to work in a group at the pre-test, at post-test children in experimental group made up for the difference. In addition, the ability to work in a group of children within the intervention group significantly increased from pre-test to post-test (Robinson & Zajicek, 2005). The Forest School Program, which was an educational program performed in a natural environment also indicated that the intervention program increased the awareness of others and the ability to work with others from pre-test to post-test. However, it is important to indicate that there was no control group in the study and findings cannot be evaluated as strength (Davis & Waite, 2005; Gill, 2011). Additionally, Uhls et al. (2014) found that children aged 11-13 years old who attended a 5-day overnight nature-based camp had increased ability to understand nonverbal emotional cues, while control group did not display an improvement on nonverbal emotion understanding from pre-test to post-test.

1.1.4 Nature and Psychological Adjustment of Children

Much of the research also investigated the relationship between psychological adjustment of children and greenery. One of the studies in the literature
examined the moderated effect of nearby natural environment within the relationship between stressful life events and adjustment of children in Grades 3 to 5 who resided in rural areas. It was demonstrated that the effects of stressful life events on children’s psychological distress level were lower under the high nature conditions, indicated by the outdoor yard that had green material, the high number of indoor plants, and the high amount of natural window view. In addition, they also found that children who felt distress more frequently benefited more from the natural environment (Wells & Evans, 2003). Similarly, Corraliza, Collado, and Bethelmy (2011) took not only the observational measure of nearby nature as in the study of Wells and Evans (2003) but also the perception of children about the natural environment around them. They stated that the high accessibility to the nature within the school and home areas had a positive effect on children’s well-being, and increased the capacity of children to deal with adversity. They also indicated that children who perceived lower levels of nature around them displayed a higher level of stress compared to children who perceived higher levels of nature around them. Moreover, researchers redesigned the middle school yards in rural areas. It was observed that after the construction of the greener schoolyards, physiological stress level of children that were measured with the heart rate and blood pressure decreased. They also stated that perceived well-being of children was enhanced by the renovated outdoor play spaces (Kelz, Evans, & Röderer, 2013). Similarly, Roe and Aspinall (2011) compared children who attended a Forest School, which is an outdoor education program, versus typical indoor school setting in terms of their stress and anger levels and the degrees of sadness and happiness. They found that all outcomes for children in the Forest School positively changed when compared to the outcomes for children who attended typical indoor school setting. However, it is important to consider these findings with caution since they had only 18 students for each group. Another research was conducted by using the electronic medical data of 345,143 people in the Dutch population. It was found that the relationship between green spaces within a 1 km and 3 km radius
around homes and mental health was strongest for children under the age of 12. They also demonstrated that the relation was more salient for particularly depression, indicating that children who resided in the high quantity of green spaces neighborhood were less depressed than the others (Maas et al., 2009). Similarly, researchers stated that emotional and peer relationship problems of children were negatively associated with the time spent in green areas (Amoly et al., 2014). Although adjustments of children in relation to natural environment have been examined, the role of child’s self-development, which was explained below, has not been investigated in this relationship. Therefore, in the current study, we examined the mediator role of child’s capacity for self-regulation with regards to the relationship between nature and adjustment of children.

1.1.5 Nature and Self-Development of Children

Self-development of children was investigated in the related literature. In particular, self-worth, self-efficacy, self-awareness, self-confidence, self-esteem, and self-regulation have been explored. For instance, Wells and Evans (2003) demonstrated that higher level of nature in the residential environment of children was associated with higher levels of self-worth of children. They also stated that nearby nature moderated the effects of stressful life events on self-worth of children.

Furthermore, there are a number of intervention studies in the literature. One of them aimed to enhance self-efficacy of male adolescents whose ages ranged between 14 and 16 within the outdoor wilderness settings. It was found that the self-efficacy score of adolescents who participated in complete intervention group was higher than adolescents taking part in control group and partial intervention program, which did not include 4-day backpacking trip (Margalit & Ben-Ari, 2014). Contrary to this finding, Starling (2011) stated that the unstructured play within the natural environment did not promote the self-
efficacy scores of children from pre-test to post-test. In contrast, they found slight decline in children’s scores.

In addition to the literature related to the self-efficacy, Robinson and Zajicek (2005) also reported that the self-awareness scores of 3rd to 5th grade students within the Garden Program was significantly enhanced from pre-test to post-test. They revealed that although the control group children had significantly higher self-awareness scores at the beginning of the study, the difference did not remain significant at the end of the study.

Moreover, Davis and Waite (2005) investigated the self-confidence of children in the Forest School Program and demonstrated that the self-confidence scores of children were increased from pre-test to post-test. As it was mentioned before, this study did not include a control group, so the findings should be interpreted with caution. Furthermore, Ruiz-Gallardo, Verde, and Valdés (2013) conducted a two-year Garden-Based Education Program with secondary school pupils who had low academic achievement. They reported that children perceived themselves as capable and as successful as everyone else in their classroom after the intervention. Teachers also observed improvements in self-confidence and self-esteem of children. Yet, these findings were based on only teachers’ and parents’ qualitative observations. It is important to indicate that there was also conflicting finding in the literature. In the playground- and nature-based playtime interventions they rearranged schoolyards in urban and rural areas in order to make them greener, and introduced 55 min playtime during five days. They revealed that self-esteem scores did not differ between children who took part in intervention performed in green spaces and in barren, concrete areas (Barton, Sandercock, Pretty, & Wood, 2015). Supporting the findings of Barton et al. (2015), Wood, Gladwell, and Barton (2014) also demonstrated that intervention in a natural environment did not enhance the self-esteem of children aged 8-9 years old. Similarly, Reed et al. (2013) compared to green and non-green exercise. They reported that the exposure to nature during 20 min of physical exercise a week was not additively supportive
of the children’s self-esteem. Although considerable amount of study found the significant effects of greenness on self-esteem in adults (e.g., Barton & Pretty, 2010), a great deal of research which focused on children’s self-esteem did not find significant effects.

Furthermore, Taylor et al. (2002) investigated self-discipline/self-regulation by delay of gratification, inhibition of initial impulses, and concentration among low income African American children aged between 7 and 12. It was reported that children living in non-green apartments exhibited lower impulse control and attention capacities than children living in apartments, which had views of green spaces and trees. Researchers also stated that although boys were not significantly affected by the near-home nature, girls whose views from home were more natural scored higher on inhibition of initial impulses and concentration. This gender difference in self-regulation with regards to the near-home greenery was explained by the possibility that boys may spend less time near their homes since they are more likely to be allowed to play further from their home than girls. Thus, near-home greenness may not be as supportive for boys compared to girls.

To our knowledge, only one study explored self-regulation. However, three essential components of self-regulation that will be explained in detail below were not scrutinized in regards to its relationship with green spaces. Therefore, in the current study, all main components of self-regulation were investigated.

1.2 Self-Regulation

Self-regulation is defined as the process of controlling, modifying, and regulating of behavior, cognition, and emotion with the intent of goal-directed actions (Blair & Ursache, 2011; Bronson, 2000). As it is understood from the definition of self-regulation, it is a broader concept that includes behavior, emotion, and cognition. Despite the interconnectedness among these constructs, they have been also explored independently.
1.2.1 Emotional Self-Regulation

Emotional component of self-regulation refers to the strategies and skills that are used in order to change, modify, hinder, and promote emotional expressions and experiences in accordance with cultural norms and expectations for the purpose of achieving a goal (Calkins & Leerkes, 2011; Cole, Michel, & Teti, 1994; Gross, 1999; Thompson, 1994). In the literature, many studies revealed that emotional self-regulation is essential for psychological adjustment of children. To illustrate, internalizing, externalizing, and somatic symptoms of children (e.g., Khuanghlawn, 2013; Zeman, Shipman, & Suveg, 2002) and peer relations (e.g., Maszk, Eisenberg, & Guthrie, 1999; Trentacosta & Shaw, 2009; Wilton, Craig, & Pepler, 2000) were found to be predicted by emotional self-regulation skills of children.

Since emotion regulation skills have important impacts on children’s adjustment, researchers have examined the factors that affect the development of these skills. Studies showed that both individual and environmental factors have an impact on emotional self-regulation (e.g., Zeman, Cassano, Perry-Parrish, & Stegall, 2006). In terms of individual factors, it was suggested that neurophysiological components (e.g., Dawson, 1994; Gunnar, Marvinney, Isensee, & Fisch, 1989; Thomas et al., 2001) and temperamental characteristics of children (Cole, Martin, & Dennis, 2004; Jaffe, Gullone, & Hughes, 2010) play important roles in emotional self-regulation skills of children.

Environmental factors (social, cultural, and ecological) are also important when considering the development of emotional self-regulation (Zeman et al., 2006). Social environment of children was pointed out by many researchers. It was stated that children learn about the emotional world from their parents via discussing, observing, and modeling (Kopp, 1989; Morris, Silk, Steinberg, Myers, & Robinson, 2007; Zeman et al., 2006). Therefore, researchers claimed that there is a relationship between parenting and children’s emotion regulation skills. A longitudinal study revealed that the emotion-coaching behavior of
parents was associated with children’s emotional self-regulation ability (Gottman, Katz, & Hooven, 1996). In addition, Eisenberg, Cumberland, and Spinrad (1998) reported that reactions of parents to their children’s positive and negative emotions had an impact on the children’s emotional regulation. Moreover, differential socialization process that girls and boys are exposed to may lead to the difference between them in terms of emotional self-regulation (e.g., Adams, Kuebli, Boyle, & Fivush, 1995). Davis (1995) stated that although boys could regulate their expression of negative emotions, their level of negative affect during frustrating tasks was still higher than girls’.

Furthermore, previous studies showed that there were cultural differences in the use of emotional regulation strategies. Especially, a strategy of regulating emotions by expressive suppression was mostly investigated (e.g., Ford & Mauss, 2015; Gross & John, 2003; Haga, Kraft, & Corby, 2009; Soto, Perez, Kim, Lee, & Minnick, 2011; Su, Lee, & Oishi, 2013). Although a number of studies revealed cultural differences among adults, only a few focused on cultural variations in children’s emotional regulation strategies. Weis, Trommsdorff, and Muñoz (2016) found that anger-oriented emotion regulation was lower for Chilean children compared with German counterparts. Additionally, Tamang children were less likely to approve and express their negative emotions than Chhetri-Brahmin children (Cole & Tamang, 1998). Differences among cultures in terms of emotional regulation strategies may also occur due to differential socialization processes that children faced with.

Furthermore, ecological factors like noise level or greenery were found to be related to emotional self-regulation skills. Korpela (1992) showed that in order to regulate their emotions, adolescents used their favorite places which varied from department stores to natural settings. In addition, extremely low and high levels of noises in center-based child care were associated with emotional dysregulation of children (Werner, Linting, Vermeer, & Van IJzendoorn, 2016). Studies also revealed that greenery had an impact on children’s emotional regulation. The quasi-systematic review article indicated that
spending time in the nature promoted emotional regulation of both typically
developing children and children with ADHD (Gill, 2011). Similarly, in a
longitudinal study, it was found that higher percentage of green space
surrounding the neighborhood of children living in poverty was associated with
fewer emotional dysregulation.

In order to explain the process underlying the relationship between nature and
emotion regulation, researchers explored the mediating role of physical activity
levels of children and mothers, maternal psychological distress, and general
health of mothers and children. None of them yielded significant mediation
effects. Therefore, researchers suggested that the increment of social cohesion
in greenery as Sugiyama, Leslie, Giles-Corti, and Owen (2008) reported might
be the mechanism underlying the relationship between the levels of green
spaces and emotional regulation of children (Flouri, Midouhas, & Joshi, 2014).

