The Moderating Role of Reactivity in the Association of Parenting with Verbal Ability

by

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STATEMENT OF AUTHORSHIP

This thesis contains no material which has been accepted for any award or any other degree or diploma in any university or other institution. It is affirmed by the candidate that, to the best of his knowledge, the thesis contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

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ABSTRACT

According to the ecological systems theory, characteristics of the developing child interact with his/her ecology in shaping the child's developmental outcomes (Bronfenbrenner, 1992). This study examines how one temperamental characteristic of the child, i.e., reactivity, moderates the association of parenting behaviors (positive parenting, academic stimulation, punishment) with verbal abilities of children. In this thesis, the first two waves of the nationally representative data of The Early Childhood Developmental Ecologies in Turkey (ECDET) are used (N=1052). Reactivity is defined as the temperamental tendency to express negative emotional reactions to changes in the environment. In the literature, children who had high reactivity were found to be vulnerable to environmental risks and they developed or functioned poorly in the presence of risk factors. However, differential susceptibility theory considers reactivity as an indicator of plasticity rather than an indicator of vulnerability. According to this hypothesis, children with high reactivity tend to be more sensitive to both the risks and the positive aspects of their developmental ecologies than other children. In this research, I tested whether children who were highly reactive had better verbal skills than other children when the mothers were supportive. Results provided limited support for the differential susceptibility theory. In the presence of a high level of academic stimulation, highly reactive children benefited from this stimulation more than others and their receptive vocabulary levels were higher than other children. However, in line with diathesis-stress theory, other positive parenting practices only reduced the gap between children with high and low reactivity. This research not only provided evidence for the differential susceptibility theory in a collectivistic culture but also suggested that this theory required further cross-cultural validation.

Keywords: parenting, verbal ability, reactivity, differential susceptibility theory

ÖZET

Ekolojik kuram'a göre, çocuğun karakteri ve onun ekolojisi arasındaki etkileşim çocuğun gelişimini şekillendirir. Bu çalışma, çocuğun mizaç özelliklerinden birinin, tepkisellik, ebevenylik davranışları ve çocukların sözel becerileri arasındaki ilişkiyi nasıl etkilediğini incelemektedir. Bu araştırmada, Türkiye'de Erken Çocukluk Gelisim Ekolojileri (TEÇGE) araştırmasının ilk iki dalgasının verileri kullanılmaktadır (N=1052). Tepkisellik, ortamdaki değişikliklere olumsuz duygusal tepkiler gösterilmesini sağlayan mizaç yatkınlığı olarak tanımlanmıştır. Literatürde, yüksek tepkiselliği olan çocukların çevresel risklerden kolayca etkilenebilir olduğu bulunmuştur. Ancak, ayırıcı duyarlılık kuramı tepkiselliğin olumsuz bir hassasiyetten çok bir plastisite göstergesi olduğunu iddia etmiştir. Bu kurama göre, yüksek tepkiselliğe sahip çocuklar gelişimsel ekolojilerinin hem olumlu hem de olumsuz taraflarına karşı diğer çocuklardan daha duyarlı olma eğilimi göstermektedirler. Bu çalışmada, yüksek tepkiselliği olan çocukların anneleri destekleyici olduğunda diğer çocuklardan daha iyi sözel becerileri olup olmadığını test ettim. Sonuçlar ayırıcı duyarlılık kuramına sınırlı destek sağladı. Akademik uyarıcıların yüksek olduğu taktirde, yüksek tepkiselliği olan çocukların bu uyarıcılardan diğer çocuklara göre daha fazla yararlandığı ve alıcı kelime dağarcığının diğer çocuklara gore daha geniş olduğu bulunmuştur. Ancak, yatkınlık-zorlanım kuramına paralel olarak, diğer olumlu ebevenyn davranışları sadece tepkiselliği az ve çok olan çocuklar arasındaki farkı kapamıştır. Bu araştırma, hem ayırıcı duyarlılık kuramına toplulukçu bir kültürde kanıt bulmuştur hem de bu kuramın kültürler arası geçerliğinin test edilmesi gerektiğini önermiştir.

Anahtar Sözcükler: Ebevenylik, tepkisellik, sözel beceri, ayırıcı duyarlılık kuramı

DEDICATION

To my Love,

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Chapter 1: Introduction

The main aim of the current research was to study how the effects of parenting on verbal ability varied between children with high reactivity and low reactivity. This research built on two established lines of previous research. First, the association between parenting and cognitive abilities has been well-articulated in existing research (Bradley & Caldwell, 1980; Chang, Park, & Kim, 2009; Gerschoff, Aber, Raver, & Lennon, 2007; Lugo-Gill & Tamis-LeMonda, 2008). Second, the importance of considering child reactivity in studying various outcomes of child development has been well-supported theoretically and empirically (Belsky, Hsieh, & Crnic, 1998; Bronfenbrenner, 1992; Cassidy et al., 2011; Gallagher, 2002; Mesman et al., 2009). Recent evidence from the research on differential susceptibility theory indicated the critical role of temperament-parenting interaction on child development (Ellis, Boyce, Belsky, Bakermans-Kranenburg, & van Ijzendoorn, 2011). In line with the differential susceptibility theory, the present research examined the moderating role of temperamental reactivity in the association of parenting with verbal abilities of children.

This research aimed to contribute to studies based on differential susceptibility theory in two ways. First, most of the studies in this literature tested this theory for the social development of children (Knafo, Salomon, Israel, & Ebstein, 2011; Kochanska, Philibert, & Barry, 2009; Poehlmann et al., 2011; Ramchandani, van IJzendoorn, & Bakermans-Kranenburg, 2010). Little was done concerning cognitive abilities of children with a differential susceptibility perspective. Second, these studies generally had samples that were composed of white, middle class families and their children (Belsky et al., 1998; Pluess & Belsky; 2009, 2010; Bakermans-Kranenburg & van IJzendoorn, 2011). The present study is the first study that tested the differential susceptibility theory in a collectivistic society with a representative sample.

In early childhood, verbal skills were not only a part of cognitive abilities but also it was an enabling agent for them; it helped children acquire cognitive skills (Nelson, 1996). In the literature, this role of verbal skills explained with two processes: First, children who are advanced in language evoke more interaction with adults than children who are less advanced. Second, children who know more words, have higher processing speed of information than children with lower vocabulary. Thus, vocabulary may increase the acquisition of cognitive abilities (Hurtado et al., 2008). Several studies found that vocabulary size in early years was associated with linguistic and cognitive abilities later in childhood (Feldman et al., 2005; Fernald, Perfors, & Marchman, 2006). Therefore, vocabulary knowledge has been assumed to be a core aspect of general intelligence at these ages. For example, performance on standardized vocabulary tests has been highly correlated with performance on general tests of IQ (Dunn & Dunn, 1997).

