LINKS BETWEEN EXECUTIVE FUNCTIONS AND SCHOOL READINESS

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To my family...

ABSTRACT

In this study, links between executive functions and school readiness in 4- and 5-year-old Turkish children (N = 69) were examined. Both individual assessments (executive functions, and school readiness) and parent reports (executive functions, school readiness) were used to assess the variables of interest. Executive functions were assessed through hot and cool dimensions. It was hypothesized that hot executive functions would be related to social aspects of school readiness whereas cool executive functions would be related to cognitive aspects of school readiness (i.e., math and literacy). There was partial support for the hypotheses; cognitive and social aspects of school readiness were both predicted by cool and hot executive functions. In addition, parent reports were in the same line with behavioral assessments; school readiness was predicted by both cool and hot executive functions. Possible implications, limitations, and future directions were discussed in the light of the findings.

Keywords: Hot and cool executive functions, school readiness, learning related behaviors

ÖZET

Bu çalışmada 4 ile 5 yaşındaki çocukların (*N*=69) yürütücü işlevlerinin ilkokula hazır bulunuşlukları arasındaki ilişki incelenmiştir. Bireysel değerlendirmeler (yürütücü işlevler, ilkokula hazır bulunuşluk) ve anne raporları (yürütücü işlevler, ilkokula hazır bulunuşluk) araştırma değişkenlerini ölçmek için kullanılmıştır. Yürütücü işlevler sıcak ve soğuk olmak üzere iki yönlü incelenmiştir. Hipotezlere göre sıcak yürütücü işlevlerin ilkokula hazır bulunuşluğun sosyal yönleriyle ilişkili olması beklenirken, soğuk yürütücü işlevlerin bilişsel ilkokula hazır bulunuşluk değişkenleriyle (örn., matematik, harf bilgisi ve fonolojik farkındalık) ilişkili olması beklenmiştir. Hipotezler kısmi olarak desteklenmiştir. Sosyal ve bilişsel olarak ayrılan ilkokula hazır bulunuşluk hem sıcak hem soğuk yürütücü işlevler tarafından yordanmıştır. Aileden toplanan anketlerde de okula hazır bulunuşluk hem sıcak hem soğuk yürütücü işlevler tarafından yordanmıştır. Uygulamalar, sınırlılıklar, ve ileriki çalışmalar için öneriler bulgular ışığında tartışılmıştır.

Anahtar Kelimeler: Soğuk ve sıcak yürütücü işlevler, ilkokula hazır bulunuşluk, öğrenmeye ilişkin davranışlar

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CHAPTER 1

According to the UNESCO Institute for Statistics (UIS) database from 204 countries, the school entrance age varies between 4 and 8 and the mean school entrance age is found to be 6 for 126 countries (UIS, 2014). In Turkey, the school entrance age had been 6 years (72 months) for a long time until 2012 (Dinçer, 2012). However, in 2012, school entrance age was changed by law and arranged as 60 to 66 months as opposed to 72 months (Dinçer, 2012). Nevertheless, at the beginning of 2013-2014 academic year this regulation was flexed back again to 72 months. After this change, currently, parents can decide whether their children start the elementary school when they are 60- to 66-months-old or later. This regulation that parents can decide when to send their children to school was implemented due to problems that younger children had when they started school between 60-66 months. According to Yılmaz, Taşçı, Fidan and Nurlu's (2014) study, teachers reported that children who were between 60 and 66-months-old at the time of school entrance could not focus on the materials, could not follow classroom rules and had attention problems. According to Yılmaz et al.'s (2014) research one possible reason for the problems young children had could be that children's developmental levels did not match the demands of the first year of education. These reported problems point to the importance of school-readiness, which can be defined as being ready for the first year of elementary school's demands and having the capacity to make the transition from kindergarten to elementary school (Blair, 2002).

The early academic demands which are expected from children to accomplish in school have been specified as mathematical ability, such as counting and number knowledge, and early literacy skills, such as phonological awareness, letter knowledge and spelling (Tymms, Jones, Albone, & Henderson, 2009). However, school readiness is not only related with academic demands such as mathematics skills and literacy but it is also important for a child to be able to manipulate social and behavioral demands of school (Duncan et al., 2007).

Thus, children can be considered ready for school if they have good pre-mathematical and pre-literacy skills, and if prepared for school environment's social and behavioral demands.

School readiness has been studied heavily, and has been considered as one of the key factors for later school success (Willoughby, Kupersmidt, & Voegler-Lee, 2012). It is found that children who had competent early school profiles in terms of pre-academic, social and cognitive skills maintained those skills over time (McWayne, Cheung, Wright, & Hahs-Vaughn, 2012). In addition to being linked with academic success, school readiness has also been found to be related with success in school environment with peers and teachers (Rimm-Kaufman & Pianta, 2000). Given that school readiness is important in predicting future outcomes it is important to understand the correlates and predictors of this important phenomenon.

In the literature, physical well-being, motor abilities, cognitive development, and socio-emotional development have all been argued to predict children's school readiness (Pianta, Cox, & Snow, 2007). However, numerous studies (Allan, Hume, Allan, Farrington, & Lonigan, 2014; Duncan et al., 2007) showed that cognitive and socio-emotional skills are better predictors of school readiness than other above-mentioned factors.

In this master's thesis, the goal was to examine the correlates of school readiness, both cognitive and socio-emotional aspects of it, in preschool children. Specifically, an important correlate of school readiness, executive functioning skills, were examined thoroughly as predictor of school readiness abilities, such as math and literacy skills, and learning related behaviors.

CHAPTER 2

Literature Review

In this chapter potential correlates of school readiness are reviewed and their relation with school readiness is discussed.

2.1 School Readiness

School readiness involves a transition to a new learning environment. School readiness is defined as "not just a measurable set of skills that appear just before school entry but the cumulative outcome of the child's experiences in the first five years of life" (Oberklaid, Goldfeld, & Moore, 2012, p.130). When school readiness is seen as a "cumulative outcome of the first five years of life" it can be conceptualized as a vast concept which involves different components. In the literature researchers stated that there are five main components of school readiness. Kagan and Neuman (1997) identified them as physical and motor well-being, social and emotional development, approaches to learning, language development, and cognition. Similar to Kagan and Neuman's (1997) conceptualization, Australian Early Development Index (AEDI) also assess school readiness with five main domains, which are physical health, social competence, emotional maturity, language and cognitive skills, communicative skills and general knowledge (Oberklaid et al., 2012). In language and cognitive skills domain basic literacy and numeracy are taken into consideration, and approach to learning, and readiness to explore new things are considered part of AEDI's social competence domain. From the broader perspective, it is clear that school readiness has so many domains, but it is important for us to narrow down the domains in terms of their predictive power. In the literature, meta-analyses compare different components in terms of the strength they predict academic achievement and in the following section these meta-analyses will be reviewed.

McWayne, Fantuzzo and McDermott (2004) conducted a study to differentiate aspects of school readiness in the extent that they predict school success. Authors assessed preschool

children's emergent literacy, numeracy, social and motor competencies, speech, language, cognition, perception, interactive peer play behaviors and attitudes towards learning. From these wide assessments, they came up with three dimensions predicting early academic success; 1) general classroom competencies (emergent literacy, numeracy, social and motor competencies), 2) specific approaches to learning (attitudes towards learning), and 3) interpersonal classroom problems (interactive peer play behaviors). Results showed that only general classroom competencies and specific approaches to learning were related with children's early academic success but interpersonal classroom problems were not.

It has been emphasized that both cognitive and socio-emotional skills play a part in school readiness (Blair & Razza, 2007; Denham, 2006; Willoughby et al., 2012). While those cognitive and social-emotional skills are linked with school readiness, Duncan et al.'s (2007) meta-analysis compared and contrasted these different (but correlated) skills to find out which are better predictors of school readiness. Six longitudinal studies were included in this meta-analysis. Math skills of the children were found to be the best predictor school readiness, followed by reading and attention skills. Thus, the conclusion was that socioemotional skills were not as strong predictors of school readiness or later school achievement as were cognitive skills. Therefore, Duncan and colleagues (2007) concluded that in order to increase school readiness and academic achievement, interventions and kindergarten curriculum should emphasize cognitive development of young children more so than socio-emotional development.

Duncan et al. (2007) and McWayne et al. (2004) studies portray that even though school readiness has a wide range of components, some components predict school readiness and academic achievement better than others. As a result of these findings, in the present study school readiness was measured with pre-academic skills of mathematic, literacy and learning related behaviors. Pre-mathematical skills involve number knowledge and counting,

and pre-literacy skills involve phonological awareness, letter knowledge and spelling (Tymms et al., 2009). Learning related behaviors were described as sitting in the classroom, working without the help of the teacher, and listening to the material teacher is lecturing about (Stipek, Newton, & Chudgar, 2010).

School readiness can be investigated from various perspectives, one of which is fluid cognitive functioning perspective. Fluid cognitive functioning can be described as a cognitive process of active maintenance of information for planning and goal directed behaviors (Blair, 2006). As Blair (2006) describes "fluid functioning involves the inhibition of irrelevant, competing, or prepotent information likely to interfere with information maintenance and response execution and the alternate shifting and sustaining of attention important for organizing and executing sequential steps or actions" (p.110). Even though it may seem like fluid cognitive functioning is not related with the information which is in storage in the long term, fluid cognitive functions are involved in encoding and retrieving processes. Moreover, encoding and retrieving processes play an important role in learning. Academic achievement is not independent from learning therefore it is also suggested that fluid cognitive functioning can explain individual differences in academic achievement (Blair, 2006).

It has been proposed that, especially in educational settings, assessing and intervening in fluid cognitive functioning is important because of its relation to later academic success (Blair, 2006). Thus, by many researchers, fluid cognitive functioning is assessed as an aspect of school readiness and as a strong predictor of later academic success (Blair, 2006; Duncan et al., 2006; Duncan et al., 2007). Fluid cognitive functioning involves maintenance, planning and goal directed behaviors which are generally assessed by another function which share similar characteristics; namely, executive functions (Blair, 2006). Therefore, it is expected that executive functioning will be a strong predictor of school readiness and later academic success. In the following section, executive functions are reviewed.

2.2. Executive Functioning

Executive function (EF) is a term used to describe goal-directed thoughts and behaviors that involve higher level cognitive processing such as attention, inhibition, working memory and set shifting (Miyake et al., 2000). Most researchers conceptualize executive functions as involving three main components, such as inhibitory control, working memory and set-shifting (Miyake et al., 2000). Although, other higher-order cognitive processes, such as planning and problem solving are sometimes conceptualized as central aspects of EF, according to Anderson (2002) planning and problem solving are built upon these three main components, involving all of these functions (i.e., inhibitory control, working memory and set-shifting) and thus cannot be considered as building blocks of EF. In the literature, debates regarding whether executive functions (EF) are a unitary construct or whether the components are independent have been ongoing. Most developmental studies, however, conceptualize and assess EF as including different abilities which are correlated with each other, like Miyake et al. (2000) put it, "executive functions may be characterized as separable but related functions that share some underlying commonality" (p. 88). Although Miyake et al.'s (2000) theoretical perspective involved research with adults, Garon et al. (2008) reviewed research with children and concluded that these three main components of EF begin to emerge before the age of 3 and, similar to what Miyake et al. proposed, they become integrated after 3 years of age.

Inhibitory control is the ability to delay a response for a useful or acceptable consequence (sometimes called 'delay inhibition') or to inhibit a prepotent response (sometimes called 'conflict inhibition'). In order to assess delay inhibition, Gift Wrap Task (Kochanska et al., 2000) has been used with children. In the Gift Wrap Task, children are instructed not to look while a gift is being wrapped by the experimenter in order to achieve the gift. For assessment of conflict inhibition, Day/Night Task (Gerstadt et al., 1994) has been heavily used in children. In the Day/Night Task children are instructed to say "Day" when

they see card with a picture of moon and stars, and to say “Night” when they see a card with a picture of sun.

Another aspect of EF, working memory, is used when information is held in mind, and manipulated or processed. For example, in the backward digit span task children are given a series of numbers and they are instructed to say the numbers in the backward order (e.g., if the experimenter says 1, 2 then the child is instructed to say 2, 1; Cohen, 1997). Set-shifting, the third aspect of EF, is involved in flexibility of rules for shifting from one mental representation to another or from one behavior set to another (Miyake et al., 2000). Set-shifting is claimed to have two components; response shifting and attention shifting. Response shifting involves changing of behaviors according to changed directions. For example, in the hand game (Hughes, 1998) children are instructed to make the same hand gesture (either pointing or fisting) as the experimenter in the first phase of the test but they are asked to do the opposite hand gesture (to point when the experimenter is fisting, and vice versa) in the second phase (Hughes, 1998). On the other hand, attention shifting involves change of the focus of attention in which different dimensions of the object/event/etc. are taken into account in different phases. For example, in Dimensional Change Card Sorting Task (Frye, Zelazo, & Palfai, 1995), children are asked to first sort cards in terms of their shape (e.g., either a boat or rabbit) and then they are asked to shift their focus of attention to the color of the cards and sort the same cards in terms of their colors (e.g., either red or blue).