1.2.2 Cognitive Self-Regulation

Cognitive self-regulation is another dimension of the regulation skills. Researchers
have mostly emphasized executive functioning in order to explain
and measure the cognitive component of self-regulation (Cheng,
2011). Executive function can be defined as the higher order cognitive ability
which is necessary for executing the future-oriented behavior such as task
switching, attention, working memory, planning, and organization (Elliott,
2003; Miyake et al., 2000; Zelazo, Carter, Reznick, & Frye, 1997; Welsh,
Friedman, & Spieker, 2006; Welsh, Pennington, & Groisser, 1991). Substantial
body of research revealed that cognitive self-regulation is highly related to the
typical development of children. To illustrate, it was found that social
competence (e.g., Fahie & Symons, 2003; Peskin & Ardino, 2003) and
academic achievement (e.g., Cragg & Gilmore, 2014; Diamantopoulou, Rydell,
Thorell, & Bohlin, 2007) were positively predicted by children’s cognitive self-
regulation skills.
Due to the importance of cognitive self-regulation on children’s lives, researchers also focused on the factors affecting the development of this ability. Studies showed that individual factors such as age (e.g., Bronson, 2000; Fuhs, Farran, & Nesbitt, 2013; Garon, Bryson, & Smith, 2008; Wiebe, Espy, & Charak, 2008), neurophysiological components of children (e.g., Durston, 2003; Reuter, Ott, Vaitl, & Hennig, 2007), and temperament of children (e.g., Chang & Burns, 2005; Rothbart, Sheese, & Posner, 2007) had impacts on cognitive self-regulation skills.

Moreover, researchers also pointed out the role of children’s environment on cognitive self-regulation skills. For example, parenting practices (e.g., Ellis & Nigg, 2009), prenatal environment of children (e.g., Alduncin, Huffman, Feldman, & Loe, 2014; Lanfranchi, Jerman, Dal Pont, Alberti, & Vianello, 2010), and school environment (e.g., Fuhs et al., 2013) were found to affect development of cognitive self-regulation. Ecological factors have also been widely explored in the literature. In terms of noise in the environment, although some of the studies did not find significant effect of environmental noise on cognitive regulation ability of children (Stansfeld et al., 2005), some others indicated that environmental noise had an impact on the cognitive regulation, including memory, problem solving, and attention (e.g., Evans & Lepore, 1993; Shield, Dockrell, Asker, & Tachmatzidis, 2002). On the other hand, the levels of green areas as an ecological factor were also investigated. Many studies, as indicated before, found that vegetation levels that were surrounded the environment of children supported the attention capacity of children (e.g., Taylor et al., 2002; Wells, 2000). However, in the literature attention capacity of children sometimes considered as part of children’s self-regulatory development and some other times as part of children’s cognitive development. In the current study, it was taken into account as part of cognitive self-regulation skills.
1.2.3 Behavioral Self-Regulation

Behavioral self-regulation has been mostly defined in the literature as the capacity of control actions in order not to do or in order to regulate the speed of them (Riley, San Juan, Klinkner, & Rammingger, 2008). Researchers suggested that behavioral manifestation of the executive functions can be defined as behavioral self-regulation. In other words, the underlying mechanism behind the behavioral regulation is also executive function, including inhibitory control, attention, and working memory (e.g., McClelland, Cameron, Wanless, & Murray, 2007; Ponitz et al., 2008). A number of studies revealed that behavioral regulation is highly important for development of children. For instance, it was stated that academic achievement of children (e.g., Birgisdóttir, Gestsdóttir, & Thorsdóttir, 2015; McClelland et al., 2007; Ponitz, McClelland, Matthews, & Morrison, 2009; Von Suchodoletz et al., 2013) and peer relations (e.g., Eisenberg et al., 1997) were affected by children’s behavioral regulation skills.

Several researchers have examined the individual factors effecting the development of behavioral self-regulation. It was demonstrated that age (e.g., Von Suchodoletz et al., 2013; Ponitz et al., 2008), demographic background of children (e.g., Flouri et al., 2014; Wanless, McClelland, Tominey, & Acock, 2011), and children’s temperamental characteristics (e.g., Valiente et al., 2003) were related to behavioral regulation skills.

Whereas others focused on environmental factors and demonstrated that emotional and instructional support of teacher for learning was related to the higher level of behavioral regulation, including compliance with the request of teacher and involved in off-task behaviors (Rimm-Kaufman, La Paro, Downer, & Pianta, 2005). Besides, researchers found that children who attended to the high-quality child care were less likely to have behavioral regulation problem (Burchinal, Peisner-Feinberg, Bryant, & Clifford, 2000).
In addition to the important environmental factors in school settings, there are studies also focusing on the relationship between parenting and behavioral self-regulation. Some of the studies revealed a significant impact of parental responsiveness and warmth on children’s ability to regulate their behaviors (e.g., Von Suchodoletz, Trommsdorff, & Heikamp, 2011); but many others did not find a significant link between them (e.g., Pritchard, 2010). Researchers also demonstrated inconsistent findings on the relationship between behavioral self-regulation and positive-negative parental control (Karreman, Van Tuijl, Van Aken, & Dekovic, 2006). Moreover, crowding, as an ecological factor, was also investigated in terms of the development of behavioral self-regulation. To illustrate, Evans, Lepore, Shejwal, and Palsane (1998) showed that higher levels of residential crowding were associated with the behavioral adjustment problem of children aged between 10 and 12.

Although different aspects of self-regulation and a number of related factors have been investigated, the relationship between cognitive, emotional, and behavioral self-regulation and natural environment has not been examined. Many researchers have only focused on the relation between attention capacity of children which is one of the important components of cognitive self-regulation and nature. In the current study, all main components of the self-regulation including children’s emotional, cognitive, and behavioral self-regulation and their relations to greenery were explored. The role of child’s capacity for self-regulation was also examined with regards to the association between natural environment and adjustment of children. As reviewed above literature points out the importance and effects of nature on children’s development. While some of these studies take objective measures of nature, others use self-report measures of nature. However, whatever the method of measurement used for nature, what appears to be more important is the quality of the relationship between the natural world and children. In the following section studies focusing on this relationship will be reviewed.
1.3 Connection with Nature

Connection with nature can be defined as an affective attitude toward nature (Cheng, 2008). Affective attitudes toward nature have been examined with different constructs. To exemplify, experiential and emotional connection to natural world were used by Mayer and Frantz (2004) in order to predict connection of individuals with nature. Connection with nature was also operationalized by Schultz (2001; 2002, p. 67) as the inclusion of nature in the self. On the other hand, the emotional affinity toward nature, which is a construct related to predisposition toward nature including feelings of oneness with nature, feelings of safety, feelings of freedom, and love of nature was explored as individual’s connectedness to nature (Kals, Schumacher, & Montana, 1999). Another relevant construct of connection with nature is child’s environmental orientation. Larson, Green, and Castleberry (2011) suggested that eco-affinity, which was described as an interest in nature and predispositions to engage in environmental behavior, and eco-awareness defined as an awareness of environmental issues such as importance of sustainability of natural world were used in order to measure the connectedness with nature of children.

The role of connection with nature was explored on adult participants (e.g., Hinds & Sparks, 2008; Mayer, Frantz, Bruehlman-Senecal, & Dolliver, 2008; Nisbet, Zelenski, & Murphy, 2008). For instance, Kals et al. (1999) retrospectively asked adults frequency of time spent in nature when they were between 7 and 12 years old. They found that present and past time spent in nature predicted the emotional affinity toward nature. In addition, mediator role of nature connectedness was also investigated. Mayer et al. (2008) found the effects of exposure to nature including 15 min walking in a natural setting and having a virtual nature experiences on positive emotions of adults. It was stated that exposure to nature enhanced positive emotions and connectedness to nature. Specifically, the effects were stronger within the condition of exposure
to real nature. They also demonstrated that connection with nature partially mediated the effects of exposure to nature.

In the literature, there are only few studies related to children’s perception of their connection to nature. Cheng and Monroe (2012) examined the children’s connection to nature, including sense of responsibility, sense of oneness, empathy for creature, and enjoyment of nature. They demonstrated that the perception of children about nature near their home was positively associated with children’s connection to nature. They also found that knowledge of the natural environment, attitudes of families related to nature that was perceived by children, and experiences in the natural world were also correlated with the connection to nature of children. Similarly, it was reported that emotional affinity toward natural world of children in the middle childhood years were increased more when they attended two-week nature camp compared to two-week urban camp (Collado, Staats, & Corraliza, 2013). These studies are important to indicate the predictors of children’s nature connectedness. Researchers also showed that emotional affinity of children toward natural environment mediated the association between willingness to carry out environmental related behaviors and exposure to nature (Collado et al., 2013). To the best of our knowledge, there were only two studies, one of them from adult literature; the other from child literature, revealed the mediator role of children’s nature connectedness. Within the light of their findings, the mediator role of children’s nature connectedness was also explored in the current study.

Moreover, researchers indicated that biological factors play an important moderating role in the effects of environment on children and make children more sensitive to environment. For instance, the serotonin receptor gene (5HTT) was found be associated with rearing environment (Bakermans-Kranenburg, Dobrova-Krol, & van IJzendoorn, 2012). Additionally, dimensions of temperament such as reactivity have been widely investigated (e.g., Ramchandani, IJzendoorn, & Bakermans-Kranenburg, 2010). Ramchandani and colleagues (2010) found the moderating effect of reactivity
in the relationship between prosocial behavior and parental involvement. However, there were few studies investigating perceptual sensitivity in relation to environment (e.g., Ertekin, 2014). Ertekin (2014) found the moderating effect of perceptual sensitivity among different care types (e.g., institutions and foster care). Although perceptual sensitivity in relation to the environment was not directly examined, Conradt, Measelle, and Ablow (2013) found the positive relationship between baseline respiratory sinus arrhythmia (RSA) and perceptual sensitivity. It is important to emphasize that baseline RSA was sensitive to early rearing environments (Propper, 2012). Therefore, the findings indicated that perceptual sensitivity is likely to be another factor moderating the role of environment on child outcomes. Therefore, in the present study, moderator role of perceptual sensitivity was investigated.

1.4 Temperamental Characteristic: Perceptual Sensitivity

Although there has been many definition of the temperament in the literature (e.g., Buss & Plomin, 1984; Rothbart, 1981; Thomas & Chess, 1977), researchers have some common understanding and shared interpretation about the temperament. It has seen as relatively stable innate characteristics that affect the way of approaching and experiencing the world (Kristal, 2005). Although researchers conceptualized differently, they suggested that child temperament has different dimensions. One of the dimensions that was theorized by Rothbart, Ahadi, Hershey, and Fisher (2001) is perceptual sensitivity, which was examined in the current study. Perceptual sensitivity is defined as the amount of perceptual awareness of the low-intensity stimulations from the environment. Rothbart and Jones (1998) suggested that the exactly same stimulation does not have the same impact on children due to the variability within the perception in terms of sensitivity. Therefore, in the current study, it was expected to find that perceptual sensitivity of children moderates the relationship between the levels of vegetation and connectedness to nature of children. Although the same vegetation level surrounds environment of children, their connectedness to natural world would differ due
to the difference in their perceptual systems. To the best of our knowledge, there was not any study in the literature that investigated this moderated relationship.