It is also important to examine early verbal abilities of children because these skills predict later social and cognitive development. Research showed that poor language skills are related to externalizing behaviors (Menting, van Lier, & M. Koot, 2011; Moffitt & Caspi, 2001; Se´guin, Parent, Tremblay, & Zelazo, 2009). In addition, literature showed that early vocabulary of children predicted later verbal IQ, early literacy development, school readiness and reading comprehension (Bornstein & Haynes, 1998; Fewell & Deutscher, 2002; Forget-Dubois et al. 2009; Storch & Whitehurst, 2002). A long term longitudinal study indicated that after the effects of income, maternal education and quality of home environment were controlled, early vocabulary skills still predicted literacy skills of young adults (Baydar, Brooks-Gunn, & Furstenberg, 1993). Therefore, understanding sources of variability in children's verbal abilities in early childhood is important because of its association with long term trajectories of development.

This research is based on data provided by the first and only longitudinal study that examines the early developmental ecologies of Turkish children. Furthermore, Early Childhood Developmental Ecologies in Turkey (ECDET) is the first nationally representative child development study in Turkey. This study collects information about child and family characteristics and the developmental ecology of the child such as the neighborhood characteristics to understand the early developmental trajectories of Turkish children (Baydar et al., 2008). ECDET started to follow 1,052 3-year old children and these children are reassessed each year for 5 years. Until now, four waves of the study have been completed and this thesis uses data from the first two years.

The introductory section gives information about the theoretical basis of the current study. The definition and dimensions of temperament and the conceptualization of reactivity in the study are also presented. Then, the differential susceptibility theory, which served as the basis for this thesis, is introduced, and it is used to advance hypotheses of the study. The research hypotheses and conceptual framework of the study are presented.

1.1 The theoretical basis

This research contributed to the literature by examining the effect of nature-nurture interaction on child outcomes using the recently advanced differential susceptibility theory. Relative contribution of nature and nurture on child development has been discussed for many years. Parenting and other contextual factors were considered to be the most important predictors of child development at 60's and 70's (Baumrind, 1979; Maccoby, 1980). However, in the past decades, the common perspective about the dominant effect of parenting and rearing environment on child development was attenuated because of the advancements in genetic research in child development and the estimated effect of genotype on developmental outcomes was as prominent as the effect of parenting (McGuffin, Riley, &

Plomin, 2001). However, rather than declaring one or the other less important, recent literature has examined the interaction between nature and nurture to study child development (Bakermans-Kranenburg & van Ijzendoorn, 2010; Boyce & Ellis, 2005,2011; Kochanska, 1997; Lerner, 1995; Pluess & Belsky, 2009; 2010). This tendency in the current research has been generated by the ecological systems theory (Bronfenbrenner, 1992) and it was supported by the diathesis-stress theory (Monroe & Simons, 1991) and lately by the differential susceptibility theory (Pluess & Belsky, 2010).

This research was based on the premise that children varied in how they were affected by their environmental experiences. This premise was suggested by transactional/dual-risk model (Sameroff, 1983) and the diathesis-stress model (Monroe & Simons, 1991; Zuckerman, 1999) both of which pointed out the vulnerability of some individuals' development because of their temperamental (e.g., "difficult" temperament), genetic or physiological make-up. Researchers pointed out that these individuals reacted to negative circumstances more strongly than others, and thus they were developmentally at risk (Rothbart & Bates, 1998). Resiliency theory contributed to this topic by proposing that some individuals were not affected by environmental adversity as much as their counterparts. Even though the main focus of theory was on the protective environmental factors that created resiliency, it paid attention to child's innate characteristics that functioned as a protector against environmental risks (Luthar & Cicchetti, 2000). Recently, differential susceptibility theory and biological-sensitivity to context theory stated that some children were more susceptible to environmental influences in both positively and negatively (Ellis et al., 2011). In line with the differential susceptibility, the current research studied differences in child's susceptibility to environment influences via examining the effects of parenting on verbal ability depending on the temperamental characteristics of the children.

1.2 Definition and dimensions of temperament

In this study, temperament referred to biologically based child characteristics that were also affected by environment. Some researchers defined temperament as the biologically based core of individual differences that are stable across time and situations (Hagekull, 1989). Thomas and Chess (1977) stated that "*temperament is relatively innate in nature, and well established by 2–3 months of age"* (Chess & Thomas, 1977). Rothbart & Bates (2006) noted that the biological basis of temperament was evidenced by its strong correlation with later personality. They nonetheless defined temperament as *constitutionally-based individual differences in reactivity and self-regulation*. The term "constitutional" in this case was used to underscore the contribution of the interaction between genotype and environment in the expression of temperament. It was generally emphasized that "*temperament is about inclinations which may not be continually expressed and requires the presence of specific eliciting conditions"* (Rothbart & Bates, 2006). That is, temperament had a biological base but experience and maturation could influence its expression in behaviors.

Rothbart and Bates (2006) suggested two main dimensions of temperament, i.e., reactivity and self-regulation. Self-regulation represented the control of the child over his/her emotions and behaviors, but especially the control over his/her attention. Reactivity or negative emotionality referred to the temperamental tendency to intensely experience various forms of negative affect such as anger, and fear. Reactivity was considered to be the core dimension of a "difficult temperament" because reactive children showed more negative reactions when interacting with others than children who were not reactive (Bryan & Dix, 2008; Paulussen-Hoogeboom et al., 2007). Therefore, they needed more attention and more effort from their parents to soothe them than other children. As a result, these children were considered "difficult". Recently, Ellis et al. (2011) referred to reactivity as the behavioral

indicator of neurobiological susceptibility of children to their environment. Many researchers in the differential susceptibility literature have used reactivity to measure susceptibility of the children to their environment (Pluess & Belksy, 2009, 2010). That is the reason reactivity was used to study child susceptibility to environmental influences in the current research.

1.3 Conceptualization of reactivity (negative emotionality)

This research embraced the perspective of positive psychology to study child development. Positive psychology focused on the possible effects of positive individual traits and positive experiences on human development with the aim of preventing negative outcomes (Seligman, 2003). This study investigated the potential positive contribution of temperamental reactivity to child development.

There are two main theoretical approaches to explain the association between reactivity and child development: the diathesis stress model and the differential susceptibility model. The diathesis-stress model argued that some individuals were more vulnerable than others to environmental effects due to their temperamental (e.g., difficult temperament), biological (e.g., highly physiologically reactive), or genetic (e.g., 5 HTTLPR short alleles, DRD4) make-up (Monroe & Simons, 1991). In this perspective, "diathesis" referred to individual characteristics that made children vulnerable to environmental adversity; "stress" has referred to negative environmental factors that trigger the maladaptive developmental characteristics. In this model, reactivity was a vulnerability factor that caused negative developmental outcomes in the presence of environmental stress. In addition, reactivity did not make a difference for children in developmental outcomes when they were in the context of a supportive environment. That means, reactive children did not differ from other children when they were supported. Therefore, the negative effects of reactivity on child development were generally emphasized in the related literature (Rothbart & Bates, 2006).