Preschool period, especially between ages 3 to 6, is considered important for executive functioning, because this is the time period in which there is considerable brain development in the prefrontal cortex, which is considered the main area for executive functions, and also the time that children display significant improvements in inhibitory control (e.g., inhibiting their responses to particular stimuli), working memory (e.g., beginning to hold and manipulate information) and set-shifting (e.g., having flexibility to switch between certain

mind-sets and/or behaviors) (Garon et al., 2008). In Best, Miller and Jones's (2009) review, authors focused on the development of components of executive functioning, specifically inhibitory control, working memory and set-shifting and planning in preschool years between 4 and 6. Authors stated that improvements can be seen in inhibitory control and working memory with age; older children are more competent in inhibiting their responses and in holding and manipulating information in their minds. Best et al. (2009) also concluded that set-shifting ability is built upon inhibitory control and working memory, thus set-shifting ability also continues to develop during these years along with other EF abilities such as planning.

Executive functions, according to Zelazo and Carlson (2012), can also be categorized in the hot-cool dimensions based on the tasks' motivational characteristics. Hot executive function tasks involve motivational and/or emotional significance but in cool EF tasks the immediate response is not related with any motivational goal. To have a clearer understanding about hot and cool dimensions, examples of each kind are given below. For instance, in the Gift Wrap Task reviewed earlier (Kochanska et al., 2000), the experimenter tells the child that he/she brought a gift for the child but forgot to wrap it. In this task, the child should inhibit his/her desire to turn around and peek at the gift in order to achieve the gift. Because the task requires children to inhibit an emotionally significant response, this task is considered as 'hot'. In a cool EF task, however, there is no stimulation about motivations or emotions. For example, Day/Night Task, as discussed above, (Gerstadt et al., 1994) assesses inhibitory control skills of children without triggering an emotion or motivation.

Research reveal that not only these hot and cool EF tasks activate different brain regions (Zelazo & Müller, 2002), but also that hot EF is harder and passed later in life than cool EF (Prencipe & Zelazo, 2005). In Prencipe and Zelazo's study (2005) 3- and 4- year-olds were administered a task that differentiates hot and cool aspects of EF. In this study, there

were 9 cards presented to the child. On these cards there were 3 different types of reward (candies, stickers and pennies) and 3 types of delay conditions (one now vs. two later, one now vs. four later, one now vs. six later). For example, if the card had a candy on it and the delay condition was one now vs. four later, children could get one candy immediately or wait and get four candies at the end of the experiment. First of all, experimenter selected two cards and demonstrated what happens if she waits or immediately takes the reward. Children were then randomly put in two conditions; in the first condition the reward was for children (making the task 'hotter' by making it motivationally relevant for the child) and in the second condition the reward was for the experimenter (making the task 'cooler' by removing the motivational aspect). Results showed that both 3- and 4-year-old children were more successful when they were making decisions for the experimenter on the 'cooler' trials, than when they were making decisions for themselves. In other words, hot version of the task was harder for both 3- and 4-year-old children, although there was also an age-related increased success in both conditions (e.g., 4-year-olds did better than 3-year-olds in both conditions). This study shows that, in preschool children, hot EF tasks are harder to pass than cooler EF tasks.

2.3 School Readiness and EF

EF improves during preschool years. In addition, fluid cognitive functioning (which is assessed with EF tasks) predicts later academic achievement. For these reasons, EF and school readiness relation has been studied heavily. First of all, each EF component's link with school readiness will be explained.

As mentioned above, there are several distinct but correlated components of EF. Thus, it is important to differentiate the role of different components of EF individually on school readiness. Most frequently studied EF components in relation to EF have been working memory and inhibitory control. Best et al. (2009) stated that academic achievement requires

children to have higher levels of working memory. For example, when children need to follow instructions or do calculations in their heads they need to activate working memory. In addition, they would need inhibitory control to inhibit distractions and stay on tasks (Garon et al., 2008). Thus, in education, it is discussed that working memory serves as a problem solver in mathematic development and inhibitory control helps children stay on tasks and avoid inappropriate ways of solving tasks (Bull & Scerif, 2001).

In order to assess the links between executive functioning (EF) and school readiness at different developmental periods, Best, Miller and Naglieri (2011) conducted a study that involved 2036 participants. The participants were followed from the age of 5 to 17. Their executive functioning (EF), school readiness levels before primary school and academic abilities after first grade were measured during this period. EF abilities were measured with Cognitive Assessment System (CAS; Naglieri & Das, 1997), and school readiness and academic abilities were measured with Woodcock–Johnson Tests of Achievement–Revised (Woodcock & Johnson, 1989). Woodcock-Johnson Tests of Achievement is applicable to children between 5- and 17-years of age and it is argued that at the age of 5 it reflects school readiness scores, whereas assessments after age 5 reflect children's academic success. All in all, results revealed that the participants' EF performance in planning and set-shifting components (however, not working memory and inhibitory control) increased till the age of 15. In addition, performance on all four components of EF predicted school readiness at age 5, and academic achievement throughout all these years. The researchers collapsed different ages into two groups to compare younger (5-7) and older (8-17) age groups. When they compared these groups, they found that the greatest improvement in EF tasks was observed between the ages of 5 to 7. In a different analysis, the researchers compared younger and older age groups in terms of the strength of the correlation between EF and academic achievement. The results revealed that correlation between EF and academic achievement was

stronger for the younger group (i.e., for participants between the ages of 5-7) than it was for the older group. When all these findings were considered, it can be concluded that not only the greatest improvement in EF was seen in younger ages, but also the strongest link between academic achievement and EF was found at earlier ages. These results, revealing the strongest link between EF and academic achievement at earlier ages, also led to another study by Shaul and Schwartz (2014).

A study by Shaul and Schwartz (2014) tried to investigate the role of EF on pre-academic skills at ages 5 and 6. The second aim of the project was to assess whether executive functions are related with pre-emergent school readiness skills in general (as a composite score) or with only reading or only mathematical skills. Executive functioning skills were assessed with a task that assesses inhibitory control and working memory (i.e., Head-Toes-Knees-Shoulders task; Ponitz et al., 2009) and another task that assesses inhibitory control (i.e., NEPSY-Statue Task; Korkman, Kirk & Kemp, 1998). Emergent literacy was assessed with phonological awareness tests and orthographic knowledge skills. Mathematic ability was assessed via asking children to do simple summing (e.g., numbers were between 1 and 3, and the highest sum was 5). Children whose ages were closer to 6 had stronger correlations between EF and school readiness scores than those who were younger (e.g., closer to 5-year-old). In addition, results showed that EF is related to both mathematic and early literacy skills in preschool children.

Although school readiness (SR) has different cognitive and social components, most SR studies focused on cognitive aspects, especially on mathematics. Bull, Espy, and Wiebe (2008) stated that mathematical ability could be assessed with the working memory model, which is considered a core mechanism for cognitive capacities. Therefore, in their study, they decided to separate working memory from the other aspects of EF. In addition, they assessed children's short term memory, which is distinct from working memory in the sense that short-

term memory only involves holding information in mind without manipulating/processing the information. Children's mathematical abilities, working memory, short-term memory and EF (planning, inhibitory control and set-shifting) were assessed in the beginning of the primary school, at the end of the first year of primary school and in the third grade. Forward digit span from Weschler Intelligence Scale for Children (WISC-III; Wechsler, 1991) and Corsi Blocks-span forward (Milner, 1971) were administered to assess short-term memory, whereas backward digit span task (WISC-III; Wechsler, 1991) and Corsi Blocks-span backwards were used to assess working memory. Planning was assessed by Tower of London (Korkman, Kirk, & Kemp, 1998) and inhibitory control and set-shifting abilities were measured with Shape School (Espy, 1997). Bull and colleagues (2008) found empirical evidence for contributions of all the cognitive abilities assessed (namely, working memory, short-term memory, and EF (planning, inhibitory control and set-shifting)) to mathematical achievement. The results showed that overall children who have better working memory, short-term memory and executive functions had better mathematic abilities within the first three years of primary school. When working memory and components of executive functions were assessed individually, visual spatial short-term memory (Corsi Blocks-span forward) was found to be the strongest predictor of math achievement.

Clark, Pritchard and Woodward (2010) also examined EF's role on mathematic achievement. Their sample consisted of 104 children whose EF abilities and academic achievements were assessed between ages of 4 and 6. For this study, researchers looked at the EF ability at age 4 and mathematic achievement at age 6. At age 4 these children completed tasks for inhibitory control (measured with Shape School; Espy, 1997), set-shifting (measured with Flexible Item Selection Task, FIST; Jacques & Zelazo, 2001) and planning (measured with Tower of Hanoi; Simon, 1975; Welsh, 1991). Finally, children's mathematic achievement at age 6 was measured by Woodcock-Johnson III Tests of Achievement (WJ-III;

Woodcock, McGrew, & Mather, 2001). Results showed that mathematic achievement at age 6 was predicted by all EF abilities (i.e., inhibitory control, set-shifting and planning) at age 4. Authors concluded that EF abilities work together to predict early mathematic abilities in preschool.

In a review article by Bull and Lee (2014), links between different EF components and mathematical achievement were investigated thoroughly. In general, executive functions are considered a base for mathematic achievement because all aspect of EF, working memory, inhibitory control and set-shifting, are considered important for mathematic achievement. While children are solving problems, they have to retrieve relevant information and hold it in mind. While doing this they also should stick to one strategy and inhibit others. Nevertheless, they should shift their strategies when faced with different problems and try different ways of solving the problems. Bull and Lee (2014) concluded based on the reviewed studies that there is a strong and unique correlation between working memory and math achievement. Working memory was the unique predictor of the standardized tests and numerical magnitude skills. However, evidence for the links between math abilities and inhibitory control and set-shifting were unclear. These results should be taken with caution though, as Bull and Lee (2014) also noted that not all research in the field assesses all aspects of EF and that different components of EF might be overlooked in some of the reviewed studies. In fact, Bull and Lee (2014) pointed out that the studies which report a link between inhibitory control and mathematic achievement did not assess working memory skills of children. They concluded that when all three aspects of executive functions were put into investigation, working memory, unlike inhibitory control and set-shifting, emerge as the strongest and a unique predictor of math abilities. According to the authors this happens because inhibitory control and set-shifting tasks also involve working memory abilities; in both inhibitory control and set-shifting tasks, rules have to be remembered and worked with, therefore working memory also steps in.

In the above section the links between components of EF and school readiness were portrayed in normative samples. A new study suggested that if executive functions have a link with school readiness, it can be also speculated that if children have deficits in executive functioning development, their school readiness will be also delayed. In order to investigate this Willoughby, Magnus, Vernon-Feagans, and Blair (2016) conducted a study with 1,120 children some of whom showed typical development whereas others were considered at-risk. In this study children's executive functioning and school readiness abilities were assessed at ages 3, 4 and 5. The results revealed that children who do not show typical developmental trajectories of EF had lower scores in school readiness tasks across all ages. This link was found even when socio-economic status and other cognitive abilities were controlled for.

All in all, EF was investigated as a main source of predictor for school readiness in the literature and found to be related with school readiness in both normative and non-normative samples. In the following sections, other differentiations of executive functions (hot and cool) and different aspects of school readiness will be reviewed.

2.4 Hot and Cool Executive Functions, and Academic and Social Demands of School Readiness

In the classroom environment, social and academic demands can both be related with hot and cool executive functions because in the classroom environment demands share both motivational and neutral triggers. For example, in the classroom a child must pay attention to learning numbers but at the same time he/she can be motivated to get a reward (e.g., teacher's praise, good grade) for learning it correctly. There are a limited number of studies which assess both the hot and cool executive functions' contribution to school readiness. In one cross-sectional study by Brock, Rimm-Kaufman, Nathanson, and Grimm (2009) it was speculated that children use their cool executive functions when they try to understand letters or numbers but it is also important for them to follow the classroom rules and do activities in

exchange for rewards (e.g., praises from teacher). These two aspects bring both hot and cool executive functions into play in school environment. The aim of their study was to find out the unique variance of hot and cool executive functions in predicting school readiness of 173 kindergarten students. Cool executive function tasks were Balance Beam (Murray & Kochanska, 2002) and Pencil Tapping Tasks (Diamond & Taylor, 1996). In the Balance Beam task, children were given instructions to walk slowly on a line pretending it was a string. In the Pencil Tapping Task (Diamond & Taylor, 1996) children tapped once when the experimenter tapped twice and they tapped twice if the experimenter tapped once. Hot executive function tasks were Toy Sort (Smith-Donald et al., 2007) and Gift Wrap Task (Kochanska et al., 2000). In the Toy Sort Task children were asked to collect some attractive toys into a bin without playing with them and Gift Wrap Task is, as described earlier, requires children to inhibit their desire to turn around and peek at the gift they would be given if they sit for 1 minute without looking. School readiness was examined with two subtests of Woodcock–Johnson III Tests of Achievement (WJ-III; Woodcock et al., 2001): letter-word identification (literacy) and applied problems (math skills). The results portrayed that hot executive functions were not related with math achievement or behavioral outcomes (i.e., social competence, social adjustment, and observed engagement in learning) whereas cool executive functions were related with math achievement, classroom behaviors and classroom engagement. None of the cool or hot executive function tasks were related with literacy skills of children.