1.5 The Current Study

All in all, studies in the literature demonstrated that interacting with green areas is important facilitator for the typical development of children. The current study investigated the associations between the nearby natural environment, perceptual sensitivity of children, nature connectedness, self-regulation skills, and adjustment of children. We expected to find that variables related to children’s surrounding natural environment affects the nature connectedness of children. Perceptual sensitivity of children was expected to moderate the relationship between greenery and connection to nature. In addition, the mediator role of self-regulation capacity of children in the relationship between nature and mental health of children was also hypothesized. Children’s self-regulation skills, which would affect the child mental health, should be predicted by connectedness with nature (see Figure 1.1).
Figure 1.1 The proposed model
CHAPTER 2

METHOD

2.1 Participants

There were 299 mother-child pairs in the current study. Participants were recruited by purposive sampling method from four elementary schools in Ankara; Kızıláhamam, Sınca, and Etimesgut districts. Of the 299 children, 134 (44.8%) were boys and 165 (55.2%) were girls. They were 3rd or 4th grade students. Children’s age ranged between 8 and 11 (\(M = 9.28, SD = .71\)). 95% of children (\(N = 284\)) were raised in intact families. Demographic information about parents of children was presented in the Table 2.1.

Table 2.1 Demographic information about parents

<table>
<thead>
<tr>
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<th>Mothers</th>
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<th>Fathers</th>
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<tbody>
<tr>
<td></td>
<td>N</td>
<td>Percentage</td>
<td>N</td>
<td>Percentage</td>
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<tr>
<td>Education</td>
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<tr>
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<td>37</td>
<td>12.4</td>
<td></td>
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<tr>
<td>High school</td>
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<td>42.8</td>
<td>139</td>
<td>46.5</td>
<td></td>
</tr>
<tr>
<td>Community College</td>
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<td>8.0</td>
<td>20</td>
<td>6.7</td>
<td></td>
</tr>
<tr>
<td>College</td>
<td>26</td>
<td>8.7</td>
<td>46</td>
<td>15.4</td>
<td></td>
</tr>
<tr>
<td>Master’s Degree</td>
<td>4</td>
<td>1.3</td>
<td>9</td>
<td>3.0</td>
<td></td>
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<tr>
<td>Income</td>
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<td></td>
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<td>0-499 TL</td>
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<td>7</td>
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<td></td>
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<tr>
<td>500-999 TL</td>
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<td>2.7</td>
<td>13</td>
<td>4.3</td>
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<tr>
<td>1000-1499 TL</td>
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<td>73</td>
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<td>1500-1999 TL</td>
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<td>76</td>
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<tr>
<td>2000-2499 TL</td>
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Table 2.1 (continued)

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<th>8.4</th>
<th>76</th>
<th>25.4</th>
</tr>
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<td>70.6</td>
<td>28</td>
<td>9.4</td>
<td></td>
</tr>
<tr>
<td>Working</td>
<td>79</td>
<td>26.4</td>
<td>260</td>
<td>87.0</td>
<td></td>
</tr>
</tbody>
</table>

2.2 Measures

2.2.1 Information Form

The information form included demographic questions, such as sex of children, the age of parents and children, and education level of parents. In addition, information about their current city, region, and address were gathered from mothers in order to obtain satellite images of their residential environments. Moreover, the information concerning the total time a child spent in green within a week during summer and winter, and number of indoor plants, mothers’ views about the importance of nature, and levels of nearby nature were also gathered from mothers. Detailed information about information form can be seen in Appendix B. Children’s perception about the levels of nature around their home were also asked (See Appendix I).

2.2.2 Temperament in Middle Childhood Questionnaire (Version 3.0) (TMCQ)

It is a parent report instrument that was developed by Simonds and Rothbart (2006) in order to assess the temperament of children from the age of 7 to 10. For the purpose of the current study, only the perceptual sensitivity subscale was used. Within the perceptual sensitivity subscale, there are 10 questions using a Likert scale (1 = always untrue; 5 = always true). Higher scores on this subscale indicate the higher sensitivity in perception. “My child notices when parents are wearing new clothing” is an example item of this subscale. Moreover, the instrument was translated into Turkish by using the translation-back translation method. In the original study, the internal consistency of the
perceptual sensitivity subscale was .77 (Simonds, 2006). The internal consistency in the current study was found as .83. The instrument can be seen in Appendix C.

2.2.3 Strengths and Difficulties Questionnaire (SDQ)

The SDQ was developed by Goodman (1997) in order to assess child mental health. It contains five subscales, which are conduct problems, hyperactivity/inattention, peer relation problems, emotional symptoms, and prosocial behavior. Each of the five subscales are made up of five items scored on 3-point Likert-type scale (0 = not true; 2 = certainly true). ‘’Restless, overactive, cannot stay still for long’’ can be the sample item of the SDQ. The reliability and validity of the Turkish version of the SDQ were assessed by Güvenir et al. (2008). High internal consistency was found except the peer relation problem subscale. In the current study, the internal consistency was found as .78 for the total difficulties subscales. It was found to be .66 for emotional symptoms, .59 for conduct problems, .67 for hyperactivity/inattention subscale. The reliability coefficient of the prosocial behavior subscale was .67. However, it was found as .26 for the peer relation problems subscale and this subscale was eliminated from the analyses. The instrument can be seen in Appendix D.

2.2.4 The Childhood Executive Functioning Inventory (CHEXI)

The CHEXI was developed in order to measure executive control in children aged from 4 to 12 (Thorell & Nyberg, 2008). The CHEXI includes 26 items using a Likert scale (1 = definitely not true; 5 = definitely true). The higher scores indicate more difficulty in executive control. The CHEXI consists of four subscales, which are inhibition, planning, regulation, and working memory. In the current study, the subscales tapping onto regulation, planning, and working memory were used in order to measure cognitive self-regulation. Yet, the inhibition subscale of the CHEXI was used to assess behavioral self-regulation, because the items of the inhibition subscale such as ‘’Acts in a
wilder way compared to other children in a group (e.g., at a birthday party or during a group activity’’) converge with the definition of the behavioral self-regulation in the current study. Test-retest reliability of the CHEXI over 2- to 4- weeks was .89 in the original study (Thorell & Nyberg, 2008). Pre-adaptation and validation of the instrument in a Turkish sample were conducted by Kayhan (2010). The Cronbach alpha coefficient for the parent-report form of CHEXI was .91 (Kayhan, 2010). The internal consistency was found as .72 for the behavioral part of the CHEXI and .91 for the cognitive part of CHEXI.

2.2.5 Barratt Impulsiveness Scale-11 (BIS-11)

The BIS-11 is a self-report measurement designed to measure impulsive and non-impulsive personality characteristics and behaviors of adults (Patton, Stanford, & Barratt, 1995). It contains 30 items using a Likert scale (1 = rarely/never; 4 = always). Higher scores indicate the higher levels of impulsivity. The BIS-11 is composed of 6 subdomains, which are cognitive complexity, self-control, perseverance, motor, cognitive instability, and attention. McCoy, Raver, Lowenstein, and Tirado-Strayer (2011) adapted the BIS-11 in order to assess children’s self-regulation skills. The new version of BIS-11 includes 16 items and two factors, which are cognitive and behavioral self-regulation. In the present study, only the behavioral self-regulation dimension was used. The instrument was translated into Turkish by using the translation-back translation method. ‘’Child says things without thinking’’ is an example item of the behavioral self-regulation subscale. It was rated on a Likert scale ranged from 1 (definitely not true) to 5 (definitely true), and the internal consistency of the BIS-11 was .72 after item 4 was deleted. The instrument can be seen in Appendix E.

2.2.6 Connection to Nature Index (CNI)

The CNI was developed by Cheng and Monroe (2012) in order to assess affective attitudes of children toward the natural environment. The CNI has
four-factor model labeled as Sense of Responsibility, Sense of Oneness, Empathy for Creatures, and Enjoyment of Nature. A total of 16 items, each of which use a Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree), were evaluated by children. Higher scores on this scale indicate the higher level of connection to the natural environment. “I enjoy touching animals and plants” can be exemplified for this scale. The CNI was translated into Turkish by using the translation-back translation method. In the original study, the reliability score from the pilot test was .87 (Cheng & Monroe, 2012). In the current study it was found as .83. The instrument can be seen in the Appendix G.

2.2.7 Inclusion of Nature in Self Scale (INS)

Schultz (2002) designed the INS as an adaptation of Inclusion of Other in Self Scale (Aron, Aron, & Smollan, 1992) in order to measure connectedness with nature and cognitive beliefs about nature. The INS is a self-report instrument that includes the graphical single item. It contains circle pairs ranged from entire separation from nature to entire connectedness with nature; one circle in the pair is defined as self, and the other circle is defined as nature. The circle pairs differ in terms of the extent to which these two circles overlap. Individuals evaluate themselves according to the extent that they contain nature as a part of their self. The INS was rated as 5-point Likert-type scale. The test-retest reliability of the INS scale after one-week and four-week was .90 and .84, respectively (Schultz, Shriver, Tabanico, & Khazian, 2004). In addition, the statements that explain the meaning of the circle pairs was added under each pair since Bragg, Wood, Barton, and Pretty (2013) recommended that children who are under 14 years old might have difficulty to understand the INS, unless the concepts are explained. The scale can be seen in Appendix H.

2.2.8 Nature Relatedness Scale (NR)

The NR was developed to measure the subjective connectedness level of individuals with the natural environment (Nisbet et al., 2008). The NR scale
includes three factors, which are experience, perspective, and self. This instrument was not specifically designed for children. It was demonstrated that some wording in the NR scale is complicated for children (Bragg et al., 2013). Therefore, in the current study, the wording was adapted for children. In addition, the current version of the NR scale is composed of 11 items, which can be understood by children, from the original 21 items. The items are rated by children using a Likert scale ranged from 1 (strongly disagree) to 4 (strongly agree). In the original study, the internal consistency was .87, and in the current study, after item 9 and 11 were deleted, it was found as .79. The scale can be seen in Appendix J.

2.2.9 Cognitive Emotion Regulation Questionnaire-Kids Version (CERQ-k)

The CERQ-k is a child version of the Cognitive Emotion Regulation Questionnaire (Garnefski, Kraaij, & Spinhoven, 2001). The CERQ-k was designed to measure the emotional regulation skills of children via thoughts and cognition (Garnefski, Rieffe, Jellesma, Terwogt, & Kraaij, 2007). It can be administered to children aged between 9 and 11. Children evaluate their response after the experience of negative events that can be exposed in a daily life. The CERQ-k includes 36 items, which are rated on a 5-point Likert-type scale (1 = never; 5 = always). It was translated into Turkish by using the translation-back translation method. It was indicated that all subscales revealed good internal consistencies (Garnefski et al., 2007). For the purpose of the current study, the subscales of Positive Refocusing, Positive Reappraisal, and Planning were used. The subscale of Positive Refocussing refers to thinking about pleasant events and issues rather than thinking about the actual experience of negative events. The Positive Reappraisal refers to assigning a positive meaning to the actual negative event that is thought to be related to personal growth. The subscale of the Planning refers to thoughts about how to overcome negative events and what the next step could be. “I think of how I can cope with it” can be the sample item of the CERQ-k. In the current study,
the internal consistency was .74 for positive refocus, .69 for reappraisal, and .69 for the planning subscale after item 7 was deleted. Factor structure of CERQ-k was also investigated. Confirmatory factor analysis revealed that the hypothesized model fit the data very well, S-B $\chi^2$ (51) = 67.60, $p = .059$, $CFI = .98$, $RMSEA = .03$ with 90% of $CI [.00, .05]$.