The differential susceptibility theory had a more positive perspective than the diathesis-stress model in explaining the development of children who had high reactivity. Proponents of the differential susceptibility theory suggested that *"some children, for temperamental or genetic reasons, are actually more susceptible to both (a) the adverse effects of unsupportive parenting and (b) the beneficial effect of supportive parenting"* (Belsky, Bakermans- Kranenburg, & IJzendoorn, 2007). According to this theory, "difficult temperament" was a plasticity factor rather than a vulnerability factor. That is, this theory accepted that reactivity could be risk factor, but it suggested that reactivity could lead to positive outcomes too. Thus, children who had high reactivity showed substantial improvements in developmental outcomes in responsive home environments compared to children with high reactivity who were raised in unsupportive home environments (Pluess & Belsky, 2009). With the premises of the differential susceptibility theory, current research examined how the verbal abilities of children who had high reactivity may be affected differentially by the home environment.

1.4 Conceptualization of the differential susceptibility theory

The role of parenting and temperament in the differential susceptibility theory can be conceptualized through two different approaches. First, parenting can be interpreted as a moderating variable in the association of temperament with child development (Barry, Kochanska, Philibert, 2008; Karreman, de Haas, van Tuijl, van Aken, Dekovic, 2010). Reactivity affects child development negatively but this effect may vary depending on the characteristics of parenting. Children with high reactivity may substantially fall behind their counterparts with negative parenting but they exceed the levels of other children in the presence of positive parenting. Thus, parenting can be considered as the moderator in the association of temperament with child development.

Alternatively, reactivity can be conceptualized as the moderating factor in the effect of parenting on child development (Lengua, 2008; van Zeijl et al., 2007). Positive parenting practices has been accepted as beneficial for child development (Bradley & Caldwell, 1984, 1989; Hubs-Tait et al., 2002) but the effect of parenting on developmental outcomes of children can show variability depending on child temperament. Children who had high reactivity may exceed in developmental outcomes of their counterparts in the presence of supportive parenting although they may be at a substantial disadvantage in the presence of negative parenting practices. Thus, the moderating role of child temperament in the association of parenting with child development can be considered an alternative interpretation to the previous argument.

Almost all of the research that studied the differential susceptibility theory has conceptualized reactivity as the moderating factor in the association of parenting with child development (Belsky, Kranenburg, & van IJzendoorn, 2007; Bradley & Corwyn, 2008; Gallagher, 2002; Van Aken et al., 2007). Also, Pluess and Belsky (2007, 2010) often mention reactivity as the susceptibility factor. Thus, in the current study, reactivity, the main indicator of difficult temperament, is conceptualized as the moderator in the association of parenting with verbal ability.

1.5 The conceptual framework and the hypotheses

In line with the relevant literature discussed in detail below, a conceptual framework was proposed and tested (see Figure 1). Two causal processes were proposed in this model that was indicated by the heavy lines in Figure 1: the effect of positive parenting, academic stimulation and punishment measures of parenting (Wave 1) on receptive vocabulary and expressive language indicators of verbal ability (Wave 2), and the effect of reactivity (wave 1)

on the indicators of verbal ability (Wave 2). Also, two main moderation processes were investigated in this research that was indicated by light lines in Figure 1:

- First, reactivity was investigated as the moderator of the association of parenting practices with verbal abilities
- Second, positive environmental factors (positive parenting, academic stimulation) were investigated as moderators of the detrimental effect of punishment on verbal abilities.

The conceptual framework of this research was presented in Figure 1.

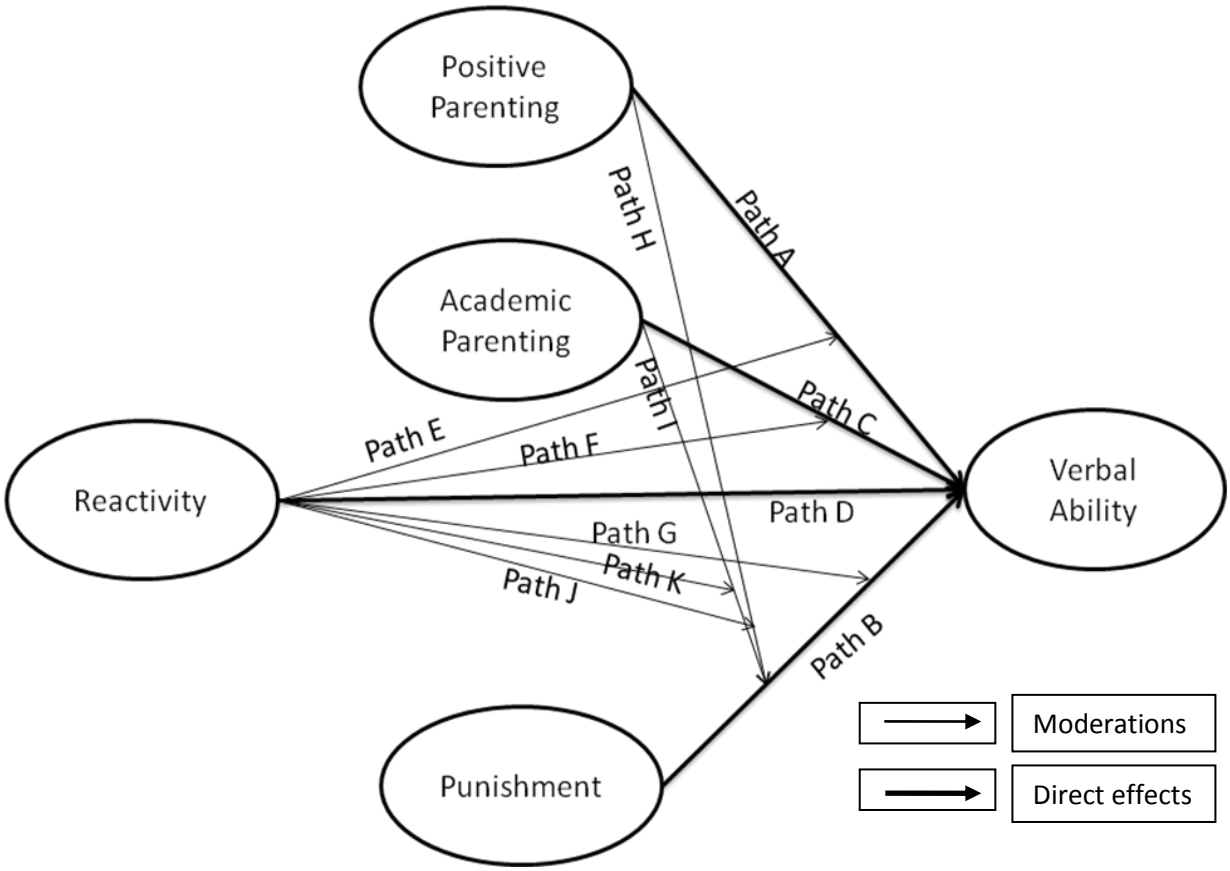

Figure 1. Conceptual Model.

The hypotheses of this research were:

1) Recent studies about the role of reactivity in child development showed that reactivity did not have a direct effect on cognitive abilities (Ellis et al., 2011). In the literature, reactivity was considered and supported as a moderator of the effect of environment on cognitive abilities (Dopkins-Stright, Gallagher, & Kelley, 2008; Pluess & Belsky, 2010). Therefore, the direct effect of reactivity on verbal abilities was expected not to be significant (Path D).