Another study by Willoughby et al. (2011) assessed the correlations between hot and cool self-regulation and children's school readiness and disruptive behaviors. School readiness was measured with Woodcock-Johnson III: Tests of Achievement (WJ-III; Woodcock et al., 2001) and disruptive behaviors were measured with Types of Aggression Rating Scale (Kupersmidt et al., 2000; Murphy et al., 2006). Even though authors labeled it

'self-regulation', their assessments involved the tasks that have been previously used to assess executive functions. Like in the study by Brock et al. (2009) Balance Beam and Pencil Tapping Tasks were used to assess cool self-regulation whereas Snack Delay and Tongue Task were administered as hot self-regulation assessments. In the snack delay task the child was asked to wait for 10, 20 and 30 second intervals in order to eat a snack in front of them. In the tongue task the experimenter puts a piece of candy on children's tongue (Kochanska et al., 2000) and children are told that they will play a game and see who can hold the candy longer on their tongue without eating, sucking or swallowing it. After this instruction experimenter also puts a candy on their tongue. There is a 10-second interval for practice and after the practice the child is supposed to hold the candy for 40 seconds. Results showed that cool self-regulation performance was uniquely correlated with academic achievement whereas performance on hot self-regulation tasks was uniquely associated with disruptive behaviors, specifically with inattentive-overactive behaviors. In terms of cool self-regulation performance, inhibitory control was significantly correlated with mathematic and literacy achievement whereas shifting was not. The social-emotional demands of school readiness, assessed with disruptive behaviors scale, were only linked with children's hot executive functioning skills. This study revealed that cool EF skills could be related with cognitive aspects of school readiness (e.g., math and literacy) whereas hot EF skills might account for social-emotional demands of school readiness.

Denham, Warren-Khot, Bassett, Wyatt, and Perna (2012) also assessed the extent that hot and cool executive functioning skills are related with learning related behaviors and social competence in classroom. Hot and cool executive functions were assessed with The Preschool Self-Regulation Assessment (Smith-Donald et al., 2007). Balance Beam, Pencil Tapping and Tower Tasks were used to assess cool executive functions, and Tower Cleanup, Toy Return, Toy Sort were used as hot executive function tasks. In Tower Task children were instructed to

make the highest tower with experimenter, taking turns. In Tower Cleanup children were told to clean the mess after the Tower Task was completed. In Toy Return task children were told to play with a toy for 1 minute but after 1 minute they had to give the toy back to the investigator. In the Toy Sort task, little objects were given to the children and to the experimenter, and the children were asked to put these little objects into little containers. Preschool teachers were asked to fill out the Preschool Learning Behaviors Scale (PLBS; McDermott, Leigh, & Perry, 2002) in order to assess preschool children's approaches to learning related behaviors and social competence. There were three subscales in this scale; Competence Motivation (e.g., ''is reluctant to tackle a new activity''), Attention/Persistence (e.g., ''tries hard, but concentration soon fades and performance deteriorates''), and Attitudes toward Learning (e.g., ''doesn't achieve anything constructive when in a sulky mood''). The results showed that children who had better hot and cool executive functioning performance had higher scores on all 3 subscales.

It is important to look at meta-analyses to make general conclusions. Literature points out the importance of inhibitory control in predicting school readiness, and Allan et al. (2014) assessed which type or method of assessing of inhibitory control would predict academic skills (math and literacy) better. Their meta-analyses involved 75 peer-reviewed articles with 14,424 children within the age range of 32-80 months. Academic skills were measured with assessment tools such as Woodcock–Johnson–III Academic Achievement subtests (Woodcock et al., 2001) and Wechsler Preschool and Primary Scale of Intelligence subtests (Wechsler, 1989). The types of inhibitory control were defined as hot versus cool. If inhibitory control tasks involved a motivator for a performance, they were classified as hot inhibitory control tasks (e.g., gift delay, snack delay) if not they were considered cool inhibitory tasks (e.g., Day/Night, Peg Tapping, Bear Dragon). The methods used to assess inhibitory control have also been categorized as behavioral tasks that children engage in or

surveys filled out by parents and/or teachers. Results showed that children's performance on the cool inhibitory control tasks was a better predictor of their academic achievement than their performance on hot inhibitory control tasks. Their results also showed that cool inhibitory control was a better predictor of math achievement than it was of literacy. In addition, the studies which used behavior tasks to measure inhibitory control portrayed stronger correlation with academic achievement than the studies which solely relied on parent report.

2.5 Current study

From Allan et al.'s (2014) meta-analyses we can conclude that cool aspects of inhibitory control could be a better predictor of cognitive aspects of school readiness and later academic achievement. On the other hand, Denham et al. (2012) suggested that both hot and cool executive functioning skills could predict social aspects of school readiness (such as learning related behaviors) in preschool children. However, literature on the links between hot and cool dimensions of EF and different aspects of school readiness is inconclusive. In the present study, I examined the extent that hot and cool executive functioning abilities are related with reading and math abilities in preschool children, which are discussed to be important cognitive aspects of school readiness. I also examined the links between hot and cool executive functions and learning related behaviors, which are considered social aspects of school readiness. In order to test these hypotheses a cross-sectional study was conducted with preschool children. In the present study, hot and cool executive functions were included as predictor variables and outcome variable was school readiness which included assessments of math, literacy and learning related behaviors. This study aimed to shed light on potential links between the variables. The links between different EF components (inhibitory control, working memory, set-shifting and planning) and school readiness were also explored. Some researchers state that inhibitory control component of executive function has the most unique

contribution to math and literacy achievement (Blair & Razza, 2007; Willoughby et al., 2011) whereas in one review article working memory was claimed to have the strongest contribution to math achievement (Bull & Lee, 2014). In terms of hot executive functioning, the literature suggests that hot EF abilities are better predictors of classroom related behaviors rather than academic skills per se (Allan et al., 2014; Denham et al., 2012; Willoughby et al., 2011). However, there is a need to understand what aspects of executive functioning predict what aspects of school readiness. Thus, this study assesses both hot and cool EF (and dissociable aspects of it, such as inhibitory control, working memory, set-shifting, and planning) and both academic (i.e., math and literacy) and social aspects (i.e., learning related behaviors) of school readiness using a multi-method approach, assessing these variables both behaviorally and via parent reports.

My hypotheses are as follows:

1. In preschool children, executive functioning abilities will be related to early mathematic and reading skills and learning related behaviors.
2. Following up on Hypothesis 1, hot executive functioning skills will predict social aspects of school readiness (i.e., learning-related behaviors) more strongly whereas cool executive functioning skills will predict cognitive aspects of school readiness (i.e., early mathematic and literacy skills) more strongly.
3. Different components of EF (i.e., IC, WM, planning, and set-shifting) will be related to different components of school readiness (i.e., math, literacy, and learning related behaviors).

CHAPTER 3

Method

3.1 Participants

Pilot testing was carried out with a sample of 10 preschoolers (1 girl, 9 boys, M_{age}= 55 months) and their caregivers to make sure that all test questions were easily understood by mothers and that children showed individual differences in the behavioral measures. After the pilot study was completed, testing procedures were finalized accordingly. Children who participated in the pilot study were not included in the main study. Seventy preschool children were tested in the main study. However, one participant was excluded from the analyses due to experimenter error in the session. The final sample consisted of 69 preschoolers (39 girls, 30 boys) ranging between 48- and 71-months of age (M_{age} = 58 months, *SD* = 7. 06) and their mothers (age range = 26-49-years; M_{age} = 37.03 years, *SD* = 4. 50). Recruitment of test participants was done through connections with several kindergartens, which agreed to announce the study to the parents of children attending their school. Kindergartens were located near Ozyegin University in Cekmekoy, Kadikoy and Maltepe.

According to demographic information gathered, most of the families had high SES levels and were well-educated. Fifty-eight of the mothers (83%) completed the question about income, and of these families, 10% reported their income to be between 1500-3000 TL/month, 38% reported their income level to be between 3000-5000 TL/month and 52% reported their income to be more than 5000 TL/month. The mean years of education of mothers and fathers were both 14 years (*SD*s = 3.30 and 4.20, respectively). Occupations of the parents were in a wide range so occupations were categorized only as white-collar or blue-collar jobs. Eighty percent of the mothers and 87% of the fathers were white-collar workers.

In total, 43 of the child participants were only children and 26 children had siblings (10 had older siblings and 16 had younger siblings). The mean number of siblings was found

as 2.28 (*SD*=.58). Seventy-four percent of the mothers stated that they have a bookcase in the house and 91% of the mothers stated that they are reading books to their children regularly. In addition, 50% of them reported that they were trying to teach literacy to their children at home. Fifty-seven percent of the mothers reported that they were trying to teach mathematics to their children.

3.2 Procedure and Materials

In order to recruit participants, kindergartens were reached out. For every kindergarten, an initial meeting was conducted with the principal. In these meetings, the study was explained to the principals and the children whose ages were 4 and 5 were determined. These children's parents were sent information about the study along with two copies of informed consent form and parent surveys, to be filled out should the parents agree to participate. The principals also sent an e-mail to the parents that included details about the present study and informed parents that those who are willing to participate in the study should fill out the informed consent forms and surveys within a week and bring to the principal. After a week, another visit to the kindergartens was done, and informed consents and parent surveys were collected. Only those children whose parents signed the consent forms took part in the study. The behavioral testing of children was done in an empty and quiet room in the kindergartens assigned by the principal. All assessments were video-taped for later coding.

The children were taken to the room one by one and the instructions were as follows: "Hi, my name is Hazal. Today we will play some games together. We will have lots of fun. Are you ready for the games? We will start with the first game!" As is the norm in individual differences research (Carlson & Moses, 2001), the order of the tasks was fixed. Tasks were given in the following order: Turkish Receptive and Expressive Language Test-Receptive Language Subtest (TIFALDI; Kazak-Berument & Güven, 2013), Day/Night Task (Gerstadt et

al., 1994), Whisper Task (Kochanska et al., 1996), Early Mathematical Assessment (Weiland et al., 2012), Self-Ordered Pointing Task (Petrides, 1995), Truck Loading Task (Fagot & Gauvain, 1997), Standard Dimensional Change Card Sort Task (DCCS; Frye et al., 1995), Phonological Awareness and Letter Knowledge tests (Karakelle, 2004), and Gift-Wrapping Task (Kochanska et al., 2000). Each of these tasks is described below.

TIFALDI was coded during the assessments with paper and pen so TIFALDI sessions were not videotaped. Duration of other behavioral assessments was coded from videos. Children completed the tasks in total (except TIFALDI) between 13 and 25 minutes. Further coding was done with individual behavioral tasks. Every task was coded in seconds for each participant. Neither the total duration of assessment nor individual assessment durations were related to age. Results showed that higher scores on Truck Loading Task, Self-Ordered Pointing Task, DCCS, Mathematical Knowledge, Letter Knowledge and Phonological Awareness tasks were related to longer duration of the tasks. These results are meaningful because in these tasks there are levels built upon the previous level, thus to obtain higher scores you have to go through many more levels and this increases the duration. On the other hand, higher scores on Day/Night and Whisper Tasks were associated with shorter times taken to complete each task.

3.2.1 Children's Tasks

Turkish Receptive and Expressive Language Task-receptive language subtest (TIFALDI; Berument-Kazak & Guven, 2013). TIFALDI is used to assess 2 to 12 years of children's language abilities. The test is standardized in a representative Turkish sample, and the age norms are published. TIFALDI has 2 subtests- one assessing expressive language abilities and the other assessing receptive language abilities. In this study, only the receptive language subtest was used. In order to assess receptive language abilities there are 83 items that are ordered in increasing difficulty levels. The experimenter starts administering the test

according to child's age level (i.e., each age group has a different starting point based on the norms established). In this task there are four pictures on each page. The administrator names one picture of the four and the child is asked to point to the picture that matches the word the administrator uttered. A base score is established when the child answers 8 consecutive items correctly, and the last item of the 8 correct responses is considered the child's base score. The test continues until the child makes 8 mistakes in a set of 10 pictures. The final item of the 10 responses is considered the ceiling score. Both raw and standard scores can be obtained from the test. Raw score is formed by summing the number of correct responses between base and ceiling scores, and standard scores are determined by comparing the raw scores with the norms provided in the original study. Raw scores ranged between 27 and 89 and standardized scores ranged between 94 and 138, which means none of the children had receptive language problems.

Day/Night Task (Gerstadt et al., 1994). Gerstadt et al. (1994) generated this task in order to assess inhibitory control in preschool children. There were 2 cards; on one card there is a picture of moon and stars on a dark blue background while on the other card there is a sun on a white background. The instructions were as follows: "In this game I want you to say night when you see the card with sun and I want you to say day when you see the card with moon and stars." After as many times as needed for the child to understand the rule practice trials end, and a total of 16 test cards are shown to children in a semi-random order (i.e., Moon, Sun, Sun, Moon, Sun, Moon, Moon, Moon, Sun, Sun, Moon, Moon, Sun, Sun, Sun, Moon). For each card, the child's response was coded as correct (e.g., saying day when the card with the moon and stars is shown) or incorrect. For some participants, the child's responses were not as clear on the videos and thus those responses were coded as missing. Scores on this task were computed as percentages of correct answers out of valid answers and could range between 0% (indicating low inhibitory control) and 100% (indicating high inhibitory control).