### 2.2.10 Emotion Regulation Questionnaire for Children and Adolescents (ERQ-CA)

The ERQ-CA was designed by Gullone and Taffe (2012). In the current study, the expressive suppression subdomain of the ERQ-CA was used. It was translated into Turkish by using the translation-back translation method. The items were rated by children on 4-point Likert-type (1 = never; 4 = always). Higher scores on this subscale indicate the higher expressive suppression. In the original study, internal consistency of the expressive suppression subscale was .75 (Gullone & Taffe, 2012) and in the current study, it was found as .64. “I control my feelings by not showing them” is an example item of the subscale of expressive suppression in the ERQ-CA (see Appendix K).

### 2.2.11 The Normalized Differential Vegetation Index (NDVI)

The density of vegetation in a neighborhood of children was obtained by using NDVI method of NASA (Weier & Herring, 2011). Home addresses of each child were geocoded. NDVI is based on the calculation of the Near Infra-Red band and visible wavelength band. It was indicated that some objects reflect the wavelengths, and others absorb when sun lights strike them. Visible lights are strongly absorbed by plants for the purpose of photosynthesis due to the presence of chlorophyll in the leaves of plants. On the other hand, near-infrared lights are strongly reflected. The amount of vegetation is measured by comparing the level of infrared and visible lights. The NDVI value is ranged from -1 to +1. The value of +1 indicates the highest amount of vegetation (Weier & Herring, 2011). ArcMap geographic information system (GIS) was used in order to process images. We specifically looked for high resolution and
cloud-free image in order to obtain more precise the NDVI values. The image was obtained from the Landsat 8 Operational Land Imager/Thermal Infrared Sensor data at 30 m x 30 m resolution. Acquisition date of the image was 31 July 2015.

2.3 Procedure

Ethical approval of the current study was taken from the Middle East Technical University Institutional Review Board (See Appendix L). In addition, in order to collect data from public schools in Ankara, the permission from Provincial Directorate for National Education was obtained. The data were collected through school visits. Informed consent (see Appendix A) and information form, Childhood Executive Functioning Inventory (CHEXI), Barratt Impulsiveness Scale (BIS-11), Strengths and Difficulties Questionnaire (SDQ), and Temperament in Middle Childhood Questionnaire (Version 3.0) (TMCQ) were completed by the mothers. After the parental permission was received, inform consent from children was also gathered (See Appendix F). Further, they were informed that they have the right to withdraw at any time. Children filled in Connection to Nature Index (CNI), Inclusion of Nature in Self Scale (INS), Nature Relatedness Scale (NR), Cognitive Emotion Regulation Questionnaire-Kids Version (CERQ-k), and Emotion Regulation Questionnaire for Children and Adolescents (ERQ-CA) at school setting which took approximately 25 minutes. One of the researchers was present in the classroom to explain questions of children.
CHAPTER 3

RESULTS

3.1 Data Screening

Data were screened before analyses by using Statistical Package for Social Sciences (SPSS) version 23.0. First of all, multiple imputation method was used in order to handle the missing data for scales with less than 50% missing per case. Second of all, scale reliabilities were calculated. Third of all, univariate and multivariate outliers were controlled. Values of the univariate outliers in seven cases were replaced with the nearest non-extreme values in these variables. There were no multivariate outliers in the data. Finally, bivariate correlation analyses were conducted. Variables that were used in the analyses did not depend linearly on each other. Moreover, two of the variables namely “the time spent in nature during the winter” and “number of indoor plants” were excluded from the analyses since they were not related to any of the outcome variables. Pearson’s bivariate correlations were presented in Table 3.1, 3.2, and 3.3. The relationships among variables within the latent factors were in the expected direction except for the relations between ERQ-CA-expressive suppression and the subscales of CERQ-k. Results indicated that ERQ-CA-expressive suppression subscale was positively associated with the subscales of CERQ-k. Therefore, expressive suppression was analyzed in the same factor of positive emotional regulation strategies.
Table 3.1 Bivariate Correlation between Variables of Greenery and Connection to Nature

<table>
<thead>
<tr>
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<th>2</th>
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*Note.* *p < .05; **p < .01*
Table 3.2 Bivariate Correlation between Variables of Greenery and Self-Regulation

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Note. * p < .05; ** p < .01
Table 3.3 Bivariate Correlation between Variables of Connection to Nature, Self-Regulation, and Mental Health

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*Note.* *p < .05; **p < .01
3.2 Descriptive Statistics

Sample sizes, minimum and maximum values, means, and standard deviations for the study variables are given in Table 3.4.

Table 3.4 Descriptive Statistics for Study Variables

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3.3 Analyses Using Structural Equation Modeling—Measurement Models

Structural Equation Modeling Software of EQS 6.1 (Bentler, 2001) was used in order to test our proposed model. The path analyses were conducted to examine paths among greenery, perceptual sensitivity, connectedness with nature, lack of self-regulation skills, and child mental health. The latent factor of greenery included the total time spend in nature during the summer, mother and child perception of the levels of nearby nature, and mothers’ view about the importance of nature for their children, and NDVI in buffers of 100m. Variables of the total time spend in nature during the summer, mother perception of the levels of nearby nature, and mothers’ view about the importance of nature for their children was constituted by single item questions in information form. The variable of NDVI in buffers of 100m was obtained by using NDVI method. Child perception of the levels of nearby nature was also constituted by single item in questionnaire package of children. The latent factor of perceptual sensitivity contained only one indicator, which was TMCPQ-perceptual sensitivity subscale. Connectedness with nature as a latent factor included mean scores of Nature Relatedness Scale, Connection to Nature Index, and Inclusion of Nature in Self Scale. The latent factor of lack of self-regulation comprised of cognitive and behavioral part of the CHEXI, BIS-11, reverse scoring of ERQ-CA-expressive suppression subscale and CERQ-k subscales. Child mental health as a latent factor involved SDQ-conduct problems, hyperactivity/inattention, emotional symptoms and reverse scoring of prosocial behavior.

Before testing the proposed model, a series of confirmatory factor analyses for latent factors were conducted. EQS with maximum likelihood estimation method was implemented.

Sample sizes, Mardia’s z values, p-values of the model $\chi^2$, CFI, RMSEA, minimum and maximum loading values of the measurement models were presented in Table 3.5.
In the measurement model of greenery, the indicator of mothers’ view about the importance of nature for their children did not have significant coefficients. Therefore, we decided to eliminate this indicator from the latent factor. Values in Table 3.5 represented the model that was formed after this indicator was taken out.

Moreover, the hypothesized measurement model of lack of self-regulation did not fit the data well. Loadings of emotional regulation strategies of children were not significant in the model. As mentioned before, we expected that connectedness with nature would affect children’s self-regulation skills. Therefore, the role of nature connectedness on emotional, cognitive, and behavioral self-regulation were separately analyzed in these explanatory analyses before testing our final model.

3.4 Explanatory Analyses

A series of hierarchical regressions were performed in order to test the relationship between connection to nature and emotional, behavioral, and cognitive self-regulation. At stage one, variables in the latent factor of greenery were entered. At the second stage, mean score of nature connectedness were entered. Behavioral regulation was composed of BIS-11 and behavioral part of CHEXI. Emotional regulation included ERQ-CA-expressive suppression and CERQ-k subscales.

Results indicated that nature connectedness predicted emotional regulation skills of children ($B = .21, SE = .04, p < .001$ with $95\% [.13, .28]$). On the other hand, the hierarchical regression analyses revealed that neither behavioral regulation nor cognitive regulation was significantly predicted by connection to nature; results seemed to suggest only nonsignificant trends, $B = -.15, SE = .08, p = .06$ with $95\% [-.31, .01]$; $B = -.06, SE = .04, p = .076$ with $95\% [-.13, .01]$. Thus, behavioral and cognitive regulation was subtracted from the measurement model. Detailed information about the measurement model of emotional regulation was demonstrated in Table 3.5.
### Table 3.5 Measurement Models

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<td>.41-.97</td>
</tr>
<tr>
<td>Lack of Regulation</td>
<td>278</td>
<td>2.00</td>
<td>.000</td>
<td>.66</td>
<td>.21</td>
<td>.00-.86</td>
</tr>
<tr>
<td>Emotional Regulation</td>
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<td>3.01</td>
<td>.117</td>
<td>.99</td>
<td>.06</td>
<td>.30-.79</td>
</tr>
<tr>
<td>Mental Health</td>
<td>289</td>
<td>3.17</td>
<td>.234</td>
<td>1.00</td>
<td>.04</td>
<td>.52-.84</td>
</tr>
</tbody>
</table>

*Note. p (χ²) = p value of the model χ² - test, CFI = Comparative Fit Index, RMSEA = Root Mean Square Error of Approximation, *a* Model was saturated.*

#### 3.5 Analyses Using Structural Equation Modeling-The Final Model

There were 190 cases in the model and the model was over-identified. Robust statistics were not used for the interpretation of the final model because the Mardia’s z score was not higher than 5 (Mardia’s z = 2.06). The results indicated that the average off-diagonal value for the absolute standardized residual was .06. Besides, 84.17% of residuals fell between -0.1 and 0.1, indicating that normal distribution was observed.

Moreover, a chi-square to degrees of freedom ratio should be lower than 2 in the well-fitting model. The rule of thumb of good fit is lower than .06 or .07 and the rule of thumb of mediocre fit is between .08 and .10 for RMSEA. The rule of thumb of good fit is higher than .95 for CFI (Hu & Beltler, 1999; MacCallum, Browne, & Sugawara, 1996; Steiger, 2007; Tabachnick & Fidell, 2013). Therefore, it can be said that the model fit the data well, $\chi^2 (87) = 136.41, p = .001, CFI = .93, RMSEA = .06$ with 90% of CI [.04, .07].

Results displayed that the path coefficient between greenery and nature connectedness was not significant. Therefore, perceptual sensitivity as a moderating factor was not added into the final model. All loadings and path coefficients were demonstrated in Figure 3.1. As a result, connectedness with nature lead to an increase in children’s emotional regulation skills, which
affected the children’s mental health. However, greenery did not predict the connection to nature levels in children, as an unexpected result.

3.6 Analyses Using Structural Equation Modeling-The Final Modified Model

The latent factor of greenery was taken out from the final model since it did not predict nature connectedness. There were 279 cases in the model. Results demonstrated that the average off-diagonal value for the absolute standardized residual was .05. Besides, 93.94% of residuals fell between -0.1 and 0.1. The Mardia’s z score was higher than 5 (Mardia’s z = 7.02), indicating slightly non-normal distribution. Therefore, results of the final modified model were based on robust statistics. This model fit the data well, S-By\(\chi^2\) (42) = 63.77, \(p < .05\), CFI = .97, RMSEA = .04 with 90% of CI [.02, .06]. All loadings and path coefficients were found to be similar to those in the final model.
**Figure 3.1** The final path model with standardized factor loadings

- **Greenery**
  - Mother-Nature Level
  - Child-Nature Level
  - Time Spent in Summer
  - NDVI-100m

- **Connect to Nature**
  - Nature Relatedness
  - Inclusion of Nature in Self

- **Emotional Regulation**
  - Appraisal
  - Suppression
  - Planning
  - Focussing

- **Mental Health**
  - Emotion
  - Prosocial
  - Conduct
  - Hyperact.

Loadings are indicated by arrows, with standardized factor loadings shown in the diagram.
3.7 Explanatory Analyses after Model Testing

In order to understand the reason why the latent factor of greenery did not have an effect on nature connectedness, additional regression analyses were performed. Results displayed that only children’s perception about the levels of nature around their home significantly predicted the connection to nature, $B = .59, SE = .13, p < .001$ with 95% CI [.34, .85]. It was indicated that the higher level of children’s perception of the nearby nature of were more like to be connected to nature. Therefore, our initial hypothesis that the relationship between greenery and connectedness with nature would be moderated by the perceptual sensitivity of children tested only for the children’s perception about the levels of nature around their home.