2) Substantial number of studies showed that parenting practices had important influence on verbal abilities (Hoff, 2006; Hurtado, Marchman, and Fernald, 2008; Smith, Landry & Swank, 2000). Thus, the direct effect of parenting (positive parenting, punishment, and academic stimulation) on verbal abilities (Path A, Path B and Path C, respectively) was expected. There were inconsistent empirical findings in identifying the most influential parenting practice on verbal abilities (Hubs-Tait et al., 2002; Straus & Paschall, 2009; Leyendecker, Jäkel, Kademoglu, & Yagmurlu, 2010). On the conceptual basis, maternal academic stimulation was expected to be the most influential.

3) Recent research showed that children with high reactivity were susceptible to environmental influences. That is, these children performed worse than others in cognitive tasks in the presence of negative parenting (Pluess & Belsky, 2010; Dopkins-Stright et al., 2008). However, they performed better than other children in the presence of positive parenting practices. Therefore, reactivity was expected to moderate the relationship between all three parenting dimensions and verbal ability (receptive vocabulary and expressive language). Specifically, these three associations were expected:

- the moderation effect of reactivity on the association of positive parenting with verbal ability (Path E)
- the moderation effect of reactivity on the association of academic stimulation with verbal ability (Path F)
- the moderation effect of reactivity on the association of punishment with verbal ability (Path G)

4) Literature on Turkish parenting practices showed that warmth and punishment coexisted in Turkish families (Kagitcibasi, 2007). Recent research indicated that in Turkish families, parental warmth moderated the effects of parental control on externalizing behaviors (Akcinar et al., 2011). Thus, the current research expected the interaction of positive parenting practices with punishment in affecting verbal ability. Specifically, these two associations were tested :

- the moderation effect of positive parenting on the association of punishment with verbal ability (Path H)
- the moderation effect of academic stimulation on the association of punishment with verbal ability (Path I)

In addition, as it was stated above, highly reactive children were affected from environmental influences more than other children. Thus, it was expected that reactivity moderated the two way interactions between punishment and positive parenting practices in influencing verbal ability. Specifically, these two associations were tested:

- the moderation effect of reactivity on the way positive parenting moderated the negative effects of punishment on verbal ability (Path J)
- the moderation effect of reactivity on the way academic stimulation moderated the negative effects of punishment on verbal ability (Path K)

To summarize, the main motivation of this research was to study the moderating role of temperament in the association of parenting with verbal ability. The theoretical reasons to study this role of temperament were explained with ecological systems theory and the new conceptualization of temperament provided by the differential susceptibility theory. In

Chapter 2, differential susceptibility theory is discussed in detail, susceptibility factors are discussed and empirical evidence is presented. In addition, the main dimensions of parenting and the literature about the effect of parenting on verbal outcomes are presented. The arguable evidence of the main effects of temperament on verbal ability and the active influence of the child on the environment are explained. In Chapter 3, information about the ECDET project, the measures and the analysis methods are presented.

Chapter 2: The Literature Review

Temperament was an ancient construct in philosophy that referred to the basic individual differences. Ancient philosophers defined temperament as *endogenously determined basic behavioral characteristics* (Kohnstamm, Bates, & Rothbart, 1998). However, the study of temperament in empirical research in human development dated back only approximately 50 years. Since the beginning of the 20th century, the focus of personality research targeted hereditary individual differences that provided the innate basis of personality (Kohnstamm et al., 1998). The definition and the conceptualization of temperament as a psychological construct were not done until the New York Longitudinal Study (Thomas et al., 1963). In NYLS, some innate child characteristics (e.g. approach, irritability) that constituted child temperament were introduced. Also, three different types of temperament (easy, slow-to-warm-up, difficult) were defined in order to classify children. After the conceptualization of temperament, the number of studies that investigated the association of temperament with personality increased substantially (Rothbart & Bates, 2006). The effect of temperament on social development (e.g. prosocial behaviors, morality) was also studied because temperament could explain why some children behaved differently than others in similar social interactions (Sanson, Hemphill, Yagmurlu, & McClowry, 2011). However, research about the potential association of temperament with cognitive

development was relatively rare. The differential susceptibility theory provided a new conceptualization for temperament research (Pluess & Belsky, 2007). The number of the studies that examined the effect of temperament on cognitive development increased with this new conceptualization (Pluess & Belsky, 2009; Dopkins-Stright et al., 2008).

2.1 The effect of reactivity on verbal ability

In childhood, learning depends mainly on child's ability to learn and on parent-child interactions. Thus, children with high attention span had higher verbal abilities because learning started by attending to stimulating individuals and objects (Dixon & Smith, 2000; Dixon Jr. & Shore, 1997; Slomkowski, Nelson, Dunn, & Plomin, 1992). Also, children with high positive emotionality had higher verbal abilities than less emotionally positive children because they evoked more positive parent-child interaction and stimulation (Spere, Schmidt, Theall-Honey, & Chang, 2004). Reactivity could compromise verbal development by either overloading children's attention systems or damaging their social relationships (e.g. scaffolding) that were relevant for verbal development.

Attention is a dimension of temperament and it is a fundamental cognitive process that underlies learning. It is important for verbal ability because learning occurs through *attentive exploratory interaction* with objects and other individuals (Dixon JR., Salley, & Clements, 2006). However, reactivity can be a potential distracter of attention; it makes it difficult to maintain focus. Therefore, children who have high reactivity may fall behind other children in terms of verbal outcomes due to the distraction of their attention. Research has showed consistent negative relationship between reactivity and attention (Gaertner, Spinrad, & Eisenberg, 2008). In addition, children with reactivity had shorter attention spans and smaller vocabularies than other children (Gartstein & Rothbart, 2003; Dixon & Smith, 2000;

Karrass & Braungart-Rieker, 2003). Thus, reactivity may affect receptive vocabulary and expressive language through its effect on attention.

Reactivity affects the interpersonal exchanges of children that are important for the development of verbal ability. Parents provided warmth and support to children with positive emotionality, but children who had high reactivity triggered negative parenting practices such as withdrawal of contact (Putnam, Sanson, & Rothbart, 2002). Also, adults wanted to interact and provide cognitive stimulation to reactive children less than their counterparts (Usai, Garello & Viterbori, 2009). That is, reactivity compromises the quantity and quality of parent-child interaction. Thus, reactivity may affect verbal ability through its effects on parenting.

2.2 The effect of parenting on verbal ability

The main dimensions of parenting are reviewed below. Also, empirical and theoretical evidence that supports the association of parenting with vocabulary levels of children is presented.

2.2.1 Introduction to the dimensions of parenting

Theory and research has generally emphasized three main parenting dimensions (Zaslow et al., 2006). The first dimension was the affective relationship between the parent and the child. This referred to emotional support and responsivity of the mother to the child. The second dimension included maternal effort to stimulate the child such as provision of learning activities and stimulating interaction (Zaslow et al., 2006). The third dimension referred to negative parental practices such as power assertive control and neglect of the mother. In this thesis, positive parenting, academic stimulation and punishment variables were measured to represent basic dimensions of parenting.