Two independent coders scored children's performance and the correlation between the raters was high, r = .95.

Truck Loading (Fagot & Gauvain, 1997). Fagot and Gauvain (1997) assessed planning abilities in children with Truck Loading Task. In this task there were a truck, 5 small differently colored cardboard houses, a poster which has a road on it and colored envelopes. The instructions were "I want you to pretend to be a delivery person. There are different colored houses and envelopes. We will be delivering envelopes to houses to invite them to a party. First I will show you to how you can do it. This is a one-way road. I want to deliver the red envelope to the red house so I put the red envelope to the truck and I go to the red house. Now you take the blue envelope and go to the blue house. Now you will invite two houses to the party. The yellow party invitation will go to the yellow house and the purple invitation will go to the purple house. Now we should distribute these invitations fast so that everyone could come to the party. The fastest driving method is driving the road only one time." After these instructions, the experimenter explained the first step to the child. In total the task has 5 steps. In each step the child will have one more party invitation and house and in those steps the child should re-organize the order of the invitations in reverse. This is explained to the child as follows: "Now you should deliver two party invitations to two houses. In order to do that, invitations must be in reverse order. The invitation for the first house goes at the top of the truck and the invitation for the second house goes at the bottom of the truck." Then the rule is reminded. "Can I take the invitation which is at the bottom to deliver to the first house?" The question is repeated until the child says 'no' and if the child says 'yes' feedback is given "You can only distribute invitations as they are sorted in the back of the truck, you can only deliver the top-most envelope". After the warm-up trials with the help of the experimenter the colors of the houses presented and envelopes were changed for the test session. The instructions were "Now I want you to deliver the invitations to the black and red

houses." After the two successful trials in each level (e.g., 2-levels indicating 2 invitations to be delivered) the difficulty is increased by 1 level, and the child could go up to the maximum level of 5 houses. The last successful trial was coded as the child's score in this task (ranging between 1 and 5), high scores meaning higher planning ability. Two independent coders coded child's behaviors and the correlation between raters was high, r = .85. In cases of disagreement, experimenter's notes during testing session were consulted.

Self-Ordered Pointing Task (Petrides & Milner, 1982). This task aims to assess visual working memory levels of children. Pictures of everyday objects taken from Snodgrass and Vanderwart's (1980) standardized set were shown to children on a white A4-size paper which was presented in front of the child. On the first page there were 2 pictures and the instructions were "I want you to point to one of these two pictures". After the child chose a picture, on a different page, same two pictures were presented, locations scrambled at this time, and the experimenter told the child to point to the picture that she/he hasn't pointed out yet. The number of pictures on each page increased one by one and on every page pictures were scrambled. The difficulty of this task comes from the fact that the location is not a valid cue; child has to keep the identity of the object s/he chooses at each time in mind. The final number of the pictures on a page was 9. The scores on this task could range from 1 to 9, with higher scores indicating higher visual working memory skills. Two raters coded the data independently and correlation between the raters was very high, r = .98.

Standard Dimensional Change Card Sort Task (Frye et al., 1995). This task was developed by Frye et al. (1995) to assess set-shifting abilities in children. In this task, there were two boxes each having a picture on – one box with a blue boat picture and another with a red rabbit picture on. The instructions were as follows: "We will play a game now. It's called the shape game. We have two boxes here. This box has a blue boat on it and this box has a red rabbit on it. Now, in this shape game, I will give you cards and I want you to put all the rabbit

cards into this box (experimenter shows the box with red rabbit picture on) and put all the boat cards into this box (experimenter shows the box with blue boat picture on)." After the 5 successful trials the researcher instructed the child that they would now start a new game, called the color game. Instructions were "Now I will give you cards again but this time I want you to put all the red cards into this box (experimenter shows the box with red rabbit picture on) and all blue cards into this box (experimenter shows the box with blue boat picture on)." There were again 5 cards in this second set, called the post rule switch session. The two trials were compatible with the old rule (e.g., the cards have to be sorted into the same box regardless of the rule) and three trials were incompatible with the old rule (e.g., a card that can be sorted into one box according to the first rule now has to be sorted into the other box). Children's performances on the post-switch session (score out of 5) and on incompatible trials (out of 3) were coded, with higher scores indicating better set-shifting ability. Again, two raters coded data independently, and the correlation between their ratings were very high, *r*s= .92 and .90, for for post-switch session and incompatible trials, respectively.

Whisper Task (Kochanska et al., 1996). In this task first children were instructed to whisper their names. If children can pass this trial they can begin the task. The instructions were "Now I will show you cards which have cartoon characters on. I want you to whisper those characters' names. You may not know some characters' names but make sure to whisper." In pilot testing original characters that were used in Kochanska et al. (1996) study were used. There were a total of 10 characters (6 familiar, 4 unfamiliar). The familiar characters were Big Bird, Pocahontas, Donald Duck, Snow White, The Beast, and Mickey Mouse and unfamiliar characters were Huckle, Elmer Fudd, Petunia, and Fat Albert. In the pilot assessment, none of 10 children tested could recognize Big Bird, Pocahontas, Snow White, Donald Duck and The Beast so these characters were replaced with Keloğlan, Dora, Garfield, Pepe, Sofia and The Smurfs, which were more familiar to Turkish preschoolers. At the end the final character list

and the order of the presentation was as follows: Keloğlan, Garfield, Fat Albert, Dora, Elmer Fudd, Princess Sofya, Petunia, Pepe, Smurfs, and Huckle. The experimenter showed each card one-by-one and for each card, the coding was either a *0* = a shout, normal or mixed voice, or *1* = a whisper. The highest score was 10, indicating better inhibitory control, and the lowest score was 0. Two independent coders' ratings were correlated highly, r = .86, demonstrating high inter-rater reliability.

Gift Wrap (Kochanska et al., 2000). In the Gift Wrap Task, the materials were one gift box, gift wrap and a bow. The instructions were; "I bought a gift for you but I forgot to wrap it. Now turn your back and don't look at the gift while I am wrapping it for you. It will be a big surprise!" The gift was wrapped noisily for 60 seconds while the child is sitting backwards. Although there are many different ways of coding children's behaviors during this time, in the literature researchers most frequently use the number of times the child peeked during the 60-second time frame therefore this score is used in the analysis, in which higher scores indicate lower inhibitory control. Children's behaviors were coded by two independent coders for how many times the child peeked during the 60-second time frame, and the correlation between the raters was high, r = .80

Mathematical Ability (Weiland et al., 2012). Weiland and her colleagues (2012) administered a short form of mathematical abilities that is suitable for children who attend kindergarten. In this short form there were 18 questions. This task was translated into Turkish by the experimenter (see Appendix A). In the pilot study this task was administered to 10 children to make sure that the questions were understood by children and also to check for possible ceiling/floor effects. These 18 questions were asked and for every correct answer/behavior the child received 1 point. After data collection it was found out that none of the children gave correct answers on two items, so these two questions were excluded and only scores on 16 questions were taken into account. A math ability composite score was formed by taking the

percentage of correct answers out of the number of questions child answered (ranging between 0% and 100%), with higher scores indicating higher early math ability.

Letter Knowledge and Phonological Awareness (Karakelle, 2004). Letter Knowledge and Phonological awareness tasks were developed by Karakelle (2004) in order to find out their contributions to reading and speed of reading. In the letter knowledge task 29 letters (both upper and lowercase) in Turkish language were shown to the children in an A4 sized paper and for every correct answer the child received 1 point, therefore the possible highest score in this task is 29. Two raters coded the child's answers offline and the interrater reliability was high, $r = .98$.

In the phonological awareness task there were four subtasks; rhyming, phoneme deletion, phoneme blending, and syllable blending. In the rhyming task children were read four words and they were asked to find the word which rhymes with the first word that they heard (e.g., cam, tam, sol, yel; cam rhymes with tam). Phoneme deletion is a task in which children are asked to delete the last letter of the said word and say the word without the last letter (e.g., deve - dev; yazı - yaz). In phoneme blending task the researcher said letters and asked the child to blend them and say out loud the whole word (e.g., instructor will say *a* and *t* and the child will say *at*). The words consisted of 2, 3 or 4 letters and had either one or two syllable. In the syllable blending task, the child received the syllables one by one and is asked to say the word out loud (e.g., the instructor says *çi* and *vi* and the child says the word "*çivi*"). For every subtask the correct responses were scored with one point. There are 8 questions for rhyming and phoneme deletion tasks, with possible scores ranging between 0 and 8. For phoneme blending, and syllable blending tasks there are 10 questions, and possible scores range between 0 and 10. In the pilot study none of the children passed rhyming and phoneme deletion tasks so these two tasks were not included in the main study. In addition, for phoneme blending, there was a floor effect in the main study, the pass rate was found as 21%,

so phoneme blending was also excluded from the analysis. Thus, out of four phonological awareness subtasks, only scores on the syllable blending tasks were included in the analysis. Two coders' interrater reliability was found to be high for syllable blending, r = .89.

3.2.2 Questionnaires administered to Mothers

The questionnaire package that was sent to mothers involved questions about demographics, Children's Behavior Questionnaire (CBQ; Rothbart et al., 2001), the Behavior Rating Inventory of Executive Function – Preschool (BRIEF-P; Isquith, Crawford, Espy, & Gioia, 2005), Learning Related Behaviors (McDermott et al., 2002) and School Readiness Survey (Baydar, 2011) (see Appendix B). Brief information about each questionnaire is presented in the following section.

Demographic form. Demographic form is designed to gather information about family and child characteristics. In the demographic form questions about birth date (both child and parents), number of, age, and gender of siblings, education level of parents, income, and occupation were asked.

Children's Behavior Questionnaire (CBQ; Rothbart et al., 2001). CBQ has been designed to assess temperamental characteristics of children who are between 3 and 7 years old. The original long form CBQ has 195 items (e.g., Seems always in a big hurry to get from one place to another, When picking up toys or other jobs, usually keeps at the task until it's done) and items are rated on a 7-point Likert scale (ranging from l=extremely untrue to 7=extremely true). In the original scale there are 15 subscales; Positive Anticipation, Smiling/laughter, High Intensity Pleasure, Activity Level, Impulsivity, Shyness, Discomfort, Fear, Anger/Frustration, Sadness, Soothability, Attentional Focusing, Attentional Shifting, Inhibitory Control, Perceptual Sensitivity, Impulsivity, Low Intensity Pleasure. In the present study 52 item version of CBQ was used which was taken from an unpublished master's thesis (Alaylı, 2015). In this survey items were taken from the following subscales; Attentional

Shifting, Attentional Focusing, Impulsivity, Inhibitory Control, Perceptual Sensitivity and Anger/Frustration. In the analyses four dimensions of temperament that are related to executive functioning were taken into consideration; Attentional Focusing, Attentional Shifting, Inhibitory Control, and Impulsivity. Attentional Focusing subscale has 8 items (α=.56), Attentional Shifting subscale has 6 items (α=.66), Inhibitory Control subscale has 10 items (α=.85) and lastly Impulsivity subscale has 9 items (α=.32). According to Cronbach's Alpha only inhibitory control subscale had good internal consistency. Therefore, in the subsequent analyses only inhibitory control subscale was used.

Participants with missing data were examined thoroughly, and only one participant with more than 10% missing data in CBQ inhibitory control subscale was excluded from the analysis.

BRIEF-P (Isquith et al., 2005). The Behavior Rating Inventory of Executive Function-Preschool (BRIEF-P) was developed in order to assess children's executive functions in daily settings. BRIEF-P is a survey which can be administered to teachers and caregivers. There are 63 items (e.g., my child upset too easily and mood changes too rapidly) assessing children's EF in five domains: Inhibitory control, Shifting, Emotional Control, Working Memory, and Plan/ Organize. The 3-point Likert type scale is used (1= never, 2= sometimes, 3= often). Elementary school version of BRIEF was translated into Turkish by Sezgin (2013) for a thesis project. Thirty-two of the 63 items in the Elementary school version of BRIEF overlap with items in the BRIEF-P. Remaining 31 items were translated by the researcher and were administered to mothers in the pilot study. In the current study BRIEF-P was administered to mothers. Composite scores for each of the subscales are computed by averaging across items in the relevant subscale, and higher scores in BRIEF-P represent poorer EF abilities.

Internal consistencies for BRIEF-P subscales were good except for the shifting subscale (10 items; α = .62). The inhibitory control subscale consisted of 16 items (α = .82),

the emotional control subscale consisted of 10 items (α = .78), the working memory subscale consisted of 17 items (α =.88) lastly plan/organize consisted of 10 items (α = .70). When missing data were examined, like CBQ, only one participant with more than 10% missing data were excluded from the analysis.