Hierarchical regression analysis was conducted. At stage one, the children’s perception about the levels of nearby nature was entered. At the second stage, perceptual sensitivity of the children was entered into the model. At the final stage, the interaction term of perceptual sensitivity and the children’s view about the levels of nature around their home was entered in order to test the moderation hypothesis. Results at the second stage demonstrated that perceptual sensitivity significantly predicted nature connectedness of children, $F_{inc} (1, 281) = 8.141, p < .01, \Delta R^2 = .03; B = .47, SE = .17$ with 95% CI [.15, .80]. At the final stage, the overall model was significant, $F (3, 280) = 11.669, p < .001, R^2_{adjusted} = .10$. The interaction term also explained an additional 2.2% significant variation in nature connectedness, $F_{inc} (1, 280) = 6.778, p = .01; B = -.50, SE = .19$, with 95% CI [-.87, -.12]. In other words, perceptual sensitivity was a significant moderator of the relationship between the children’s perception about the levels of nature around their home and nature connectedness. The unstandardized simple slope for the low level of perceptual sensitivity was .71, and the unstandardized simple slope for the high level of perceptual sensitivity was .19. As a result, at high perceptual sensitivity, children’s connectedness to nature were similar for the higher and lower levels of natural environment. However, at low perceptual sensitivity, connection to
*nature* was different between children who evaluated their nearby environment as natural versus unnatural (See Figure 3.2).

**Figure 3.2** Graph for the interaction between children’s perception about the levels of nature around their home and perceptual sensitivity in predicting nature connectedness of children.
4.1 Discussion of the Results

The aim of the current study was to examine the relations between the *nearby natural environment*, *perceptual sensitivity of children*, *nature connectedness*, *self-regulation skills*, and *adjustment of children* with SEM.

Before testing the proposed model, we investigated the relationship between latent variables and their measurements. Consistent with our expectation, we observed significant relationship between the latent factor of *nature connectedness* and its measurements, which were *Connection to Nature Index, Nature Relatedness Scale, and Inclusion of Nature in Self Scale*. In addition, we also found that all measurements of the latent factor of *mental health* had significant loadings, in tune with our expectation. However, there were non-significant coefficients in the the latent factors of *greenery and lack of self-regulation*.

We thought that the latent factor of *greenery* would compose of *NDVI in buffers of 100m, the number of house plants, children’s and mother’s perception of the levels of vegetation around their home, time spent in nature during winter and summer, and mother’s views about the importance of nature*. However, three variables, which were *the number of indoor plants, time spent in nature during winter, and mothers’ view about the importance of nature* were excluded from the analyses, since they did not correlate with any of the outcome variables and/or have significant coefficient in the model. The reason why there were no relationships between *the number of indoor plants* and any of the outcome variables might be due to the function of house plants. In Turkish culture, indoor plants are mostly used as decoration objects and
mothers usually do not allow their children to touch or play with indoor plants. On another note, Turkish parents mostly do not let their children go outside during winter. Therefore, the time spent in nature during winter may not be meaningful variable in Turkish culture. The third greenery variable that was dropped from the latent factor was mothers’ views about the importance of nature. It did not have a significant coefficient in the measurement model and it was not related to other variables included in the latent factor of greenery. The mean value of mothers’ views about the importance of nature was near the highest score, as shown in Table 3.4. Thus, we thought that mothers might have tendency to give favorable responses in terms of the importance of nature.

As indicated before, the hypothesized measurement model of lack of self-regulation did not fit the data well. Therefore, explanatory analyses were conducted in order to recompose the latent factor of self-regulation in the final model. In these analyses, the association between nature connectedness and emotional, cognitive, and behavioral self-regulation were separately analyzed because we expected that children’s self-regulation skills would be affected by nature connectedness. Results of the current study did not reveal a pattern that was paralleled to our hypotheses. It was found that only emotional regulation skills of children were predicted by nature connectedness. Thus, only emotional regulation strategies of children were analyzed in the final model. Few studies in the literature investigated nature connectedness of children (e.g., Collado & Corraliza, 2011; Collado et al., 2013) and none of them scrutinized the connection to nature in relation with self-regulation skills of children. Previous studies investigated a number of factors regarding self-regulation skills of children in terms of natural environment. It was indicated that children residing at the high residential surrounding greenness displayed better inhibition of their initial impulses, attentional functioning, and delay of gratification (e.g., Amoly et al., 2014; Taylor et al., 2001; Taylor et al., 2002; Wells, 2000). Yet, according to findings of a recent study which was consistent with our findings, unlike emotional well-being of children, cognitive domains
of children—such as executive function, verbal and visual memory—were not predicted by children’s exposure to vegetation (Ward, Duncan, Jarden, & Stewart, 2016). Possible mediators that we did not measure might explain these contradictory findings. To illustrate, Dadvand and colleagues (2015) stated that air pollution mediated the relationship between the amount of residential surrounding greenness and cognitive development. Thus, further studies should focus on these contradictory findings in terms of both nature connectedness and surrounding vegetation.

When we tested the measurement model of emotional self-regulation data supported the model well. As indicated before, positive correlations were observed among expressive suppression, refocusing on plan, positive reappraisal, and positive refocusing (Table 3.2 and 3.3). Many researchers found positive relationship among refocusing on plan, positive reappraisal, and positive refocusing (e.g., Garnefski et al., 2007). The main mechanism behind these emotional regulation strategies might be based on the reinterpretation of emotions. However, in the literature, there are inconsistent findings regarding the relationship between expressive suppression and other emotional regulation strategies. To illustrate, Gullone and Taffe (2012) demonstrated a negative association between reappraisal and suppression strategies of adolescents aged from 16 to 18 years old. This study did not show a significant relationship between these strategies in 10 to 15 years-old participants. Other researchers also found that reappraisal and expressive suppression strategies in adults were independent from each other (e.g., Balzarotti, John, & Gross, 2010; Cabello, Salguero, Fernández-Berrocal, & Gross, 2013). However, consistent with our findings, researchers found positive association between expressive suppression and positive reappraisal among Turkish adolescents (Ulaşan Özgüle, 2011; Saritas-Atalar & Altan-Atalay, 2016). It is possible that the strategy of regulating emotions by suppressing them could be related to cultural values. Yet, the relationships among emotional regulation strategies have not been investigated in cross-
cultural studies. In the related literature, researchers examined the differences among cultures in terms of *expressive suppression*. They mostly compared Asian and Latino cultures to European American cultures; the first can be seen to be similar to Turkish culture and less individualistic, and the later can be perceived as more individualistic (Hofstede, 1980). For example, Gross and John (2003) stated that European American adults used expressive suppression less than their Asian American, Latino, and African American counterparts. It was also indicated that American children evaluated the emotional regulation strategy of talking to someone as more effective than Chinese children (Wan & Savina, 2016). Although there was not any cross-cultural study concerning expressive suppression strategy of Turkish and European/American children, European/American and Turkish culture could also have differences in suppression. In addition, the association between expressive suppression and negative psychological consequences was observed for European-American young adults but it was not found for their Chinese counterparts (Soto et al., 2011). All these findings suggest that expressive suppression is dependent on the cultural context. In the present study, since there was a positive relationship between suppression and other emotional regulation strategies, suppression was analyzed in the same factor of positive emotional regulation strategies. However, further studies should evaluate expressive suppression strategy in detail and its relationship with psychological adjustment in Turkish children. Cross-cultural studies may also make a contribution in order to figure out the differences and similarities between Turkey and other countries in terms of expressive suppression.

After variables, which were *the number of indoor plants, time spent in nature during winter, and mothers’ view about the importance of nature* was taken out from the model, the latent factor of lack of self-regulation replaced with the latent factor of emotional self-regulation, and *expressive suppression* was added into the model as positive emotional regulation strategy, the proposed model was tested with SEM.
The latent factor of *greenery* including *NDVI in buffers of 100m, children’s and mother’s perception of the levels of vegetation around their home, and the time spent in nature during summer* fit the data well but not predict the *connection to nature* levels in children. Additional regression analyses were conducted in order to separately examine *greenery* variables in relation to *nature connectedness*. In line with the previous study (Cheng & Monroe, 2012), we found that *children’s perception of levels of nature around their home* predicted *nature connectedness* of children. However, other variables in the latent factor of *greenery* were not associated with children’s *connectedness to nature*.

It is possible that parents might play an important role for children to develop *connection to nature* while they are together in nature by commenting about things around them encouraging children to talk, ask, and play. Therefore, future studies should investigate whether parents encourage and facilitate their children’s exploration of the natural world and whether this type of parenting enhances nature connectedness of children. Results also revealed that *the total time spent in nature during summer* did not predict *nature connectedness* of children. *The total time spent in nature during summer* was asked to mothers with the following instruction: ‘’How many hours per week does your child spend their time in natural, greenery, and outdoors areas during summer?’’. However, mothers might have reported the time spent outside, without thinking whether the environment was natural and green or not. We also found that *mother’s perception of levels of nature around their home* was highly correlated with *NDVI in buffers of 100m*, and these components of the latent factor of *greenery* did not predict children’s *nature connectedness*. These findings of the current study suggested that there might be different mechanisms that would explain why *mother’s perception of levels of nature and objective measure of vegetation* did not predict nature connectedness, while children’s perception of levels of nature did. Our moderation hypothesis discussed below might explain the mechanism behind this finding.
It was hypothesized that perceptual sensitivity of children would moderate the relationship between greenery and connection to nature. Since only children’s perception of the levels of nearby nature was related to connection to nature, the moderation hypothesis was tested merely for this relationship. It was found that for children with low perceptual sensitivity, nature connectedness differed among children. Children who evaluated their nearby environment as natural had higher levels of nature connectedness than children evaluated as unnatural. However, at high level of perceptual sensitivity, children’s connectedness to nature was found to be similar for the higher and lower levels of the natural environment. Even if children with high perceptual sensitivity evaluated their surrounding environment as less green, their temperamental characteristic gave them an opportunity to connect with nature, since they had a chance to detect even the low pitch sound of birds. That is to say, perceptual sensitivity of children might have reduced the importance of children’s perception of levels of nature around their home in predicting nature connectedness. On the other hand, children with low perceptual sensitivity needed larger green areas to connect with nature. Findings related to the moderation hypothesis also suggested that objectively measured greenery might predict connectedness to nature of children, who had low perceptual sensitivity scores. In the current study, we did not obtain a high variance in perceptual sensitivity scores, as can be seen in Table 3.4. Further studies should replicate the study with various groups and/or samples.

As mentioned before, researchers examined mental health and self-development of children in relation to the vegetation. However, the role of child’s capacity for self-regulation has not been investigated with regards to the relationship between nature and mental health of children. In the present study, we could examine only the mediator role of emotional regulation strategies of children with SEM. Results of the current study indicated similar finding that was found in the explanatory hierarchical regression analyses and discussed above. Nature connectedness affected emotional regulation strategy of
children. Additionally, results regarding the role of emotional regulation on the mental health of children were in tune with what was expected and found in previous studies. A plenty of research indicated that children with higher emotional self-regulation capacities had lower levels of externalizing and internalizing problems, somatic symptoms, and higher levels of social relationships (e.g., Mihalca & Tarnavska, 2013; Garnefski et al., 2007; Zeman et al., 2002). In the current study, only the mediator role of expressive suppression, positive reappraisal, planning, and positive refocusing were investigated. Future research should focus on other components of emotional self-regulation such as putting into perspective and other-blame in Turkish cultural context.