Research indicated that parenting was associated with cognitive abilities (Bradley & Caldwell, 1980, 1984; Bradley et al., 1989; Bronfenbrenner & Ceci, 1994; Chang et al., 2009; Hubs-Tait et al., 2002; Lugo-gil et al., 2008). There was much research that studied the effects of two of the parenting dimensions or general parenting quality on cognitive development (Barocas et al., 1991; Culp et al., 2000; Diaz, Neal, & Vachio, 1991; Kelly et al., 1996; Jennings & Connors, 1989; Tamis-LeMonda, Bornstein & Baumwell, 2002). However, in the literature, few studies have used three of these main dimensions of parenting separately to predict cognitive development (Hubs-Tait et al., 2002; Straus & Paschall, 2009; Leyendecker, Jäkel, Kademoğlu, & Yagmurlu, 2010). There were no consistent results that showed how these parenting dimensions affected cognitive abilities uniquely and jointly. Straus and Paschall (2009) found that maternal cognitive stimulation had the strongest association with cognitive abilities among other parenting practices. Although the association of corporal punishment with cognitive abilities was found, a similar association was not found for maternal warmth. Leyendecker et al. (2010) found that among the different dimensions of parenting (involvement, positive parenting, inconsistent discipline, rigid discipline practices, and home literacy environment), home literacy environment was the only predictor of cognitive development for German preschoolers and parental involvement was the only one for Turkish preschoolers. Hubs-tait et al. (2002) examined the unique contributions of these three parenting dimensions on cognitive abilities with different cognitive outcomes by using SEMS. They found that cognitive stimulation, emotional support, and intrusive behavior predicted perceptual aspect of cognitive development together and the emotional support and intrusive behavior predicted verbal aspect of cognitive development. In short, research results were not consistent enough to identify the unique contributions of these different parenting

dimensions (positive parenting, academic stimulation, punishment). The present research examined how these different parenting dimensions predicted verbal abilities.

2.2.2 The effect of academic stimulation on verbal ability

Maternal academic stimulation is an important factor in promoting cognitive abilities of the child. Maternal cognitive stimulation consists of the amount and complexity of the structured and spontaneous interactions between the mother and the child. Chang, Park and Kim (2009) showed that the children of parents who engaged in more parent-child activities such as parent-child play and reading had higher cognitive outcomes than their counterparts over three waves. Landry et al. (2000) indicated that when mothers included themselves to their children' activities and stimulated their children during the interaction by providing options and decisions, it positively affected cognitive abilities of the children at both 2 and 3.5 years of age. Smith et al. (2000) indicated that mother-child interactions that included reasoning and discussing of conceptual links about concurrent and following incidents at the age of 3 predicted verbal and non-verbal cognitive abilities of children at the age of 5 even after controlling for SES. Also, Storch and Whitehurst (2001) found that shared reading and access to printing materials were helpful for vocabulary development in preschool children. In addition, Hubs-Tait et al. (2002) found that when both maternal emotional support and maternal intrusiveness were present in the analyses, maternal cognitive stimulation still predicted perceptual aspects of cognitive abilities. Linver et al. (2002) indicated that provision of stimulating experiences at home mediated the relation between family income and cognitive ability of the children.

2.2.3 The importance of positive parenting for cognitive development

It is important for children to have a positive relationship with their parents to promote verbal abilities (Culp et al, 2010). Bronfenbrenner stated that *a warm bond, a strong mutual attachment with a person who is committed to the child's well-being*, was necessary for the social and cognitive development of the children (Bronfenbrenner, 1992). Also, Vygotsky stated that affection motivated children to think and learn (Vygotsky, 1987). He suggested that when there was a learning atmosphere that provided affection and *freedom to err*, it helped learning through promoting the attention and motivation of the child. Estrada, Arsenio, Hess, & Holloway (1987) indicated three ways to explain how affection of the mother influenced child cognitive abilities: providing structured tasks that increased learning, sharing information for the child, and motivating the child to explore and keeping his/her attention on the task. Empirical evidence supported the importance of parental warmth and acceptance for cognitive outcomes. Maternal positive affect was found to be related to children's later receptive vocabulary (Kelly et al., 1996) and concurrent cognitive test scores (Kirsh et al., 1995). Furthermore, the effects of environmental variables such as family resources and parental characteristics on cognitive outcomes of children were mediated by parental warmth and responsiveness (Gerschoff et al., 2008; Kiernan & Huerta, 2008; Lugo-gill et al., 2008). Thus, it is important to consider the effect of positive relationship in the development of verbal ability.

Maternal speech is an important aspect of mother-child interaction and it may affect the vocabulary level of the children. Hurtado et al. (2008) indicated that mothers who talked more with their children could provide *seven times more words, five times more utterances, three times more different words and sentences that were twice as long as the mothers who talked less*. These researchers stated that this high level of verbal stimulation from talkative

mothers helped their children increase their vocabulary and processing speed. Smith, Landry and Swank (2000) found that for both full-term and pre-terms children, maternal effort to stimulate the child and to help the children interact with their environment via directing their attention, contributed to cognitive abilities. In her review, Hoff (2006) underscored that maternal responsiveness and the amount and quality (complex and variety of words) of maternal speech differentiated children in terms of verbal abilities. In conclusion, along with maternal emotional support, maternal speech and language stimulation are important inputs that support the verbal outcomes of the child.

2.2.4 The effect of maternal disciplinary style on verbal ability

The strategy the mother uses for dealing with conflict can be influential for the development of verbal ability of their children. Conflict occurs frequently during the interactions of the mother-child dyad. A mother and a child engage in conflict on average between 3.5 to 15 times (Dix, 1991) or even more frequently (Laible & Thompson, 2002). The mother may use multiple strategies to deal with conflict. She may prefer to engage the child in the problem solving process such as using induction and discussing alternatives. In contrast, the mother may prefer power assertive strategies. If mothers don't prefer power assertive methods of discipline, they would employ verbal methods such as explanations and reasoning to modify the behavior of the child.

Empirical research showed that the strategy the mother used could affect the verbal outcomes of the children. Smith (2000) indicated that the use of verbal methods of discipline such as explanation and reasoning were likely to provide the child with more cognitive stimulation than the use of punishment without induction. Verbal discipline could explain cause-effect relationships to the child and could provide the child with new words and grammar. Smith & Brooks-Gunn (1997) studied the effect of punishment (both verbal and

physical punishment at 12 months) on IQ (36 months) with 715 low birth-weight children. Result showed that the children who were exposed to "harsh discipline" had the lowest IQ, even after controlling for birth weight, neonatal health status, ethnic group, mother's age, family structure, mother's education, and family income. Strauss and Pascall (2009) examined the effect of corporal punishment on the cognitive development of children between the ages 2-4 and then 4 years later. They found that in both cohorts the more children were exposed to corporal punishment; the more they fell behind their counterparts in terms of various cognitive abilities such as math, reading and memory. In addition, research showed that the stress and fear caused by power assertive methods could lead cognitive deficiencies in children (Heuer & Reisberg, 1992; Perry, 2006). Thus, children need some amount of parental control to be able regulate their behaviors and show optimum verbal outcomes but physical punishment or frequent use of power assertive methods can disrupt the normal verbal development of children.