Learning Related Behaviors (McDermott et al., 2002). Learning related behaviors are the behaviors that are involved in learning processes which can determine children's learning performance, and were assessed in this study in order to tap social aspects of school readiness. This survey assesses learning related behaviors in three dimensions; competence motivation, attention/persistence and attitudes toward learning. These dimensions have been found to be related with general learning processes, and considered part of school readiness. The items in competence motivation and attention/persistence subscales overlap highly with those in BRIEF-P, so only 7 items assessing attitude toward learning (e.g., Shows little desire to please teacher/aide; Doesn't pay attention to teacher/aide) were used. The items are answered on a 3-point Likert type scale (1= Doesn't apply, 2= Sometimes applies, and 3= Most often applies), with higher scores indicating negative attitudes towards learning. This survey is originally in English and was translated into Turkish by the researcher and applied in the pilot study. The internal consistency of the scale was found acceptable, α =.72. One participant had more than 10% of missing data so it was excluded from the analyses.

School Readiness Test (Baydar, 2010). School readiness task was developed by Baydar (2010) which is applicable to kindergarten students. This survey was given to mothers and the scores were added to obtain a parent report school readiness score for children. There are 15 questions (e.g., when asked, my child can tell what color an object is; when my child hurts himself/herself s/he can tell about his/her problem) answered on a 5-point Likert scale (ranging from 1=absolutely wrong to 5=very true). Higher scores on this scale indicate higher school readiness abilities of children. The internal consistency was found acceptable, α= .73.

CHAPTER 4

Results

4.1 Data Preparation

Prior to the analyses, behavioral data and surveys were investigated. First of all, missing scores for behavioral tasks for each child were examined. One participant who did not have enough valid behavioral data on cool EF, hot EF, or school readiness tasks was excluded from the analysis (e.g., the participant had more than 50% missing data on these tasks).

Behavioral tasks also involved practice trials to make sure that children understood the task instructions. If children could not pass practice trials, they were not administered the actual test trials. Twenty-two percent of the children could not pass the practice trials for Day/Night Task, 22% failed in practice trials for syllable blending task, 29% failed to follow instructions in the practice trials for Truck Loading Task, and 39% could not pass the practice trials in DCCS. Those children who could not pass the practice trials did not have scores for those tasks.

4.2 Preliminary Analyses

Descriptive statistics (means, standard deviations, ranges) for age, behavioral tasks, and parent reports are presented in Table 1. According to these descriptive analyses, all tasks had normal distribution and no ceiling or floor effect was observed, except for the parent report of school readiness which had close to ceiling scores.

Table 1.
Descriptive Statistics of Study Variables (*N* = 69)

Variables	*M*	*SD*	Range
Age	58.64	7.12	48-71
Receptive Language (90-140)	122.16	12.34	94-138
Day/Night (0-100%)	82.77	22.16	7.25-100
Self-Ordered Pointing Task (2-9)	7.48	2.20	2-9
DCCS (Post Switch) (0-5)	4.02	1.25	2-5
DCCS (Incompatible trials) (0-3)	2.16	1.20	0-3
Truck Loading (1-5)	3.43	1.28	2-5
Whisper Task (0-10)	5.3	4.31	0-10
Gift Wrap (Number of times child peeked)	2.23	3.49	0-18
Letter Knowledge (0-29)	8.13	10.09	0-29
Syllable Blending (0-10)	5.75	3.88	0-10
Math Ability (0-100)	68.54	20.18	0-100
CBQ (Inhibitory Control) (1-7)	5.33	.99	2.50-7
BRIEF-P Inhibitory Control (1-3)	1.67	.32	1.06-2.50
BRIEF-P Emotional Control (1-3)	1.69	.36	1.11-2.67
BRIEF-P Working Memory (1-3)	1.50	.32	1.00-2.41
BRIEF-P Planning (1-3)	1.50	.33	1.0.-2.30
School Readiness Parent Report (1-5)	4.48	.38	3.53-5
Learning Related Behaviors (1-3)	2.4	.37	1.57-3

*Numbers in parentheses represent possible range of scores on that task.

In order to create composite scores for cool and hot executive function performance and school readiness, correlations among tasks and factor analyses were carried out. Based on the literature, I predicted that all EF tasks would be correlated with each other. Moreover, I predicted that cool EF tasks would be highly strongly correlated with each other, whereas hot EF tasks would correlate more strongly with each other. However, only a few of the correlations among EF tasks reached significance levels (see Table 2). A significant correlation was found between planning (Truck Loading) and hot inhibitory control scores (Gift Wrap), r (47) =-.36, p=.01, demonstrating that the better the child performed on planning task, the less likely they were to peek during the Gift Wrap Task, portraying high inhibitory control. In addition, set-shifting scores (DCCS Task performance) were correlated with hot inhibitory control task scores (Whisper Task), r (39) = .34, p=.03; children who were

better able to shift their attention between dimensions also scored higher on a hot inhibitory control task. None of the other correlations among EF tasks were significant. No links were found among four cool EF tasks administered, neither were there links between two hot EF task scores. Therefore, in the present study, composite scores for EF or hot versus cool EF were not computed.

School readiness was also examined with behavioral tasks. I predicted that school readiness tasks would be related with each other. In the literature, it is found that math and literacy abilities are correlated, and stronger correlations are found between different aspects of literacy measures than between math and literacy. When correlations among school readiness tasks were examined (see Table 3), the only significant correlation was found between letter knowledge and math abilities, r (58) = .59, p=.001. This finding indicates that children who had higher scores in letter knowledge also had higher scores in math abilities. The correlation between letter knowledge and syllable blending was in the predicted direction, however, failed to reach significance level, r (53) = .24, p=.09. Given these results, I decided to analyze these task scores separately instead of creating a composite score of SR or literacy.

Analyses were also conducted in order to portray additional information about the associations between age, gender, language, SES, language, executive functions and school readiness.

As expected, age correlated positively with raw scores on receptive language task, r (60) = .49, p < .001; the older the children the higher receptive language scores they received. It is also found that age correlated with both cool inhibitory control (Day/Night Task scores), r (53) =.44, p= .001, and hot inhibitory control task scores (Gift Wrap), r (67) =-.26, p=.03, revealing that that older children were better able to inhibit themselves both in cool and hot EF tasks.

Table 2.
Correlations of Age, Language, SES Behavioral EF and School Readiness Tasks

Measure	1	2	3	4	5	6	7	8	9	10	11
1. Age	—										
2. Language	.49**	—									
3. Mother's Education	-.04	.24	—								
4. Day/Night	.44**	.36*	.10	—							
5. Self-Ordered Pointing	.03	.18	-.05	.11	—						
6. DCCS	.26	.23	.01	.31	.16	—					
7. Truck Loading	.21	.36*	.17	.08	.14	-.01	—				
8. Whisper	.03	.06	.11	.23	.07	.34*	-.04	—			
9. Gift Wrap	-.26*	-.17	-.20	-.15	-.06	.05	-.36*	.18	—		
10.Letter	.70**	.48**	.22	.42**	.02	.05	.18	.29*	-.14	—	
11. Syllable Blending	.21	.31*	-.15	.31*	.09	.42*	.01	.11	.00	.24	—
12.Math Ability	.51**	.66**	.38**	.43**	.21	.40*	.31*	.20	-.29*	.58**	.24

Note. *p<.05 **p<.001

Table 3.
Correlations of Age, Language, Mother's Education, Mother Reported SR and Behavioral SR

Measure	1	2	3	4	5	6	7	8	9	10	11	12
1. Age	—											
2. Language	.49**	—										
3. Mother's Education	-.04	.24	—									
4. CBQ - Inhibitory Control	-.05	.13	-.13	—								
5. Inhibitory Control (BRIEF-P)	.00	.04	.11	-.78**	—							
6. Emotional Control (BRIEF-P)	.02	-.16	.06	-.51**	.54**	—						
7. Working Memory (BRIEF-P)	-.04	-.17	-.15	-.42**	.35**	.34**	—					
8. Planning (BRIEF-P)	.05	-.00	-.12	-.41**	.40**	.52**	.70**	—				
9. Letter	.70**	.48**	-.20	.04	-.02	-.05	-.14	-.03	—			
10. Syllable Blending	.21	.31*	-.15	-.08	.11	.22	-.23	.03	.25	—		
11.Math Ability	.51**	.66**	.38**	.08	-.06	.02	-.23	.02	.59**	.25	—	
12. School Readiness	.34*	.40**	.25	.32*	-.29*	-.14	-.44**	-.25	.57**	.47**	.41**	—
13. Learning Related Behaviors	.09	.22	.16	.47**	-.51**	-.54**	-.50**	-.42**	.17	-.06	.17	.46**

Note. *p<.05 **p<.001

However, contrary to my expectations, age did not correlate with any of the other EF task scores. In school readiness assessments, age correlated with both math skills, r (69) =.49, p< .001, and letters, r (58) =.70, p< .001; older children scored better on math and letter knowledge. When links between age, EF, and school readiness were examined in mothers' reports age correlated positively only with parent reported school readiness, r (53) =.33, p=.02; as age increased mothers reported their children to have better school readiness.

Language was correlated with nearly all aspects of school readiness (behavioral measures and parent reported school readiness) but not with learning related behaviors. Receptive language scores were correlated with letter knowledge, syllable blending and mathematical ability; as children's language ability increased their letter knowledge, syllable blending and mathematical abilities increased, r (60) = .66, p<.001, r (47) = .31, p= .03, r (52) = .48 p<.001, respectively. Parent reported school readiness was also correlated with language scores of children, r (50) = .40, p<.001; demonstrating that as children's language abilities increased their scores on parent report school readiness increased.

Moreover, mother's education level was also found to be linked with children's mathematical achievement, r (57) = .38, p< .001; as mother's education level increased children's mathematical achievement level increased. Lastly income was found to be related with learning related behaviors, r (49) = .28, p= .04; as income increased children's scores on learning related behaviors increased.

4.3 Main Analyses

As stated in hypothesis 1 and 2, I predicted that EF scores would be correlated with school readiness scores, and that cool EF task scores would be more strongly correlated with cognitive aspect of school readiness (i.e., math and literacy) than hot EF task scores. Because EF tasks did not correlate among each other strongly, it was not possible to create a single EF composite score, or hot-cool EF composite scores. For these reasons, individual behavioral

task scores were explored in their relation to different aspects of school readiness (Hypothesis 3). It was found that cool inhibitory control task scores (Day/Night) were significantly correlated with all three cognitive aspects of school readiness assessed in the study; letter knowledge (r (47) =.42, p=.05), math ability (r (53) =.43, p=.01) and syllable blending (r (42) = .31, p= .03). Children who had higher scores on cool inhibitory control did well on all school readiness tasks. Set-shifting scores (DCCS- considered a cool EF task in the literature) were positively correlated with syllable blending, r (32) = .42, p=.001, and math abilities, r (42) =.40, p=.001; children who were better able to shift their attention when they were instructed to do so did well on syllable blending and mathematics tasks. In addition, planning task performance (Truck loading – considered a cool EF task in the literature) was also correlated with math ability, r (48) = .31, p=.001; demonstrating that children who were better able to plan their actions in the Truck Loading Task also did better on math questions. Children's scores on the Whisper Task (considered a hot inhibitory control task in the literature) were positively correlated with letter knowledge, r (51) =.29, p=.03, and children's scores on the Gift Wrap Task (considered a hot inhibitory control task in the literature) were negatively correlated with math abilities, r (67) = -.30, p=.01, suggesting that the better children were in inhibiting their tendency to shout out names in the Whisper Task and in inhibiting their tendency to peek when their gift is being wrapped, the better they were in letter knowledge and math tasks, respectively. These findings taken together demonstrate that children who have higher inhibitory control did also well in letter knowledge and math abilities. Overall, I was able to show that there were links between certain EF and SR scores, and that different components of EF correlated differently with aspects of school readiness. Age, language and SES could not be controlled due to the sample size and because of the low and non-systematic correlations among EF tasks it was not possible to test Hypotheses 1 and 2 systematically.

When analyses were run including parent reports in addition to behavioral tasks it was found that contrary to my expectations, mother's responses of executive functioning abilities did not correlate with children's actual performance on behavioral EF tasks. Correlations between school readiness scores from mother's surveys and children's behavioral performance on school readiness tasks (i.e., math, letters, and syllable blending) were also assessed. Results showed that all behavioral measures of school readiness, mathematical abilities, syllable blending, and performance on the letters task were correlated with mother-reported school readiness, r (53) = .40, p=.003, r (40) = .45, p=.003, and r (44) =. 57, p< .001, respectively. Children's Learning Related Behaviors reported by mothers, assessing social aspects of school readiness, were not correlated with any behavioral measurement of school readiness but it was correlated with mother-reported school readiness, r (53) = .46, p< .001.

When correlations among mother's responses on questionnaires assessing EF and school readiness (e.g., CBQ, BRIEF-P, Learning Related Behaviors, School Readiness) were examined, all EF components (CBQ inhibitory control, and inhibitory control, emotional control, working memory and planning subscales of BRIEF-P) were significantly correlated among each other (see Table 3). Learning related behaviors correlated with all aspects of parent reported EF. School readiness was also linked with nearly all parent reported EF variables, except for a link between school readiness and planning subscale of BRIEF-P and school readiness and emotional control subscale of BRIEF-P (see Table 3.). These results show that (almost) every aspect of executive functions assessed via parent reports hold significant correlations with learning related behaviors and school readiness as reported by mothers. Therefore, based on parent reports, there was support for hypothesis 1, demonstrating that executive functions and school readiness are related.