4.2 Strengths and Contributions of the Current Study

There are a number of strengths of the present study. First of all, statistical methodology of the study might be evaluated as strong in order that SEM was used to test the hypotheses. SEM had advantages over regression analyses since, multiple dependent variables, which were nature connectedness, self-regulation skills, and adjustment of children could be tested simultaneously in the same comprehensive model. The other advantage was that we could test our latent variables with multiple indicators. Therefore, we could cover different aspects of latent variables in the same analyses (e.g., Hermida, Luchman, Nicolaides, & Wilcox, 2015).

The density of greenery around children’s home was objectively calculated by using NDVI method of NASA, although the results were non-significant (Weier & Herring, 2011). In addition to the objective measure of vegetation, the perception of mothers and children about the levels of greenery around their home were asked. Multi-method approach (both objective and perceived) to the assessment of the levels of vegetation around their home might be the other strength of the current study.
The current study made some significant contributions to the existing literature. To the best of our knowledge, self-regulation skills of children in relation to the natural environment have not been investigated on this scale before. In the current study, emotional, behavioral, and cognitive component of self-regulation skills were explored independently. Moreover, perceptual sensitivity as one of the dimensions of temperamental characteristics of children has not been examined in the related literature. We found that the differences in perceptual systems of children create a change in nature connectedness of children. Our finding related to the moderation hypothesis revealed the importance of temperamental characteristics of children in relation to surrounding environment of children. Thus, it could give an important direction for future research.

4.3 Limitations of the Present Study

Results of the current study should be interpreted with caution due to limitations related to methodology. One of the main limitations of the study was the representativeness of the sample. Participants were recruited from four elementary schools in Ankara, the capital city of Turkey. Results cannot be generalized to the greater population. Therefore, the study should be replicated with more representative samples in order to increase the external validity of the findings. Second of all, *children’s mental health, behavioral, and cognitive self-regulation* were assessed by mother-report questionnaires. Observation-based assessments could also be used in order to improve the methodology of the current study. Finally, there were only 190 cases in the final model due to missing values. The sample size could be considered as quite small for Structural Equation Modeling. After the latent factor of *greenery* was taken out from the final model, there were 279 cases in the model. It was found that findings in the final modified model were similar to those in the previous model. Thus, sample size could be evaluated as adequate to detect the hypothesized effects in the present study.
4.4 Implication and Future Suggestions of the Study

This study has important implication with regards to intervention studies that can be implemented to develop nature connectedness of children. Results of the current study implies that intervention programs must consider childrens’ point of view of nature, go beyond being just a playground, getting the children connect with it. Recognizing natural world, enjoying of nature, and increasing knowledge of children about natural world can play a critical role for the nature connectedness of children. Researchers may also take into consideration children’s sense of responsibility to the natural world and sense of oneness with nature when developing these intervention studies. The intervention programs may also be embedded into children’s school education. For instance, in school settings, nature-based areas can be created and nature-based outdoor education can be applied in order to promote emotional self-regulation skills and adjustment of children. Future studies should also emphasize the importance of intervention programs in light of the findings of the present study. These studies may affect policy makers, educators, and parents in order to foster generalization these programs.
REFERENCES


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Değerli Annelerimiz,


Ölçeklerde rahatsız edici sorular bulunmamaktadır. Ancak, ölçek doldurma aşamasında sizi ya da çocuğunuzu rahatsız edecek bir durum olursa, çalışmayı yarıda bırakabilirsiniz.

Çalışmayla ilgili sorularınızı Ps. Tuğçe Bakır’a (E-posta: tugce.bakir@metu.edu.tr) (Telefon: 0554 510 59 11) iletebilirsiniz. Ayrıca araştırma sonuçlarının özeti istediğiniz takdirde tarafımızdan size ulaştırılacaktır. Çalışmaya katılmınız ve desteğiniz için teşekkür ederiz.

☐ “Çalışmaya gönüllü olarak katıldığım ve çocuğumun çalışmaya katılmasına izin veriyorum.”

Veli ad-soyad: ___________________ İmza: _____________ Tarih: _____________

Öğrenci ad-soyad: ____________________

☐ “Çalışmaya katılmak istemiyorum ve çocuğumun çalışmaya katılmasına izin vermiyorum.”

Veli ad-soyad: ___________________ İmza: _____________ Tarih: _____________

Öğrenci ad-soyad: ____________________
### Appendix B: Information Form

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Çocuğunuzun Cinsiyeti</td>
<td></td>
</tr>
<tr>
<td>Çocuğunuzun Doğum Tarihi</td>
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</tr>
<tr>
<td>Çocuğunuzun herhangi bir süreçte (kronik) hastalığı var mı?</td>
<td>□ Evet (Cevabınız evet ise, lütfen hastalığınızı belirtiniz:………………………………..)</td>
</tr>
<tr>
<td></td>
<td>□ Hayır</td>
</tr>
<tr>
<td>Çocuğunuzun bedensel, görme, işitme yetersizliği ya da gelişim geriliği gibi tanısı var mı?</td>
<td>□ Evet</td>
</tr>
<tr>
<td></td>
<td>□ Hayır</td>
</tr>
<tr>
<td>Şu an yaşadığınız yer? (İl ve ilçe)</td>
<td></td>
</tr>
<tr>
<td>Ev adresiniz? (İkamet ettğiniz alandaki yeşil alan oranını ölçmek için kullanılacaktır. Lütfen adresinizi mümkün olduğuna ayrıntılı yazınız.)</td>
<td></td>
</tr>
<tr>
<td>Şu an yaşadığınız yerde ne kadar zamanı ikamet ediyorsunuz?</td>
<td></td>
</tr>
<tr>
<td>Yıl içerisinde ikamet ettğiniz yerde değiştiriyor musunuz?</td>
<td>□ Evet (Cevabınız evet ise ayrıntılı belirtiniz:………………………………………………………………………………………………………………………………………………)</td>
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<td>□ Hayır</td>
</tr>
<tr>
<td>Soru</td>
<td>Seçenekler</td>
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<td>----------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Çocuğunuz doğduğundan bu yana nerelerde yaşadı? Lütfen sırasıyla ve sürelerine ayrıntılı olarak belirtiniz.</td>
<td>1. 2. 3. 4. 5. 6.</td>
</tr>
<tr>
<td>Toplam kaç çocukuz var?</td>
<td></td>
</tr>
<tr>
<td>Evinizde toplamda kaç kişi yaşıyor?</td>
<td></td>
</tr>
<tr>
<td>Yaşınız?</td>
<td>□ İlk (en büyüğü) □ İkinci □ Üçüncü □ Dördüncü veya daha fazla</td>
</tr>
<tr>
<td>Çocuğunuz doğum sırasına göre kaçinci?</td>
<td></td>
</tr>
<tr>
<td>Çocuğunuzun bakımından, siz ve babasından başka sorumlu olan biri var mı? (birden fazla seçeneği işaretleyebilirsiniz)</td>
<td>□ Anneanne/Babaanne (Haftada ...... saat) □ Diğer (lütfen belirtiniz) ........................................................................................................</td>
</tr>
<tr>
<td>Eğitim durumunuz</td>
<td>□ Okuma-yazma bilmiyor □ İlkokul □ Ortaokul □ Lise □ Yüksek okul (2 yıllık) □ Üniversite (4 yıllık) □ Yüksek Lisans □ Doktora</td>
</tr>
<tr>
<td>Mesleğiniz</td>
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</tr>
<tr>
<td>Şu an çalışıyor musunuz?</td>
<td>□ Evet □ Hayır</td>
</tr>
</tbody>
</table>

75
| Aylık kazancınız | □ 0-499 TL  
□ 500-999 TL  
□ 1000-1499 TL  
□ 1500-1999 TL  
□ 2000-2500 TL  
□ 2500 üzeri |
|-----------------|--------------------------------------------------|
| Çocuğunuzun babasının mesleği | □ Evet  
□ Hayır |
| Şuan çalışıyor mu? | □ Evet  
□ Hayır |
| Çocuğunuzun babasının aylık kazancı | □ 0-499 TL  
□ 500-999 TL  
□ 1000-1499 TL  
□ 1500-1999 TL  
□ 2000-2500 TL  
□ 2500 üzeri |
| Çocuğunuzun babasının eğitim durumu | □ Okuma-yazma bilmiyor  
□ İlkokul  
□ Ortaokul  
□ Lise  
□ Yüksek okul (2 yıllık)  
□ Üniversite (4 yıllık)  
□ Yüksek Lisans  
□ Doktora |
| Medeni haliniz | □ Evli ve birlikte yaşıyor  
□ Evli ama eşinden ayrı yaşıyor  
□ Eşinden ayrılmış  
□ Eşini kaybetmiş |
| Çocuğunuz bir **haftada** ortalama kaç saat doğada, yeşil alanlarda, açık havada vakit geçiriyor? | **Kışın:**  
**Yazın:** |
Sizce evinizin çevresi ne kadar doğal (ağaçlar, bitkiler vs.)? Lütfen cevabınızı aşağıda yer alan sayııldardan (1’den 4’e kadar) birini seçip daire içine alarak gösteriniz.

<table>
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<th>3</th>
<th>4</th>
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</table>

Evinizin içerisinde kaç adet bitki bulunmaktadır?

___ Adet

Sizce çocuğunuzun doğa (ağaçlar, çiçekler, solucanlar, böcekler vs.) ile etkileşim halinde olması ne kadar önemlidir? Lütfen cevabınızı aşağıda yer alan sayııldardan (1’den 4’e kadar) birini seçip daire içine alarak gösteriniz.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hiç önemli değil.</td>
<td>Biraz önemli.</td>
<td>Önemli.</td>
<td>Çok önemli.</td>
</tr>
</tbody>
</table>
Appendix C: Temperament in Middle Childhood Questionnaire (Version 3.0) (TMCQ)

**Orta Çocukluk Döneminde Mizaç Envanteri**
Benzer durumlarda çocuklar farklı tepkiler verebilmektedirler. Biz aşağıdaki durumlarda çocuğunuzun nasıl tepki verdiğini öğrenmek istiyoruz. Lütfen aşağıdaki cümleleri dikkatlice okuyunuz. Ardından çocuğunuz için o cümleinin ne kadar doğru olduğunu belirleyip, onun için en uygun olan sayıyı (1'den 5'e kadar) daire içine alınız.

Soruları çocuğunuzun son 6 ay içindeki davranışlarını düşünerek işaretleyiniz. Lütfen her soruya yanıt verdiğinizden emin olunuz.

Çocuğum:

<table>
<thead>
<tr>
<th>soru</th>
<th>Her zaman yanlış</th>
<th>Genellikle yanlış</th>
<th>Bazen doğru, bazen yanlış</th>
<th>Genellikle doğru</th>
<th>Her zaman doğru</th>
</tr>
</thead>
<tbody>
<tr>
<td>İnsanların göz renklerini fark eder.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Kuşların seslerini fark eder.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Parfüm, sigara ve yemek kokusu gibi kokuları fark eder.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Bir başkasının üzgün ya da kızgın olduğunu onun yüzüne bakığında anlayabilir.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Kumaş ya da diğer yumuşak malzemelere dokunur.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Çevresindeki ufak değişiklikleri (bir odadaki ışığın parlaştığı gibi) fark eder.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Başkaların fark etmediği şeyler fark eder.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Nesnelerin üzerindeki ufak lekeleri, kirleri bile fark eder.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Bir şeylerin düz veya pürüzlü olup olmadığını anlamak için onlara dokunmaktan hoşlanır.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Anne veya babası yeni bir kıyafet giydiğiinde fark eder.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
### Güçler ve Güçlükler Anketi

Her cümle için, **Doğru**, **Değil**, **Kısmen Doğru**, **Tamamen Doğru** kutularından birini işaretleyiniz. Kesinlikle emin olmasanız ya da size anlamsız görünse de elinizden geldiğince tüm cümleleri yanıtlamanız bize yardımcı olacaktır. Lütfen yanıtlarınızını çocukunuzun **son 6 ay** içindeki davranışlarını göz önüne alarak veriniz.