2.2.5 The difference of Turkish parenting practices from the European norms

Parenting practices differ between cultures, specifically; collectivist societies have major differences from individualist cultures. Baumrind indicated three main parenting types based on responsiveness and control in parenting; authoritative, authoritarian and permissive (Bornstein, 1995). She found that most of the parents fell into the categories of authoritarian and authoritative. Authoritative parents provided emotional support and guidance to their children; and they used positive methods of control such as inductive reasoning rather than power assertive methods of control. Authoritarian parenting referred to parental rejection, low emotional support and negative methods of control such as psychological control and physical punishment. New cross-cultural research showed that this classification did not capture the nature of parenting practices in a collectivistic society (Akcinar, 2009; Kagitcibasi, 2007).

Although parents in collectivistic cultures used high amount of power assertive control because respect for autonomy and elderly was an important value (Kagitcibasi, 1989; Taylor & Oskay, 1995); value of children was also high (Kagitcibasi, 1982) and was expected from the mothers to be caring and warm towards the children (Yagmurlu & Sanson, 2009). Leyendecker et al. (2010)'s study indicated that German parents showed more cognitive and academic stimulation and less inconsistent parenting and rigid discipline practices to their children than Turkish parents. However, the same Turkish parents showed as much positive parenting as German parents showed to their preschoolers. That is, Turkish parents showed both high emotional support and high power-assertive control to their children. Thus, in the Turkish sample of this current research, punishment and emotional support are not expected to be two opposite poles of the same continuum. Rather they are expected to coexist.

In collectivistic cultures, parental warmth may moderate the effect of punishment on child outcomes. Parental acceptance-rejection theory indicated that when children perceived parental rejection (i.e., withdrawal of love and care) it led to psychological and behavioral problems in children (Rohner & Britner, 2002). Power assertive methods of control were taken as an expression of rejection in Baumrind's typologies of parenting. Thus, families that use high amount of punishment were considered as rejecting families. However, cross-cultural research showed that warmth in these families should be considered before labeling them as rejecting because especially in collectivistic cultures children did not feel rejection if the level of warmth was high (Deater-Deckard & Dodge, 1997; Hughes, Blom, Rohner, & Britner, 2005; Kagitcibasi, 1996; Rudy & Grusec, 2001). Therefore, the negative effect of punishment on child outcomes was apparent when the child felt rejection of the parents. That is, parental warmth influenced child's perception of the family positively and it decreased the negative effect of punishment on child's developmental outcomes.

There was empirical evidence that indicated the interaction between parenting practices in the area of social development. The correlation between physical punishment and externalizing behavior problems were more substantial in families that provided less warmth than other families (McLoyd & Smith, 2002; Simons, Wu, Lin, Gordon, & Conger, 2000). In addition, Akcinar et al. (2011) studied this notion with a Turkish sample and found that maternal warmth moderated the effects of both psychological and behavioral control on externalizing behaviors of the children. However, there was limited research that examined these interaction patterns with cognitive outcomes and the results were not in line with the literature in social development. Straus and Paschall (2009) found that there was interaction of corporal punishment neither with maternal emotional support nor with maternal cognitive stimulation. However, literature suggested that interaction between parenting practices were expected more in collectivistic societies than individualistic societies. The current research contributed to this limited literature and the consideration of all power assertive methods of discipline.

2.3 The effects of reactivity on parenting

Differences in children's temperament may contribute to the differences in how their parents show affection, apply discipline, and provide cognitive stimulation. Mothers of "difficult" children became disappointed and angry at their children and this temperament (social fearfulness, activity, anger) made the mother unresponsive to the needs and interests of their children (Bryan & Dix, 2008). Along with these negative emotions of the mother, children who were highly reactive were exposed to more power assertive discipline, less warmth and less cognitive stimulation than children with easy temperaments. A brief review of the research that showed the negative effect of the reactivity on parenting is presented below.

Empirical evidence provided support for the negativity of interactions between the children with high reactivity and their parents. Van den Boom and Hoeksma (1994) indicated that in early childhood, child difficulty predicted less visual contact, less stimulation, less physical contact, less soothing and less responsiveness to the signals of the children than other infants. In a study using a within-family design, Jenkins, Rasbash, and O'Connor (2003) found that children who had negative affectivity were exposed to more negative parenting (low warmth, low sensitivity) compared to their siblings. Other researchers showed that these children received more restrictive control and lower physical stimulation (Calkins, Hungerford, & Dedmon, 2004). In addition, their parents tended to use less induction for difficult children' mistakes than the parents of other difficult children (Karraker, Lake, & Parry, 1994). In a meta analysis, Hoogeboom, Stams, Hermanss, & Peetsma (2007) showed that children who had high reactivity evoked less inductive control (9 studies were included and involving 957 mother– child dyads), less responsive parenting (55 studies, 5,467 mother–child dyads) and more restrictive control (22 studies, 2,559 mother–child dyads) than other children. Also, research showed that maternal care and support to reactive children decreased with time although it was high in infancy (Hoogeboom et al., 2007). In conclusion, in this study, the measurements of reactivity and parenting at age 3 were used to eliminate the effect of this association on verbal ability.

2.4 Temperament as a moderator

The theoretical basis for the potential moderating role of temperament on the association of parenting with receptive vocabulary and expressive language is discussed below. Then, different susceptibility factors and specific research that supported the influence of these factors on child development are presented.

2.4.1 The theoretical basis for the moderating role of reactivity

The ecological systems theory proposed that characteristics of the developing child interacted with his/her primary environment over time in shaping the child's developmental competence (Bronfenbrenner, 2005; Lerner, 1995). According to Heckman (2008), abilities are largely produced. He stated that through genetics and structuring the proximal environment of the child, parents were involved in this process (Heckman, 2008). Each child came to the world with some characteristics (e.g. temperament), but the abilities of the child (e.g. cognitive ability) were shaped by the interaction of these early characteristics with parental investments (e.g. cognitive stimulation, emotional support). In line with this notion, psychiatric research pointed at Gene X Environment interaction (Burmeister, McInnis, & Zollner, 2008), and developmental psychology examined Temperament X Parenting interaction (Rothbart & Bates, 2006). Both groups found results that supported this conceptualization of child development. In addition, some researchers suggested that abilities of children with "difficult" temperaments may show variability depending on parenting behavior (Wachs, 2006). They indicated that supportive parenting behaviors helped children regulate their negative dispositions and the child increasingly benefited from the environmental sources of stimulation. Recently, differential susceptibility theory provided a conceptualization for the possible positive role of "difficult" temperament in the association of parenting with developmental outcomes of children (Pluess & Belsky, 2007).