Further analyses were done with step-wise regression in order to investigate the specific predictive power of the parent reported executive functions on school readiness and

learning related behaviors. In correlation analyses it was found that parent reported school readiness was linked with children's age, receptive language, inhibitory control subscale of CBQ and inhibitory control and working memory subscales of BRIEF-P (see Table 3).

Table 4.

Stepwise Regression Analyses for School Readiness (Parent Report)

Predictor variables	*Adjusted* R^2	ΔF	B	SE B	β
Step 1	.174	5.948**			
Age			.01	.01	.23
Language			.01	.00	.29
Step 2	.281	4.674**			
Age			.01	.01	.23
Language			.01	.00	.22
Inhibitory Control (CBQ)			.02	.10	.05
Inhibitory Control (BRIEF-P)			-.12	.28	-.10
Working Memory (BRIEF-P)			-.34	.16	-.30*

* $p < .05$ ** $p < .01$

A stepwise regression was conducted in order to explain roles of age, language, inhibitory control (CBQ and BRIEF-P) and working memory (BRIEF-P). In the first model when age and language were added as independent variables and the dependent variable was school readiness, the model was significant, explaining 17% of the variance, F (1, 47) = 5.95, p= .005. In the second model when inhibitory control (CBQ and BRIEF-P) and working memory (BRIEF-P) were also added as independent variables, this model was also found significant, explaining total of 28% variance, F (5, 47) = 4.67, $p < .001$. In the second model only working memory was found to be significant. This result was in the same line with the literature, working memory have found to be a stronger predictor than inhibitory control.

Learning related behaviors were found to be correlated with inhibitory control (CBQ), and all subscales of BRIEF-P (i.e., emotional control, working memory, planning and inhibitory control). A stepwise regression was conducted. In the first model emotional control added as a predictor variable and results revealed that the first model was significant (F (1, 51) = 20.80, $p < .001$) explaining 28% variance of the model. In the second model emotional control, working memory, planning and inhibitory control were added and this model was also significant (F (2, 51) = 16.95, $p < .001$) explaining 39% variance.

Table 5.

Stepwise Regression Analyses for Learning Related Behaviors (Parent Report)

Predictor variables	*Adjusted* R^2	ΔF	B	SE B	β
Step 1	.280	20.797**			
Emotional Control (BRIEF-P)			-.530	.116	-.54***
Step 2	.385	9.554**			
Emotional Control (BRIEF-P)			-.408	.224	-.42***
Working Memory (BRIEF-P)			-.402	.130	-.36**

* $p < .05$ ** $p < .01$ *** $p < .001$

CHAPTER 5

5.1 General Discussion

The main purpose of the study was to examine the links between hot and cool executive functioning and different aspects of school readiness, such as more domain general, social aspects, measured with learning related behaviors, and academic skills, measured with math and literacy tasks. Based on the literature, it was predicted that executive functioning abilities of children will be related to their early mathematic and reading skills and learning related behaviors. More specifically, it was hypothesized that hot executive functioning skills would predict learning-related behaviors (domain-general, social aspects of school readiness) whereas cool executive functioning skills would predict early mathematic and reading skills which are part of the cognitive, academic aspects of school readiness. Furthermore, different components of executive functions (working memory, inhibitory control, set-shifting and planning) were explored in terms of their relation to different aspects of school readiness (social and cognitive). Data were collected from parent reports and children's behavioral performance. Overall while there was support for links between executive function and school readiness (both in behavioral tasks and based on parent reports), the EF measures were not strongly correlated with each other which made it impossible to create a composite EF score or composite scores for hot and cool EF. The main premise of the study that cool and hot EF tasks would correlate among each other was not fulfilled, therefore, the second hypothesis of the study was not tested fully. When individual EF tasks were analyzed in terms of their relation to school readiness, again the results did not support previous findings in literature; there was no support for cool EF tasks correlating with cognitive aspects of school readiness more strongly than hot EF tasks. In this section first of all, the findings related to EF and SR link will be discussed. Secondly, correlations among executive function tasks will be

discussed from theoretical perspectives. Thirdly, limitations and future directions will be presented.

In the first hypothesis, it was speculated that children's executive functioning abilities would be related with their school readiness. There was partial support for this hypothesis. When behavioral data was examined it was found that children's performance on some executive functioning tasks (i.e., hot and cool inhibitory control, set-shifting and planning) was linked with cognitive aspects of school readiness assessed in the study (i.e., mathematical abilities, literacy and syllable blending). Moreover, parent reports also supported these results in that certain parent-reported executive functioning abilities of children (i.e., inhibitory control and working memory) were linked with parent-reported school readiness. These results demonstrate that there are links between EF and SR, although it was not as robust of a correlation as predicted.

In the literature, mathematic abilities were found to be related with all aspects of cool executive functions (Bull et al.,2008; Bull & Lee, 2004; Clark et al., 2010). In line with the literature, in the current study, mathematical abilities of children were associated with performance on all cool EF tasks (inhibitory control, set-shifting and planning) except for working memory. In addition, although unexpected based on the literature, there were correlations between mathematical abilities and hot inhibitory control tasks. The discrepancy between the literature and my results regarding working memory's links with mathematical abilities, could be due to the assessment techniques used in the present study. In the literature, non-verbal working memory and visual-spatial short term memory were found to be the most specific predictors of mathematic ability (Bull et al., 2008; Bull & Lee, 2004). However, in the present study, short-term memory was not assessed, and a new Turkish adaptation of a non-verbal working memory test was administered. In the future, it might be worth

investigating the validity of this recently translated working memory task with a wider age range.

In the current study, phonological skills were related with cool inhibitory control and set-shifting task scores, and performance on letter knowledge task was found to be linked with hot inhibitory control and cool inhibitory control performance. In the literature to our best knowledge these results are surprising; no studies have found a relation between set-shifting and phonological skills nor a relation between letter knowledge and inhibitory control tasks. These results need further investigation.

Even though the findings did not portray robust correlations in behavioral assessments it was found that inhibitory control, with both hot and cool aspects, was related with all aspects of school readiness in both behavioral measures (i.e., mathematical abilities, letters and syllable blending), and parent reports of school readiness and learning related behaviors. Moreover, among parent reports, cool inhibitory control (CBQ inhibitory control) was linked with academic demands of school readiness whereas hot inhibitory control (BRIEF-P emotional control) and working memory (mother's report) were specific predictors of social demands of school readiness (assessed with learning related behaviors). In the literature, it was found that inhibitory control and working memory had the strongest contributions to school readiness therefore our results supported literature in this direction, and there was partial support for hypothesis 2, that academic demands of school readiness were predicted by cool EF abilities and social demands were predicted by hot EF abilities.

5.1.1 Correlations among Hot and Cool Executive Functions

I predicted in the second hypothesis that different components of executive functions (hot versus cool) could be related with different components of school readiness (academic and social demands). First of all, correlational analysis portrayed that behavioral examination of executive function abilities were not separated by hotness and coolness dimension.

Moreover, cool executive function tasks (Self-Ordered Pointing Task, Day/Night, Self-Ordered Pointing Task, DCCS and Truck Loading) did not correlate among each other, neither did the hot EF tasks. In addition, there were no strong correlations between EF and age. These were unexpected findings. Garon et al. (2008) indicate that 3-5 years of age is critical for EF development, that age correlates with EF development during preschool period, and that coherence between EF tasks increase between ages 3 to 6 (Rothbart & Posner, 2001). In the present study children who were 48 to 71 months of age were assessed. It was possible that if only data from older children were analyzed, correlations could be found among EF tasks. However, when only 5 year olds (60-71 months) were examined (n = 36), correlation coefficients revealed no stronger correlations than those of 4-year-olds. Therefore, based on these unexpected results, the validity of the behavioral EF tasks in this study can be questioned, and results should be taken with caution.

Behavioral measures of EF were not correlated with each other, or with age. However, when parent reports were analyzed, parent reported EF abilities correlated with each other. In the literature findings showed that when comparing behavioral and parental assessment of EF and SR link, parent reports portrayed lower statistical power (Allan et al., 2012). Our finding contradicts with this. One possible explanation could be that behavioral measurement of EF directly assesses specific behaviors in a lab environment, whereas parent report of EF assesses everyday behavior, with higher ecological validity. One conclusion can be made that maybe EF abilities can be assessed with more general observations rather than simple tasks.

Hot executive function tasks were assessed by Whisper Task and Gift Wrap Task. These two tasks were not found to be correlated. Although some researchers (see Prencipe & Zelazo, 2005) claim hot EF tasks are discriminated from cool EF tasks from neural and motivational points of view, others stated that for hot aspect of inhibitory control some other mechanisms play a role. According to Nigg (2000) hot aspect of the inhibitory might also be

viewed as having different components. A hot inhibitory task might tap cognitive versus motor demands. Nigg (2000) builds his speculation on anatomical connections; tasks tapping cognitive versus motor demands of inhibition were found to be related with different brain regions. Hot inhibitory control tasks tapping different demands were also found to be linked with different types of problematic behaviors. If a child has cognitive inhibitory control deficits he/she could show internalizing problems whereas if a child has motor inhibitory control deficits he/she could show externalizing problems. In the present study Whisper Task can be an example of cognitive demand task because Nigg (2000) stated that in order to inhibit a preponent response working memory also plays a role. If Whisper Task is examined through Nigg's (2000) speculation it can be stated that children should remember the rule "whisper" (demanding working memory abilities), and thus the task might be tapping cognitive demands. For a hot inhibitory control task tapping motor demands Gift Wrap can be an example because there is a behavioral suppression of an automatic response (turning around to peek). This theoretical perspective can fit to our data and cognitive versus motor demands can explain the finding that our two hot executive functioning tasks did not correlate with each other.

5.1.2 Correlations among School Readiness Measures

In the present study school readiness was assessed from two aspects; cognitive and social demands. Cognitive demands were assessed with behavioral measures of mathematic ability, syllable adding and letter knowledge. Cognitive demands of school readiness were also assessed via a parent report survey of School Readiness. Social demands of school readiness were assessed with learning related behaviors survey which was administered to parents.

First of all, there were correlations among measures (behavioral and parent reports) of cognitive aspects of school readiness abilities. When social demands of school readiness,

namely learning related behaviors, were examined none of the behavioral assessments were linked with parent reported learning related behaviors. The finding which contradicts with these findings was that parent reported school readiness and learning related behaviors were linked with each other. However, this might be explained by the same-informant factor – both of these questionnaires were filled out by parents.

In the present study general aspect of the results showed that there are links between executive functions and school readiness but when hot and cool dimension of executive function were examined, there were not many meaningful results. These findings led us to search for other predictors of school readiness. In the following section, emotional regulation and socialization aspects will be reviewed.

Blair (2002) wrote a literature review about how self-regulation and school readiness are related. He stated that children in childhood have high levels of negative emotionality, and during this time high order cognitive abilities may not be used when faced with emotionally triggered situations. Also Blair (2002) stated that typically developing but emotionally reactive and poorly regulated children are considered as not being ready for the first year of elementary school. Thus, other temperamental characteristics, such as self-regulation and emotional reactivity, might be better predictors of school readiness and executive functioning. Future studies should examine these in order to better reveal predictors of school readiness.

Parents' cognitions about school are also found to influence children's transition to school (Taylor, Clayton & Rowley, 2004). Taylor et al. argued that if parents have an accurate cognition about school's effect on their children they tend to change their parenting styles in order to see a good transition to school. Nevertheless, another study by Puccioni (2015) assessed parent's conceptions about school readiness, transition practices and children's academic achievement. Transition practiceses involved academic and social aspects. In terms of academic aspects, Puccioni (2015) assessed literacy and mathematic teaching from parents

whereas social aspects included communication boosts and making the child calmer. Results showed that children's academic achievement was predicted by parent's conceptions about school readiness and transition practices. Parents who had legit conceptions about school readiness, tend to have good transition practices therefore children had higher academic achievement. In the present study mother's practices about academic achievement (math and literacy learning) at home were assessed and found not to be related with school readiness. Social attribution's to school's characteristics were not assessed. Maybe social attributions can also be a predictor of school readiness.

5.2 Limitations and Future Research

The present study has several limitations. When the demographic characteristics of parents are examined children were coming from high SES families. SES and school readiness were found to be related; children from high SES families had higher scores of school readiness (Garcia, 2015). In our study too, mother's education and school readiness (mother report) were found to be related. Income was also found to be related with social demand of school readiness (learning related behaviors). However, none of the EF measurements were found to be related with SES.

Mathematical abilities, working memory and planning were measured with tasks which were translated into Turkish for the first time. In addition parent reports of executive function (BRIEF-P) were translated into Turkish for this study. It is possible that for these new measures, instructions and questions were not as clear as they should be. Psychometric characteristics of these tasks might have affected our results, and future studies should investigate these tasks.

School readiness and executive functioning abilities of children were assessed concurrently. When searching for predictions it is important to assess longitudinal links between variables of interest. Current hypotheses were tested by testing children at one time

point, and assessing school readiness before they start schooling. In addition, parents were chosen as informants of school readiness of children. However, many past studies asked teachers to report on children's school readiness (citation). It is possible that the links between EF and school readiness would be stronger if school readiness was measured later when children were about to start school and reports were taken from teachers in addition to parents.