<table>
<thead>
<tr>
<th>Cümle</th>
<th>Doğru</th>
<th>Değil</th>
<th>Kısmen Doğru</th>
<th>Tamamen Doğru</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diğer insanların duygularını önemser.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Huzursuz, aşırı hareketli, uzun süre kıpırdamadan duramaz.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Sıkça baş ağrısı, karın ağrısı ve bulantıdan yakın.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Diğer çocuklara kolayca paylaşırlar. (iyiyecek, oyuncak, kalem v.s.)</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Sıkça öfke nöbetleri olur ya da aşırı sinirlidir.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Daha çok tek başına, yalnız oynama eğilimindedir.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Genellikle söz dinler, erişkinlerin isteklerini yapar.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Birçok kaygısı vardır. Sıkça endişeli görünür.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Eğer birisi incinmiş, moralı bozulmuş ya da kendini kötü hissediyor ise ona yardımcı olur.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Sürerken elleri ayakları kırık kıpırdır ya da oturduğu yerde kıpırdanıp durur.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>En az bir yakın arkadaşına yardım eder.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Sıkça diğer çocuklara kavgaya eder ya da onlarla alay eder.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Sıkça mutsuz, kederli ya da ağlamaktadır.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Genellikle diğer çocuklara tarafından sevilen.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Dikkatı kolayca dağılar. Yogenlaşmakta güçlük çeker.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Yeni ortamlarda gergin ya da huysuzdur. Kendine güvenini kolayca kaybeder.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Kendinden küçüklere iyi davranır.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Doğruyu söylemez.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Diğer çocuklara ona yeterince iyi davranmazlar.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Sıkça başkalarına (anne, baba, öğretmen, diğer çocuklar) yardım etmeye istekli olur.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Bir şeyi yapmadan önce düşünür.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Ev, okul ya da başka yerlerden kendine ait olmayan eşyaları izinsiz olarak alır.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Erişkinlerle çocuklardan daha iyi geçer.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Pek çok korkusu var. Kolayca ürker.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Başladığı işi bitirir, dikkat süresi iyi.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
</tbody>
</table>
Lütfen, her ifadeyi dikkatlice okuyunuz ve sonra o ifadenin çocuğunuz/öğrenciniz için ne kadar doğru olduğunu belirtiniz. Cevabımızı, her ifadeden sonra yer alan sayılardan (1'den 5'e kadar) birini daire içine alarak gösteriniz. Lütfen her soruyu yanıt verdiğinizden emin olunuz.

<table>
<thead>
<tr>
<th>Kesinlikle doğru değil</th>
<th>Doğru değil</th>
<th>Kısmen doğru</th>
<th>Doğru</th>
<th>Kesinlikle doğru</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td><strong>Kıprı kıprırdır, yerinde duramaz.</strong></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>Düşünmeden konuşur.</strong></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>Aklına eseni yapar, aklına ilk gelene göre hareket eder.</strong></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>O andaki duruma göre hareket eder.</strong></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>Davranışlarını kontrol edebilir.</strong></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
Appendix F: Inform Consent for Children

Gönüllü Katılım Formu

Bu çalışmaya tamamen gönüllü olarak katılıyorum. Bu çalışmanın bir sınav olmadığını, doğru veya yanlış cevap olmadığını ve verdiği yanılış yanıtların tamamen gizli tutulacağını biliyorum.

Ad:

Soyad:

Okul:

Sınıf:
Appendix G: Connection to Nature (CNI)

Doğa ile Kurulan Bağ Ölçeği
Biz çocukların doğa ile ilgili ne hissettiklerini merak ediyoruz. Lütfen aşağıdaki soruları dikkatlice oku. Ardından o cümleye ne kadar katıldığını, senin için en uygun ifadenin içine tik işaret (✓) koyarak bize göster.

ÖRNEK:

<table>
<thead>
<tr>
<th>Koşmayı severim.</th>
<th>HAYIR, Hiç katılmıyorum</th>
<th>EVET, Biraz katılıyorum.</th>
<th>EVET, Katılıyorum</th>
<th>EVET, Kesinlikle katılıyorum</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Doğadaki farklı sesleri duymayı severim.

- Doğadaki yabancı çiçekleri görmeyi severim.

- Üzgün hissettüğimde, dışarı çıkmayı ve doğanın tadını çıkarmayı severim.

- Açıq havada, yeşillikte, doğanın içinde olmak beni huzuru hissettirir.

- Bahçe ile uğraşmayı severim (örnek; tohum ekmek, meyve toplamak gibi).

- Taşlar ve deniz kabukları toplamak eğlencelidir.

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Hayvanlara zarar verilmemesi benim için önemlidir.

Hayvanları (örn.; kuşlar, sincaplar, köstebekler...) temiz ve doğal çevrelerinde görmekten hoşlanırım.

Hayvanlara ve bitkilere dokunmaktan keyif alırım.

Hayvanların bakımini üstlenmek benim için önemlidir.

İnsanlar doğal yaşamın bir parçasıdır.

Hayvanlar ve bitkiler olmadan, insanlar yaşayamazlar.

Dışarıda, açık havada olmak beni mutlu eder.

Benim davranışlarının (örn.; fidan dikmem, yabancı hayvanları rahatsız etmemem gibi) doğal dünyayı farklılaştırmabilir.

Yerden çöp toplamak doğal korumaya yardımcı olabilir.

İnsanların doğal çevreyi değiştirmeye hakları yoktur (örn.; hava kirliliğini artırarak doğanın dengesini bozmak gibi).
Appendix H: Inclusion of Nature in Self Scale (INS)

Doğanın Benlikteki Kapsamı Ölçeği
Doğa ile birbirinize nasıl bağlısınız? Lütfen aşağıdaki resimlerden senin doğa ile olan ilişkini en iyi tarif edenini tik işareti (✓) koyarak bize göster.

Doğaya ilgim yoktur.    Doğa ile biraz ilgiliyim.

Doğa ile çok ilgiliyim.    Doğa ile ben neredeyse bir bütünüz.

Doğa ile ben bir bütünüz.
Appendix I: Children’s View about the Levels of Nature around Their Home

Etrafını Çevreleyen Doğal Alan Miktarının Algısı
Sence evin çevresi ne kadar doğal (ağaçlar, bitkiler vs.)? Vereceğin cevap doğru veya yanlış olarak değerlendirilecektir. Lütfen cevabınızı aşağıda yer alan ifadelerden en uygun olanına tik (✓) işareti koyarak göster.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image.png" alt="Circle" /></td>
<td><img src="image.png" alt="Small Circle" /></td>
<td><img src="image.png" alt="Medium Circle" /></td>
<td><img src="image.png" alt="Large Circle" /></td>
</tr>
</tbody>
</table>
Appendix J: Nature Relatedness Scale

Doğaya İlintilik Ölçeği
Biz çocukların doğa ile ilgili ne hissettiklerini merak ediyoruz. Lütfen aşağıdaki soruları dikkatlice oku. Ardından o cümleye ne kadar katıldığını, senin için en uygun ifadenin içine tik işaret (✓) koyarak bize göster.

<table>
<thead>
<tr>
<th>HAYIR, Hiç katılmıyorum</th>
<th>EVET, Biraz katılıyorum</th>
<th>EVET, Katılıyorum</th>
<th>EVET, Kesinlikle katılıyorum</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Benim en sevdiğim yerler açık havada, doğanın ve yeşilligin içindedir.
2. Yaptıklarımın çevreyi, doğayı nasıl etkilediği hakkında düşünürüm.
3. Doğaya ve çevrede olan sevgim benim önemli bir parçamıdır.
4. Nerede olursam olunun yabancı hayatı fark ederim (örn.; kuşlar, mantarlar, solucanlar...)
5. Doğa ile ilişkim benim önemli bir parçamıdır.
Kendimi yaşayan tüm canlılara, çevreye ve doğaya çok bağlı hissediyorum.

Hava kötü olsa bile dışında, açık havada olmaktan keyif alırım.

Toprağı kazmaktan, toprakla oynamaktan keyif alırım.

Hayvanlar, kuşlar ve bitkilerin, insanlardan daha az yaşama, barınma ve çoğalma hakları vardır.

Şehrin en kalabalık yerinde bile çevremdeki doğanın (örn.; çiçeklerin, böceklerin…) farkındayım.

Doğayı, çevreyi korumak gereksizdir çünkü doğa kendini insan etkilerinden koruyacak kadar güçlüdür.
Appendix K: Emotion Regulation Questionnaire for Children and Adolescents (ERQ-CA)

Çocuklar ve Ergenler için Duygu Düzenleme Ölçeği
Lütfen aşağıdaki soruları dikkatlice oku. Ardından o cümleyi ne sıklıkla yaşadığını, ifadeye ait kutucuğun içine tik işaretli (✓) koyarak bize göster.

<table>
<thead>
<tr>
<th>HAYIR, Hiçbir zaman</th>
<th>EVET, Bazen</th>
<th>EVET, Genellikle</th>
<th>EVET, Her zaman</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Duygularımı kendime saklarım.  
Mutlu hissettiğimde bu nu göstermemek için dikkatli olurum.  
Duygularımı göstermeyerek kontrol ederim.  
Kendimi kötü hissettiğimde (örn.; üzgün, kızgın ya da endişeli) bu nu göstermemek için dikkatli olurum.

Çalışmamız Burada Bitti! Verdiğin cevaplar için çok teşekkür ederiz!
Appendix L: Ethical Approval of the Current Study

Sayı: 31

28 ÇÇAK 2016

Gönderen: Prof.Dr. Sibel Kazak BERUMENT
Psikoloji Bölümü
Gönderen: Prof. Dr. Canan SÜMER
İnsan Araştırmaları Komisyonu Başkanı
İlgi: Etki Onayı

Sayın Prof.Dr. Sibel Kazak BERUMENT’in danışmanlığımı yaptığı yüksek lisans öğrencisi Tuğçe BAKIR’in “The Relationship Between Vegetation and Self-regulation/ Yeşil Alan ile Ö; Düzenleme Arasındaki İlişki” başlıklı araştırması İnsan Araştırmaları Komisyonu tarafından urun göüllereti gerekli onay 2015-505-182 protokol numarası ile 15.01.2016-01.10.2016 tarihleri arasında geçerli olarak üzerine verilmiştir.

Bİglerinize saygıyla sunarım.

Prof. Dr. Canan SÜMER
Uygulamalı Etki Araştırma Merkezi
İnsan Araştırmaları Komisyonu Başkanı

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Prof. Dr. Aydan BALAMIR
İnsan Araştırmaları Komisyonu Üyesi

Prof. Dr. Mehmet UTKU
İnsan Araştırmaları Komisyonu Üyesi

Prof. Dr. Aydan SCL
İnsan Araştırmaları Komisyonu Üyesi
GİRİŞ

Doğa ve Çocukların Fiziksel Gelişimleri

Doğa ve Çocukların Bilişsel Gelişimleri
Çocukların fiziksel gelişimlerinin yanı sıra, alanyazındaki pek çok çalışma doğal çevrenin çocukların bilişsel gelişimi için önemli bir faktör olduğunu vurgulamıştır (örn; Kaplan ve Kaplan, 1989; Taylor, Kuo ve Sullivan, 2002;

Doğa ve Çocukların Sosyal ve Duygusal Gelişimleri


Doğa ve Çocukların Psikolojik Uyumları


Doğa ve Çocukların Benlik Gelişimi

ergenlik dönemindeki çocukların öz-yeterliliklerinin dört günlük doğa gezisi sayesinde artış gösterdiği bulunmuştur (Margalit ve Ben-Ari; 2014).