Although the potential positive effect of high reactivity on child development was a fairly recent hypothesis, the interaction of temperament with parenting or the notion of vulnerability created by "difficult" temperament was highly researched. Thus, there were many studies that showed the moderating role of temperament in the association of parenting with child development with a framework of vulnerability. Ramos, Guerin, Gottfried,

Bathurst and Oliver (2005) found that the association of family conflict with behavioral adjustment of children was stronger for "difficult" children than "easy" children. Also, Hetherington (1989) argued that when "difficult" children were exposed to abusive behavior, they were less able to deal with this negative circumstance than other children. Thus children who had difficult temperaments showed less adaptability than other children. No differences in the adaptability of easy and difficult children were observed under circumstances of low stress and high support. Morris, Silk, Steinberg, Sessa, Avenevoli, and Essex (2002) indicated that for irritable children, maternal psychological control was associated with internalizing problems and maternal hostility was associated with externalizing problems. Karrass and Braungart-Rieker (2003) found that responsive parenting predicted better language abilities only when children had distress to novelty (fear component of temperamental reactivity). In addition, different from all these researches, Maziade et al. (1987) found that children with "difficult temperament" was correlated more to verbal IQ for children in high SES families and in families with effective communication than other children. Also, these "difficult children" presented higher IQ than other children. Thus, the effect of the interaction between child reactivity and environmental stressors on developmental outcomes was generally studied with a vulnerability perspective.

2.4.2 Different measurements of susceptibility

Although the theoretical base of the differential susceptibility theory is fairly concise and agreed upon, there has been variation in the factors that has been used to represent susceptibility. There are three specific elements-genotype, neurobiology, and temperament-that were measured to represent children's susceptibility to the environment. Brief descriptions of these methods and empirical evidence from the studies using these methods were presented below.

First, researchers (Bakermans-Kranenburg & van Ijzendoorn, 2011; Belsky et al., 2009; Kochanska, Philibert, & Barry, 2009; Kochanska, Philibert, Kim, & Barry, 2011; Knafo, Israel, & Ebstein, 2011) identified a few specific genes as the susceptibility genes. They have stated that the more plasticity alleles an individual carried (low MAOA activity allele, short alleles (s/s, s/l) of 5-HTTLPR or 7-repeat variant of DRD4), the more susceptible they were to environmental influences. Pluess, Belsky, and Numan (2009) indicated that children with DRD4 gene were diagnosed as ADHD more frequently than other children when there was a negative environment, in that research it was parental smoking. However, they also found that children who carried this gene were diagnosed as ADHD less than other children in the absence of parental smoking. Taylor et al. (2006) found that individuals who carried short allele of 5-HTTLPR showed more depressive symptoms when they were exposed adversity than other situations. The same individuals showed less depressive symptoms than others in the presence of supportive environment. Caspi et al. (2002) found that the association of child maltreatment with social development was stronger for young adults who had low MAOA activity than others.

Another approach to identify susceptibility was biological sensitivity model that focused on physiological stress reactivity as the susceptibility factor (Boyce & Ellis, 2005; Boyce, Essex, Alkon, Goldsmith, Kraemer, Kupfer, 2006; Ellis, Shirtcliff, Boyce, Deardorff, & Essex, 2011; Obradovic, Bush, Stamperdahl, Adler, & Boyce, 2010). It was stated that every individual had their own biological sensitivity to psychological stressors. Neuroendocrine systems of individuals which were responsible for fight or flight response created this sensitivity. This sensitivity was mostly heritable but it was also influenced by the experiences of individuals. For example, Meaney et al. (1992) showed in the research with rats that low quality maternal care (i.e., low levels of maternal licking and grooming) changed

rats' stress physiology and brain morphology and made them more sensitive to environmental stressors than other rats. That is, depending on the experiences, the sensitivity level of individuals could increase or decrease. Heightened stress reactivity indicated an increased biological sensitivity that was the reason of potential negative developmental outcomes under conditions of adversity and positive outcomes under positive conditions.

Obradovic´ et al. (2010) studied interactive effects of stress reactivity (biological indicator of high reactivity) and family adversity on socioemotional and cognitive development in 338 5- to 6-year-old children. Results showed that in the context of low family adversity, reactive children had the lowest levels of externalizing symptoms and the highest levels of prosocial behaviors and school engagement. Also, they showed increased academic competence when they experienced low adversity, and they showed decrease in their academic competence in the presence of high adversity. Similarly, children who were highly reactive had the highest levels of prosocial behaviors in the context of low adversity. Further, environmental factors were not influential on the development on children with low reactivity. Their prosocial behaviors did not change in the presence of different levels of adversity.

The final characteristic that was assessed to indicate susceptibility was temperamental negativity operationalized often as reactivity (Belsky, 1997; Pluess & Belsky, 2009, 2010). It was found that for children with high reactivity environmental factors were more predictive of developmental outcomes than children with low reactivity. Because the environment was not predictable, it was argued that it was evolutionarily advantageous to have susceptibility variation in children. It was suggested that temperamental reactivity could represent susceptibility because it was the behavioral indicator of susceptibility and it was

easier to measure than the genotype or stress reactivity. Empirical evidence that supports the use of "difficult temperament" is provided below.

Blair (2002) found that for an intervention program for preterm babies; the most beneficial effects were seen in the children with high emotional negativity. Bradley and Corwyn (2008) showed that the association of positive parenting with social adjustment was stronger for children with "difficult" temperaments and it was weaker for those with intermediate and low levels of "difficult" temperament. Also, Van Aken et al. (2007) found, that social development of 16- to 19- month-old boys with "difficult" temperament was more positively affected by maternal sensitivity than other children's development. They stated that "difficult" children showed the highest increase in externalizing behavior scores of "difficult" children when there was insensitive parenting with power assertive control but the same children showed the lowest increase in externalizing behaviors when there was sensitive parenting with positive strategies of control.

Despite the supporting theoretical arguments and evidence on social development, little research considered temperament to study the effects of parenting on cognitive abilities (Dopkins-Stright et al, 2008; Kochanska et al, 2011; Obradovic et al, 2011; Pluess & Belsky, 2010). Most of this research used academic competence to represent cognitive abilities (Dopkins-Stright et al, 2008; Kochanska et al, 2011; Obradovic et al, 2011). Dopkins-Stright et al. (2008) found support for the differential susceptibility theory with a large sample (1,040 children and mothers) by testing whether infant temperament moderated relations between maternal parenting (sensitivity, warmth and intrusiveness) in early childhood and children's adjustment in the first grade. They found that infants with difficult temperaments (approach, activity level, intensity of emotions, negative mood, and adaptability) had better academic

competence than less difficult infants when parenting quality was high and poorer academic competence when parenting quality was low.

In their longitudinal study (1-11 years of age), Pluess and Belsky (2010) studied the effect of the home environment and of child care on cognitive development among children with difficult temperaments (activity, approach, adaptability, mood, intensity). They used a wide range of cognitive tasks: Letter–Word Identification, Broad Reading, Applied Problems, Broad Math, Picture Vocabulary. Their results showed that the main effect of parenting and the interaction effect of temperament and parenting were significant rather than the main effect of temperament. The evidence found by Pluess and Belsky (2010) was more apparent for the outcomes of social development than cognitive development. Children with difficult temperaments didn't exceed their counterparts in Math and Vocabulary. However, children with difficult temperaments showed fewer behavior problems than other children when they were in high quality child care.