In conclusion, the present study assessed hot and cool executive functions' links with cognitive and social demands of school readiness. Results were assessed from two sources; behavioral assessments from children and survey assessments from mothers. Overall while hot and cool dimension did not explain cognitive and social demands of school readiness in general EF and SR abilities were found to be linked. It is also valuable for us to find this link in mother's report. The non significant findings in the study might be due to methodological problems. These methodological problems were defined as translation of the tasks and having high proportion of missing data in children's behavioral tasks. However, it is also possible that the SR abilities are predicted by other variables that are not assessed in this study, than EF abilities. This is one of the first studies looking at predictors of school readiness in Turkey, and it is plausible that, for instance, parents' cognition or other aspects of parenting or child development are better predictors of school readiness in this culture, than EF abilities. Moreover, as mentioned earlier, although there were no strong links between EF and SR concurrently in this study, longitudinal studies might reveal different results.

APPENDIX A

Mathematical Abilities

1. 5’e kadar sayar mısın?
2. 3 mü daha büyük yoksa 4 mi daha büyük?
3. 3 tane kalbi gösterip, burada kaç tane kalp var?
4. 10 tane kalbi gösterip, burada kaç tane kalp var?
5. 15 tane kalbi gösterip, burada kaç tane kalp var?
6. 8 adet fasulye çocuğun önüne konulur, bu fasulyeleri sayar mısın?
7. 4 adet fasulye çocuğun önüne konulur, bu fasulyeleri sayar mısın?
8. (Parmaklarla 3 ü göstererek) Bu kaç?
9. (Parmaklarla 6’yı göstermek) Bu kaç?
10. 7 ile 5’i toplayınca kaç yapar?
11. 27 mi yoksa 32 mi daha küçüktür?
12. Üçgen şekli gösterip; bu şeklin adını söyler misin?
13. Eşkenar Dörtgen şekli gösterip; bu şeklin adını söyler misin?
14. Çocuğa Birden fazla çubuk verilir; Çubukları kullanarak üçgen yapar mısın?
15. Peki bana yaptığın bu üçgenin kenarlarını gösterir misin?
16. Çubuklarla çubuklarla ABB paterni oluşturulur. Sonrasında çocuğa çubuklar verilerek; Bana bu şeklin aynısını yapar mısın?
17. Dikdörtgen şekli gösterip; bu şeklin adını söyler misin?
18. Yamuk şekli gösterip; bu şeklin adını söyler misin?

APPENDIX B

Parent Questionnaires

Demographic Form

Anketin Doldurulduğu Tarih: ….. /……./ 20..

<u>Çalışmaya Katılan Çocuğunuzla İlgili Sorular:</u>

1. Çocuğunuzun Adı ve Soyadı: _____

2. Çocuğun Doğum Tarihi: Gün____ Ay_____ Yıl_____.

3. Çocuğun Cinsiyeti: Erkek____ Kız____

4. Evde anne ve baba dışında birlikte yaşadığınız *başka yetişkinler* var mı?

Evet _____ Hayır _____

Varsa yakınlık derecesiyle birlikte kimler olduğunu lütfen yazınız:

_____

5. Evdeki *diğer çocukları* (kardeşler, evde sürekli sizinle kalan akraba çocukları vb. gibi) lütfen yazınız.

Çocukla olan yakınlığı	Çocuğun cinsiyeti	Çocuğun doğum tarihi	Aynı evde yaşıyorlarsa işaretleyiniz

6. Lütfen çocuğunuzun bakımıyla ilgili olarak aşağıdaki tabloda çocuğunuza hangi yaşlarda kimlerin baktığını ilgili seçeneğin altına X işareti koyarak gösteriniz. Çocuğun bakımıyla ilgili aynı anda birden çok bakım çeşidi varsa ilgili tüm seçenekleri işaretleyiniz. Eger yuva-kreşe gidiyorsa lütfen haftada kaç saat gittiğini belirtiniz.

Yaşlar	Çocuğun Bakımı					
	Çocuğun Annesi	Çocuğun Anneannesi	Çocuğun Babaannesi	Yuva-Kreş/ Anaokulu	Yakınınız ya da arkadaşınız	Diğer: (lütfen aşağıya yazınız)
0–1 Yaş						
1–2 yaş						
2–3 yaş						
3–4 yaş						
4 yaşı üzeri						

Çocuğun Annesi ile İlgili Sorular:

7. Doğum tarihiniz: Gün_____ Ay_____ Yıl_____.

8. Mesleğiniz: _____

9. Şu anda yaptığınız iş: _____

10.Medeni haliniz (uygun olan seçeneğin altındaki rakamı daire içine alınız).

Evli	Ayrılmış veya boşanmış	Dul	Yeniden evlenmiş	Bekar
1	2	3	4	5

11. Toplam kaç yıl okula gittiniz: _____

12. En son bitirdiğiniz okulu aşağıdaki kutucuklardan birini işaretleyerek gösteriniz.

1. Okur-yazar değil		6. Yüksek Okul Mezunu (2 yıllık)	
2. Okur-yazar		7. Üniversite Mezunu (4 yıllık)	
3. İlkokul Mezunu		8. Yüksek Lisans Mezunu	
4. Ortaokul Mezunu		9. Doktora Mezunu	
5. Lise Mezunu			

Çocuğun Babası ile İlgili Sorular:

13. Babasının doğum tarihi: Gün_____ Ay_____ Yıl_____.

14. Babasının mesleği: _____

15. Babasının şu anda yaptığı iş:_____

16. Babasının medeni hali (uygun olan seçeneğin altındaki rakamı daire içine alınız).

Evli	Ayrılmış veya boşanmış	Dul	Yeniden evlenmiş	Bekar
1	2	3	4	5

17. Babası toplam kaç yıl okula gitti:_____

18. Babasının en son bitirdiği okulu aşağıdaki kutucuklardan birini işaretleyerek gösteriniz.

1. Okur-yazar değil		6. Yüksek Okul Mezunu (2 yıllık)	
2. Okur-yazar		7. Üniversite Mezunu (4 yıllık)	
3. İlkokul Mezunu		8. Yüksek Lisans Mezunu	
4. Ortaokul Mezunu		9. Doktora Mezunu	
5. Lise Mezunu			

19. Aylık olarak eve giren toplam para miktarı (maaşlar, kira gelirleri ve diğer tüm yan gelirlerin toplamı) nedir? (lütfen birini işaretleyiniz.)

	1	Ayda 450 TL ve altı
	2	Ayda 450 – 750 TL
	3	Ayda 750 – 1500 TL
	4	Ayda 1500 – 3000 TL
	5	Ayda 3000 – 5000 TL
	6	Ayda 5000 TL ve üzeri

20. Günlük gazete okuyor musunuz? (lütfen birini işaretleyiniz.)
___Hayır ___Nadiren ___Bazen ___Sık sık ___Her gün

21. Evde kitaplık/ kütüphane var mı? Evet _____ Hayır _____

22. Çocuğunuza kitap okuyor musunuz? (Bu soruya evet seçeneğini işaretlerseniz lütfen 23. Soruyu da cevaplandırınız)
Anne: Evet____ Hayır____

23. Çocuğunuza ne sıklıkla kitap okuyorsunuz?

a.Hiçbir zaman
b.Nadiren
c. Bazen
d.Çoğunlukla
e.Her zaman

24. Evde bilgisayar var mı? Evet _____ Hayır _____

25. Çocuğunuz bilgisayarı kullanıyor mu? Evet _____ Hayır _____

26. Çocuğunuz tablet kullanıyor mu? Evet_____ Hayır_____

27. Çocuğunuz bilgisayar veya tablette ne gibi aktivelerle uğraşır?
_____

28. Çocuğunuz televizyon başında yaklaşık ne kadar vakit (saat olarak) geçirmektedir? (Saati haftalık toplam olarak yazınız.)

Hafta içi kaç saat: _____ Hafta sonu kaç saat:_____

29. Evde Türkçe dışında konuşulan bir dil var mı? Varsa lütfen hangi dil olduğunu belirtiniz.
_____

30. Eğer evde Türkçe dışında konuşulan bir dil varsa diğer dilin yüzde kaç sıklıkla konuşulduğunu belirtiniz: _____%Türkçe _____% Diğer dil

31. Çocuğunuza matematik öğretmeye çalışıyor musunuz? Evet_____
Hayır_____-

32. Çocuğunuza haftada kaç saat matematik öğretmeye çalışıyorsunuz? _____saat (haftada)

33. Çocuğunuza okuma yazma öğretmeye çalışıyor musunuz? Evet_____ Hayır_____

34. Çocuğunuza haftada kaç saat okuma-yazma öğretmeye çalışıyorsunuz?
_____saat(haftada)

CHILDREN'S BEHAVIOR QUESTIONNAIRE
ÇOCUK DAVRANIŞLARI ANKETİ

Son **<u>6 ayı</u>** göz önünde bulundurarak, çocuğunuzun aşağıda tarif edilen bazı durumlar karşısında nasıl davrandığını en iyi gösteren sayıyı yuvarlak içine alarak belirtiniz.

	Tamamen yanlış	***Oldukça yanlış***	***Biraz yanlış***	***Ne doğru Ne yanlış***	***Biraz doğru***	***Oldukça doğru***	***Tamamen doğru***
1. Oyuncak toplama gibi işler bitene kadar onunla uğraşmaya devam eder.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2. Dokunduğu nesnelerin pürüzlü ya da pürüzsüz olduğunun hemen farkına varır.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
3.Genellikle bir faaliyete aceleyle, düşünmeden girişir.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
4.Ağrı hissetmek canını çok sıkar.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
5. Annesi veya babası yeni bir kıyafet giydiğinde veya dış görünüşünde bir değişiklik olduğunda bunun farkına varır.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
6. Oyununu bitirmeden çağırıldığında öfkelenir.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
7. Bir şeye konsantre olmuşken dikkatini çekmek zordur.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
8. Ne istediğine çabucak karar verir ve yapmaya koyulur.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
9. Bir faaliyete aklını vermekte zorlanır.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
10. Üstü ıslandığında veya üşüdüğünde oldukça rahatsız olur.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
11. Bir şey yapmaya karar vermeden önce genellikle durup düşünür.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
12. Oldukça alçak seslerin bile farkına varır.	**1**	**2**	**3**	**4**	**5**	**6**	**7**

13. Başka bir şey yapması söylendiğinde yapmakta olduğu işi bırakmakta çok zorlanır	**1**	**2**	**3**	**4**	**5**	**6**	**7**
14.Etrafta ilgisini dağıtan sesler olduğunda bir faaliyete konsantre olmakta zorlanır.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
15. Bazen resimli bir kitaba gömülür ve uzun süre bakar/okur.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
16. Dışarı çıkmaya hevesliyken, bazen heyecan ve telaşla üstüne uygun kıyafetleri (ör.palto) giymeden fırlar.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
17.Yemeğe gelirken oyununu kolayca bırakır.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
18. Uyuması gerektiği söylendiğinde öfkelenir.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
19. Durup düşünmeden aklına ilk geleni söyleme eğilimi vardır.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
20. Canını acıtabileceği yerlerde temkinli davranır.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
21. Onunla konuştuğumda bazen beni duymuyor gibi görünür.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
22. Hiç bir işi tamamlamadan birinden diğerine geçer.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
23. Anne ve babasının yüz ifadelerini hızlıca fark eder.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
24. Küçük bir kesik veya çürük keyfini oldukça kaçırır.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
25. Parçaların üst üste konmasını veya eklenmesini gerektiren uğraşılara (lego gibi) kendini verir ve uzun süre çalışır.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
26. İstediği bir şeyi (ör. oyuncak) hemen elde etmek etmek ister.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
27. Hikaye dinlerken ilgisi kolayca dağılır.	**1**	**2**	**3**	**4**	**5**	**6**	**7**

28. Nesnelerdeki ufak lekeleri, kirleri bile fark eder.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
29. Bir faaliyetten diğerine kolaylıkla geçer.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
30.Çok parlak ışık veya renklerden rahatsız olur.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
31. İstediğini alamadığında sinirini kontrol edemez, öfke nöbeti geçirir.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
32. İstendiğinde, yapmakta olduğu işi kolaylıkla bırakabilir.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
33. Yemek, sigara veya parfüm gibi kokuları genellikle fark eder.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
34. İlginç bir oyuncakla oynarken çevresiyle ilgilenmez.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
35. Oynamak istediği şeyi bulamadığında öfkelenir	**1**	**2**	**3**	**4**	**5**	**6**	**7**
36.Yünlü giysiler, kıyafetlerdeki etiketler gibi pürüzlü/sert maddelerin cildine değmesinden rahatsızlık duyar.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
37. Hareketlerini kontrol etmesi gereken oyunlarda (deve-cüce vb) iyidir.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
38. Talimatları takip etmekte zorlanır.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
39. Yeni bir faaliyete başlamadan önce beklemesi söylendiğinde bekleyebilir.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
40.Azıcık canı yansa bile ağlamaklı olur.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
41. Bir şey için sırada beklemekte zorlanır.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
42. Yerinde kıpırdamadan oturması söylendiğinde, bunu yapmakta güçlük çeker (ör:	**1**	**2**	**3**	**4**	**5**	**6**	**7**

sinemada, sınıfta).							
43. Tehlikeli olduğu söylenen yerlere yavaş ve temkinli yaklaşır.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
44. Dikkatli olması gereken yerlerde (ör: karşıdan karşıya geçerken) temkinli değildir.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
45. “Hayır” dendiğinde yapmakta olduğu şeyi kolayca bırakabilir.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
46. Çok yüksek ve cızırtılı seslerden rahatsız olur.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
47. Bir şeyi yapmaması gerektiği söylendiğinde, genellikle içinden gelen dürtüye karşı koyabilir.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
48. Oturma odasındaki yeni eşyaları ve değişiklikleri hemen fark eder.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
49. Yeni bir faaliyeti deneyen en son çocuklardan biridir.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
50. Yapmak istediği bir şey engellendiğinde bayağı hayal kırıklığına uğrar.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
51. Söylendiğinde sesini alçaltabilir.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
52. Başkaları konuşurken bazen sözlerini keser.	**1**	**2**	**3**	**4**	**5**	**6**	**7**

BEHAVIOR RATING INVENTORY OF EXECUTIVE FUNCTION – PRESCHOOL
Yönetici İşlevlere Yönelik Davranış Derecelendirme Envanteri
(YİYDDE)
EBEVEYN FORMU

İlerleyen sayfalarda çocukları tarif eden ifadelerin bir listesi bulunmaktadır. Çocuğunuzun, geçirdiğiniz **6 ay** boyunca bu ifadelerde belirtilen davranışlarla ilgili problem yaşayıp yaşamadığını öğrenmek istiyoruz. Lütfen bütün maddeler için verebileceğiniz en iyi yanıtı veriniz. Lütfen hiçbir maddeyi atlamayınız. Her bir ifadeyi okurken çocuğunuzu düşününüz ve cevabınızı yuvarlak içine alınız.