Öz-Düzenleme

Öz-düzenleme becerisi, duyguşaları, davranışları ve bilişsel süreçleri kontrol edebilme, değiştirebilme ve düzenleyebilme süreci olarak tanımlanmaktadır (Blair & Ursache, 2011; Bronson, 2000). Duyguşal, davranışsal ve bilişsel süreçler birbirleriyle oldukça ilişkili olmakla birlikte, ayrı ayrı da incelenmiştir.

Duyguşal Öz-Düzenleme


**Bilişsel Öz-Düzenleme**


**Davranışsal Öz-Düzenleme**

Çocukların gelişimleri için oldukça büyük önem taşıyan davranışsal öz-duzenleme becerisi alanyazında siklikla çalışılmıştır. Araştırmalar, çocukların akademik başarısını (Ponitz, McClelland, Matthews, & Morrison, 2009; Von Suchodoletz ve ark., 2013) ve akran ilişkilerinin (Eisenberg ve ark., 1997) davranışsal öz-duzenleme becerilerinden etkilendiğini bulunmuştur. Bunların yanısıra, davranışsal öz-duzenleme beyin cinsel ve çevresel faktörler de incelenmiştir. Bireysel faktörlerden yaş (Ponitz ve ark., 2008), demografik özellikler (Flouri ve ark., 2014; Wanless, McClelland, Tominey, & Acock,


**Doğa ile Kurulan Bağ**

Ayrıca, pek çok çalışma çocukların biyolojik ve genetik karakter özelliklerinin fiziksel çevrenin etkisinde düzenleyici bir role sahip olduğunu dile getirmektedir (örn., van IJzendoorn ve ark., 2011). Bu sebeple, doğa ile kurulan yakınlık ile çocukların etrafını çevreleyen yeşil alan arasındaki ilişkide, çocukların algısal hassasiyetlerinin önemli bir etkisinin olduğu düşünülmüştür.

**Mizaç Özelliği: Algısal Hassasiyet**


**Mevcut Çalışma**

Mevcut çalışmada, çocukların içinde bulunduğu yeşil alan, algısal hassasiyet, doğa ile kurulan bağ, öz-düzenleme becerisi ve psikolojik uyum arasındaki ilişkiler incelenmiştir. Doğa ile kurulan bağın, çocukların içinde bulunduğu yeşil alandan etkilenmesi beklenmiştir. Çocukların algısal hassasiyetlerinin bu ilişkide düzenleyici bir etkiye sahip olacağı düşünülmüştür. Ayrıca, öz-düzenleme becerisinin, çocukların doğa ile kurduğu ilişkinile psikolojik uyum halleri arasında bir aracın değişken olması beklenmiştir.
ÖNTEM

Örnekleml

Çalışmaya, 299 anne-çocuk çifti katılım göstermiştir. Çocuklar 8-11 yaş aralığında yer almaktadır. \( \text{Ort} = 9.28, \text{SS} = .71 \). Çocuklardan 134’ü (%44,8) erkek, 165’i (%55,2) kızdır. Katılımcılar, Ankara’da (Sincan, Etimesgut ve Kızılcahamam) yer alan dört farklı okuldan seçilmiştir. Çocukların %95’inin \( N = 284 \) ebeveynleri evlidir ve birlikte yaşamaktadır.

İşlem


Ölçüm Araçları

Bilgi Formu

Bilgi formunun içeriğinde demografik sorular (çocuğun yaş, cinsiyeti, ebeveynlerin eğitim düzeyi ve yaşları gibi) ve çocukun adres bilgileri bulunmaktadır. Ayrıca, çocuğun doğada geçirdiği zaman, ev içerisindeki bitki...
sayısı, annenin doğaya verdiği önem ve annenin ev çevresini ne kadar doğal gördüğü ile ilgili sorular bulunmaktadır. Çocuklara da evlerinin çevresinin ne kadar doğal olduğu sorulmuştur.

**Orta Çocukluk Döneminde Mizaç Anketi**


**Çocuklukta Yönetici İşlevler Envanteri**


**Güçler ve Güçlükler Anketi**

**Barratt Dürtüsellik Ölçeği**


**Doğa ile Kurulan Bağ Endeksi**


**Doğanın Benlikteki Kapsamı Ölçeği**

Bu ölçek, doğanın benlikteki kapsamını ölçmek için tasarlanmıştır (Schultz, 2002). Tek sorudan oluşan bu ölçekte beş adet çember çifti bulunmaktadır. Çember çiftleri belli cümlelerle tanımlanmıştır. Örneğin; “Doğaya ilgim yoktur” birbirinden ayrır çember çiftini tasvir ederken; “Doğa ile ben bir bütünüz” birbiri ile tamamen bütünleşerek tek bir çember halini almış çember çiftini tasvir etmektedir.

**Doğaya İlintililik Ölçeği**


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ölçekteki maddeler çocuklar için uygun hale getirilmiştir. Ölçeğin bu versiyonu 11 maddeden oluşmaktadır. Ancak, iki madde iç tutarlılık değerini düşürdüğü için ölçekten çıkarılmıştır.

Çocuklar için Bílişsel Duygu Düzenleme Ölçeği


Çocuklar ve Ergenler için Duygu Düzenleme Ölçeği


Bitki Örtüsü Endeksi

Ev çevresi objektif yeşil alan oranı, NASA’nın geliştirdiği bir yöntem olan uydu görüntülerinden hesaplanan bitki örtüsü endeksi kullanılarak ölçülüştür (Weier ve Herring, 2011). Değerler +1 ile -1 aralığında yer almaktadır. +1 değeri en yüksek seviyedeki yeşil alanı göstermektedir.

BULGULAR

Ön Analizler

Öncelikle eksik veriler doldurulmuş, korelasyon ve betimleyici istatistik analizleri yapılmıştır. Kışın doğada geçirilen zaman ve ev içinde yer alan bitki

**Yapısal Eşitlik Modellemesi Kullanılarak Yapılan Analizler-Ölçüm Modelleri**


Açıklayıcı Veri Analizleri

Araştırmanın bulguları, doğa ile kurulan bağın yalnızca duygusal öz-düzenleme becerisini yordadığını göstermektedir ($B = .21$, $SE = .04$, $p < .001$, %95 [.13, .28]). Bu nedenle, son modelde yalnızca duygusal öz-düzenleme becerisi kullanılmıştır.

Yapısal Eşitlik Modellemesi Kullanılarak Yapılan Analizler-Son Model

Modelde 190 katılımcı bulunmaktadır ve model normal bir dağılım göstermektedir. Model veri ile oldukça iyi bir uyum göstermektedir, $\chi^2 (87) = 136.41$, $p = .001$, $CFI = .93$, $RMSEA = .06$, %90 CI [.04, .07]. Elde edilen bulgular, doğa ile bağ kurmanın, duygusal öz-düzenleme becerisini olumlu yönde etkilediğini göstermektedir. Ayrıca, duygusal öz-düzenleme becerisinin de çocukların psikolojik uyumlarını etkilediğini bulunmuştur. Ancak, yeşil alan faktörü ile doğa ile kurulan bağ arasındaki ilişki istatistiksel olarak anlamlı bulunmamıştır. Dolayısıyla algısal hassasiyet faktörü bu modelde test edilememiştir.

Yapısal Eşitlik Modellemesi Kullanılarak Yapılan Analizler-Değiştirilmiş Son Model

Yeşil alan faktörü ile doğa ile kurulan bağ faktörü arasında istatistiksel olarak anlamlı bir ilişki tespit edilemediğinden yeşil alan faktörü modelden çıkartılmıştır. Modelde 279 katılımcı bulunmaktadır ve model veri ile oldukça iyi bir uyum göstermektedir, S-B$\chi^2 (42) = 63.77$, $p < .05$, $CFI = .97$, $RMSEA = .04$, %90 CI [.02, .06]. Bütün yükler ve path katsayları son model ile benzerlik göstermektedir.

Yapısal Eşitlik Modeli Sonrası Açıklayıcı Veri Analizleri

Açıklayıcı veri analizleri yeşil alan faktörü ve doğa ile kurulan bağ arasındaki ilişıyi daha ayrıntılı olarak incelemek için yapılmıştır. Sonuçlar, yalnızca
cocukların ev çevreleri yeşil alan seviyesi algılarının doğa ile kurulan bağı yordadığını göstermektedir, \( B = .59, SE = .13, p < .001, %95 CI [.34, .85] \). Ayrıca, algısal hassasiyetin bu ilişkide düzenleyici bir rolü olduğu bulunmuştur, \( F_{inc} (1, 280) = 6.778, p = .01; B = -.50, SE = .19, %95 CI [-.87, -.12] \). Düşük algısal hassasiyet seviyesinde, çocuklarının doğa ile kurduğu bağı, etrafını yeşil olarak değerlendiren ve değerlendirmeyen çocuklar arasında değişiklik göstermektedir. Etrafini yeşil olarak değerlendiren çocukların doğaya yakınlık değerleri yüksek olarak bulunmuştur. Ancak yüksek algısal hassasiyet seviyesinde, çocukların doğa ile kurduğu bağı düzeyi farklılık göstermemektedir. Etrafini yeşil olarak değerlendiren ve değerlendirmeyen çocukların benzer düzeyde doğaya yakınlık göstermektedirler.

TARTIŞMA


Bunun yanı sıra, beklenilenin aksine, çocukların doğa ile kurduğu ilişki duyuşal öz-düzenleme becerilerini etkilerken, davranışsal ve bilişsel öz-duzenleme becerilerini etkilememektedir. Alanyazındaki bazı çalışmalar, yeşil alanın çocukların dikkat becerilerini, doyumu erteleme ve anlık dürtüleri engellemesi davranışların olumlu yönde etkilediğini bulmuştur (örn., Amoly et

Çalışmanın Güçlü Yanları ve Sınırlılıkları


Gelecek Çalışmalar için Öneriler ve Çıkarımlar

Bu çalışmanın bulgularından yola çıkarak, çocukların doğa ile kurduğu bağı geliştirecek onların duygusal öz-düzenleme becerilerine ve psikolojik uyum
Appendix N: Tez Fotokobisi İzin Formu

**ENSTİTÜ**

Fen Bilimleri Enstitüsü

Sosyal Bilimler Enstitüsü  X

Uygulamalı Matematik Enstitüsü

Enformatik Enstitüsü

Deniz Bilimleri Enstitüsü

**YAZARIN**

Soyadı : Bakır

Adı : Tuğçe

Bölümü : Psikoloji

**TEZİN ADI** (İngilizce) : The Role of Nature on Self-Regulation and Adjustment of Children

**TEZİN TÜRÜ** : Yüksek Lisans  X    Doktora

1. Tezimin tamamı dünya çapında erişime açılsın ve kaynak gösterilmek şartıyla tezimin bir kısmı veya tamamının fotokopisi alınsın. 

2. Tezimin tamamı yalnızca Orta Doğu Teknik Üniversitesi kullanıcılarnın erişimine açılsın.

3. Tezim bir (1) yıl süreyle erişime kapalı olsun.  X

Yazarın imzası  Tarih

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