Eğer davranış hiçbir zaman sorun olmuyorsa H

Eğer davranış bazen sorun oluyorsa B

Eğer davranış sık sık sorun oluyorsa S

Örneğin, çocuğunuz ödevlerini zamanında bitirmekte hiçbir zaman sorun yaşamıyorsa, bu madde için H harfini yuvarlak içine alınız:

Ödevlerini zamanında bitirmekte zorlanır (H) B S

Eğer bir hata yapar ya da cevabınızı değiştirmek isterseniz, SİLMEYİNİZ. Değiştirmek istediğiniz yanıt üzerine bir çarpı (X) koyunuz ve sonra doğru yanıtı yuvarlak içine alınız.

Ödevlerini zamanında bitirmekte zorlanır (X) B (S)

Maddeleri yanıtlamaya başlamadan önce, bir sonraki sayfanın en üst kısmında bulunan boşlukları, çocuğunuzun ismini, cinsiyetini, kaçıncı sınıfa gittiğini, yaşını, doğum tarihini, kendi isminizi, çocukla olan yakınlığınızı ve bugünün tarihini yazarak doldurunuz.

Çocuğun ismi…… Cinsiyeti……Sınıfı……Yaşı……

Doğum Tarihi…/…/….. İsminiz……

Çocukla yakınlığınız…… Bugünün Tarihi…/…/…….

		Hiçbir zaman	Bazen	Sık sık
1.	Küçük sorunlara aşırı tepkiler verir.	H	B	S
2.	Yapması için üç şey istendiğinde sadece ilkini ya da sonuncusunu hatırlar.	H	B	S
3.	Hareketlerinin diğerlerini nasıl etkilediğinin ya da sıkıntıya soktuğunun farkında değildir.	H	B	S
4.	Bir yeri temizlemesi istendiğinde eşyaları düzensiz ve rastgele koyar.	H	B	S
5.	Yeni ortamlarda tedirgin olur.	H	B	S
6.	Ani sinir patlamaları yaşar.	H	B	S
7.	Bir görevi tamamlası için gerekli olan işlemleri yürütmekte zorlanır. (örneğin; tek bir yap-boz parçasını denemek, ödül için temizlik yapmak)	H	B	S
8.	Diğerleri dursa bile komik şeylere veya olaylara gülerken kendini durduramaz.	H	B	S
9.	İstekli bile olsa bir görevi yapması için bunun ona söylenmesi gerekir.	H	B	S
10.	Yeni durumlara alışmakta zorluk yaşar.	H	B	S
11.	Çok kolay üzülür.	H	B	S
12.	Oyunlara, yap-bozlara ya da aktivitelere konsantre olmakta güçlük yaşar.	H	B	S
13.	Sıkı bir şekilde gözlenmelidir.	H	B	S
14.	Bir şey almaya gönderildiğinde ne alması gerektiğini unutur.	H	B	S
15.	Planlarda bir değişiklik (örneğin; günlük aktivitelerin sırası, son dakika değişikliklerinin eklenmesi, markete giden yolun değiştirilmesi) olduğunda rahatsız olur.	H	B	S
16.	Küçük bir sebepten dolayı sinir patlamaları yaşar.	H	B	S
17.	Yardım edildiğinde bile aynı hataları yapmaya devam	H	B	S

	eder.			
18.	Grup içinde daha hiddetli ve saçma davranışlar sergiler.	H	B	S
19.	Kıyafetlerini gözlüğünü, ayakkabılarını, oyuncaklarını, kitaplarını kalemlerini spesifik yönergeler verildiği halde bulamaz.)	H	B	S
20.	Yeni ortamlarda ya da durumlarda kendini rahat hissetmesi uzun sürer (uzak bir akraba ziyaretinde ya da yeni arkadaşlarla)	H	B	S
21.	Duygu durumu sık sık değişir.	H	B	S
22.	Yapabileceği şeylerde saçma hatalar yapar.	H	B	S
23.	Yerinde duramaz kıpır kıpırdır.	H	B	S
24.	Uyku, yeme ve oyun aktivilerinde yerleşik rutinleri takip etmekte zorlanır.	H	B	S
25.	Gürültüden, parlak ışıklardan ve belirli kokulardan rahatsız olur.	H	B	S
26.	Önemsiz olaylar büyük tepkileri tetikler.	H	B	S
27.	Birden fazla aşaması olan günlük işleri ve aktiviteleri yapmakta zorlanır.	H	B	S
28.	Fevri hareket eder.	H	B	S
29.	Bir problemi çözerken ya da tamamlarken sıkıştığında farklı bir çözüm yolu düşünmekte zorlanır.	H	B	S
30.	Çevresinde olan değişikliklerden rahatsız olur; örneğin yeni bir eşya, odasında bir şeyin yerinin değişmesi, ya da yeni kıyafetler...	H	B	S
31.	Sinir ya da ağlama krizleri şiddetlidir ancak aniden bitiverir.	H	B	S
32.	Bir işi sürdürebilmesi için bir yetişkine ihtiyaç duyar.	H	B	S
33.	Davranışlarının olumsuz tepkilere neden olduğunu fark etmez.	H	B	S
34.	Başkalarının düzenlemesini gerektirecek boyutta dağınıklık yaratır.	H	B	S
35.	Aktiviteleri değiştirmekte zorlanır.	H	B	S

36.	Diğer çocuklara nazaran, olaylara daha sert tepkiler verir.	H	B	S
37.	Bir aktiviteyi gerçekleştirirken, ne yapmakta olduğunu unutur.	H	B	S
38.	Belirli davranışlarının diğerlerini rahatsız ettiğinin farkına varmaz.	H	B	S
39.	Bir görevin ya da durumun küçük detaylarına takılıp ana fikri kaçırır.	H	B	S
40.	Yabancı olduğu sosyal aktivitelere katılmakta zorlanır; doğum günü partileri, piknikler, bayram ziyaretleri	H	B	S
41.	Tipik günlük aktivitelerden bunalır ya da yorulur.	H	B	S
42.	Görevleri bitirmekte zorlanır (örneğin; oyunlar, yap-bozlar, -mış gibi oyun aktiviteleri)	H	B	S
43.	Arkadaşlarına nazaran daha çok kontrolden çıkar.	H	B	S
44.	Detaylı yönergeler verildiği halde odasında ya da oyun alanındaki bazı şeyleri bulamaz.	H	B	S
45.	Rutinlerde, yemeklerde ya da mekanlarda yapulan değişikliklere karşı dirençlidir.	H	B	S
46.	Bir problem yaşadıktan sonra uzun süre canı sıkılır.	H	B	S
47.	Aynı konu üzerine uzun süre konuşamaz.	H	B	S
48.	Çok gürültülü bir şekilde konuşur ya da oynar.	H	B	S
49.	Yönergeler verildikten sonra bile görevleri bitiremez.	H	B	S
50.	Kalabalık, yoğun durumlarda örneğin çok gürültülü, aktiviteli ya da insanların fazla olduğu yorulmuş ve fazla uyarılmış davranır.	H	B	S
51.	Yönlendirildikten sonra bile aktivitelere ya da görevlere başlamakta zorlanır.	H	B	S
52.	Aşırı asi ve kontrolden çıkmış davranışlar sergiler.	H	B	S
53.	Aktiviteleri yaparken kendi becerilerini gösterecek biçimde çaba göstermez.	H	B	S
54.	Uyarıldıktan sonra hareketlerini frenlemekte güçlük çeker.	H	B	S
55.	Bir olayı, kişiyi ya da hikayeyi tasvir etmeyi bitiremez.	H	B	S
56.	Görevleri ya da aktiviteleri çabucak bitirir.	H	B	S
57.	Güçlü ve güçsüz yanlarının farkında değildir.	H	B	S

58.	Aktivitelerde kolayca dikkati dağılır.	H	B	S
59.	Bir kaç dakika için bile olsa bazı şeyleri hatırlamakta güçlük çeker.	H	B	S
60.	Çok budalaca davranışlar sergiler.	H	B	S
61.	Kısa bir dikkat süresi vardır.	H	B	S
62.	Yaralanabileceği yerlerde örneğin oyun parkında, yüzme havuzunda dikkatsiz ve düşünmeden oynar.	H	B	S
63.	Bir görevi yaparken doğru ya da yanlış yaptğının farkında değildir.	H	B	S

LEARNING RELATED BEHAVIORS

Öğrenme Davranışları Anketi (ÖDA)

Aşağıda çocuğunuzla ilgili bazı maddeler bulunmaktadır. Çocuğunuzun davranışlarını **son 2 aydır** tarif eden açıklamaları en iyi karşıladığınızı düşündüren maddeleri işaretleyiniz (Her zaman, bazen, hiçbir zaman)

		Her zaman	Bazen	Hiç bir zaman
1.	Engellendiğinde agresifleşir ya da saldırganlaşır.	1	2	3
2.	Duygu durumu kötü olduğunda düzgün çalışmaz	1	2	3
3.	Öğretmenlerini memnun etmek için çok az çaba gösterir.	1	2	3
4.	Öğretmenine dikkatini vermez.	1	2	3
5.	Zorluklarla karşılaştığında yardım edilmesini istemez.	1	2	3
6.	Grup aktivitelerinde işbirliğinde bulunmaz.	1	2	3
7.	İhtiyaç duyduğu yardımı kabul etmez.	1	2	3

SCHOOL READINESS SURVEY
OKULA HAZIR OLMA ÖLÇEĞİ

Aşağıdaki maddeler okul öncesi yaşındaki çocuklar için doğru ya da yanlış olabilir. Lütfen bu maddelerin sizin çocuğunuz için ne kadar doğru ya da ne kadar yanlış olduğunu belirtiniz.

	Tamamen Yanlış	Yanlış	Emin Değilim	Doğru	Çok Doğru
1. Çocuğum kendi adını yazmak için çaba gösterir.	1	2	3	4	5
2. Çocuğun elinde iki bisküvi varken eline bir taha daha aldığında üç tane olduğunu bilir.	1	2	3	4	5
3. Çocuğum hangi televizyon programını seytretmek istediğini söyler.	1	2	3	4	5
4. Çocuğum isminin ilk harfini yazabilir.	1	2	3	4	5
5. Çocuğum ona sorulduğunda bir şeyin hani renk olduğunu söyler.	1	2	3	4	5
6. Çocuğum bir yeri ağrıdında derdini anlatır.	1	2	3	4	5
7. Çocuğum tuvaleti nasıl kullanacağını bilir (sifon çekmek, kapağı kapatmak gibi)	1	2	3	4	5
8. Çocuğum plastik şişeden su içebilir.	1	2	3	4	5
9. Çocuğum yeni öğrendiği kelimeleri konuşurken kullanır.	1	2	3	4	5
10. Çocuğum kitapların ne anlattığını merak eder.	1	2	3	4	5
11. Çocuğum bir yerde ismi yazılıysa onu okuyabilir.	1	2	3	4	5
12. Çocuğum elindeki bisküvileri sayabilir.	1	2	3	4	5
13. Çocuğum kitapların sadece resimleriyle ilgilenir.	1	2	3	4	5
14. Çocuğum şeker, kurabiye gibi şeyleri bir kaç kişiye eşit olarak dağıtabilir.	1	2	3	4	5
15. Çocuğum ona yeni şeyler öğretirken çabuk sıkılır.	1	2	3	4	5

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