Recently, one study examined the role of DRD4 gene in early literacy instruction to children (Kegel, Bus, & van Ijzendoorn, 2011). They found that children who carried the susceptibility gene benefited more from the educational instructions and showed higher literacy scores than other children. On the contrary, some studies found no support for differential susceptibility theory. Karrass and Braungart-Rieker (2003) used maternal responsiveness and negative emotionality (distress to novelty, distress to limitations) at 12 months to predict language development at 16 months. They found that maternal responsiveness predicted language development only for children with low distress to novelty in line with diathesis-stress theory but not differential susceptibility theory.

In the current research, temperamental reactivity was used to measure children's susceptibility to environmental influences. Biological or genotypical measures were not available for this sample.

Chapter 3: Method

In this section, the information about ECDET was presented. Also, the design and the sample characteristics of data were introduced. The measures and their psychometric properties were provided. Last, the approach to data analyses was discussed.

3.1 Data

In this section, the design and the characteristics of the ECDET study were presented. Also, the questionnaires that were used to measure targeted variables were described.

3.1.1 The ECDET study

The ECDET is a study that followed the developmental trajectories of children between the ages of 3 to 7 with an ecological perspective. This study was based on the ecological systems theory. Both family factors and factors other than family could influence child development. Furthermore, causal processes that affected child development could vary between individuals, contexts and cultures.

This study was the first and only longitudinal study about the ecologies of child development in Turkey that represented the Turkish population. This study examined the relationship between mother and the child, between the family and the child, and between family and the mother by collecting information on topics such as marital satisfaction, parenting, family support to the mother and developmental characteristics of the child (Baydar

et al., 2008). In addition, to understand cognitive and social development of children, social, environmental, dispositional and health related factors such as maternal psychological and physical health, child temperament and community quality were examined longitudinally, once in a year. This information was gathered by home visits through mother report assessments and home observations. The protocol lasted 2-3 hours. In the current research, the first two waves of these data were used.

3.1.2 Sample

In the ECDET study 1,052 mothers and their three-year-old children from 24 communities in 19 provinces in every region of Turkey were selected by stratified cluster sampling. The ECDET data were collected from a nationally representative sample of 1,052 36-47 month old children at the first wave, and 917 48-59 month old children at the second wave. Interviewers used the help of local officials, public health clinics or door-to-door screening to locate and identify eligible participants for ECDET. Other than few exceptions, all of female primary caregivers in this study were the biological mothers of the children (Baydar et al., 2008).

3.1.3 Measures of the study

In this section, information about the measures and the psychometric properties of these measures was presented**.**

3.1.3.1 Measures of verbal abilities

To measure the verbal abilities of the children, TIFALDI-R Receptive Vocabulary Scale, and the Sentence Repetition Test were used. The psychometric properties of these assessments were provided below.

TIFALDI was developed to measure the receptive and expressive language of children between the ages of 2-12 who were Turkish native speakers (Berument & Guven, 2010). To measure receptive vocabulary, it used cards that contained 4 different pictures, one of them is the target picture the child should pick when the target word was spelled. To measure expressive language, it used cards that contained only 1 picture on it and the child was asked to identify it. There were 104 cards to measure receptive language and 80 cards to measure expressive language. Its test-retest reliaibility was .97 and Cronbach Alpha was .99 for both subtests. The convergent validity of TIFALDI was examined by calculating its correlations with similar scales. There was a significant correlation between the receptive language subtest of TIFALDI and WISC-R ($r = 0.45$, $p<.00$) and between the expressive language subtest of TIFALDI and WISC-R ($r = 0.54$, $p<.00$).

Because the complete version of TIFALDI (norm study and the expressive language subtest) was not finished until 2010, in the present study, a different version of Tifaldi, TIFALDI-R was used to measure receptive vocabulary. This version was designed for the use of ECDET only by Baydar et al. (2008).

"*TIFALDI-R"* is a receptive vocabulary test for the children ages from 3 to 6 (Baydar et al., 2008). The assessment contains 83 items including two training items. The child is asked to show the picture of an object among four alternative pictures. That shows whether the child has necessary receptive language skills to understand the meaning of the word that was read by the interviewer. The basal level contains 9 items, the 3-year old level contains 18 items, 4-year level 15, 5-year old level 24 and the 6-year old level contains 15 items. The administration of the test is terminated if the child answers two thirds of the questions for that age incorrectly. In the development of a scoring system of the TIFALDI-Receptive, a three-parameter logistic Item Response Theory (IRT) model was used on 81 test

items (Baydar, 2008). After the procedure, age standardized scores were calculated by IRT method. In TIFALDI, each child may have responded to different sets of items and a varying number of items during the procedure depending on their performance. That is, all children did not get tested on the same set of items. Therefore, they cannot be scored on the basis of number of correctly answered items (Baydar, 2008). The advantage of IRT is that it yields a TIFALDI score regardless of the total number of items or the difficulty of items received by a given respondent.

The convergent validity of TIFALDI-R was examined by calculating its correlations with similar scales. There was a significant correlation between TIFALDI-R and Corsi short term memory test ($r\ (1052) = 0.36$, $p<.05$). Also, its correlations with parental assessments were examined (Baydar et al., 2008). There was significant correlations between TIFALDI-R and Turkish Vocabulary Test (ACEP) ($r\ (1052) = 0.39$, $p<.05$), education level of the mother ($r\ (1052) = 0.31$, $p<.05$), and the father ($r\ (1052) = 0.27$, $p<.05$).

"*The Sentence Repetition Test*" was developed by the researchers of ACEV (Mother Child Education Foundation) to examine the grammar of low SES children (Taylan, Aksu-Koç & Bekman, 2002). They prepared 20 model sentences which included specific grammatical patterns of Turkish to determine the expressive language skills of the children. The version of the test used in the ECDET study was revised according to the feedback from tthe piloy studies. The sentences included 5-8 words, not much, to eliminate the confounding effect of short term memory. There were 4 five-word sentences, 12 six-word sentences, 2 seven-word sentences and 2 eight-word sentences. The developers paid attention to the semantic difficulty of the sentences as well as their grammatical complexity. The child was asked to repeat the sentences that were getting increasingly difficult. The test ended when the

child failed to exactly repeat three sentences as a row. The item-total correlations varied between .45 and .71.

3.1.3.2 Measure of temperament

The Short Temperament Scale for Children (STSC) (Prior, Sanson, & Oberklaid, 1989) was used to assess temperamental reactivity of the children in this study. The adaptation study of this scale to Turkish was done to examine the temperaments of Turkish children in Australia (Yagmurlu & Sanson, 2009). The STSC included 30 items; each behavior was rated on a 6-point scale, 1 indicating "Almost never" and 6 "Almost always". In the Turkish version, 5-point Likert scale was used to be in line with other scales that were used in the ECDET study. Four temperamental dimensions assessed by these questions were Reactivity (e.g., "When upset or annoyed with a task, my child throws it down, cries, slams doors, etc."), Persistence (e.g., "My child likes to complete one task or activity before going on to the next."), Approach (e.g., "My child is shy when first meeting new children.") and Rhythmicity (e.g., "My child asks for or takes a snack about the same time each day.").

In the current study, reactivity scale was used. The children who were half standard deviation above the mean of the sample were selected as the "highly reactive" group. Other children were considered as the "low reactive" group. The distribution of the reactivity in the sample can be seen in Figure 3.1.

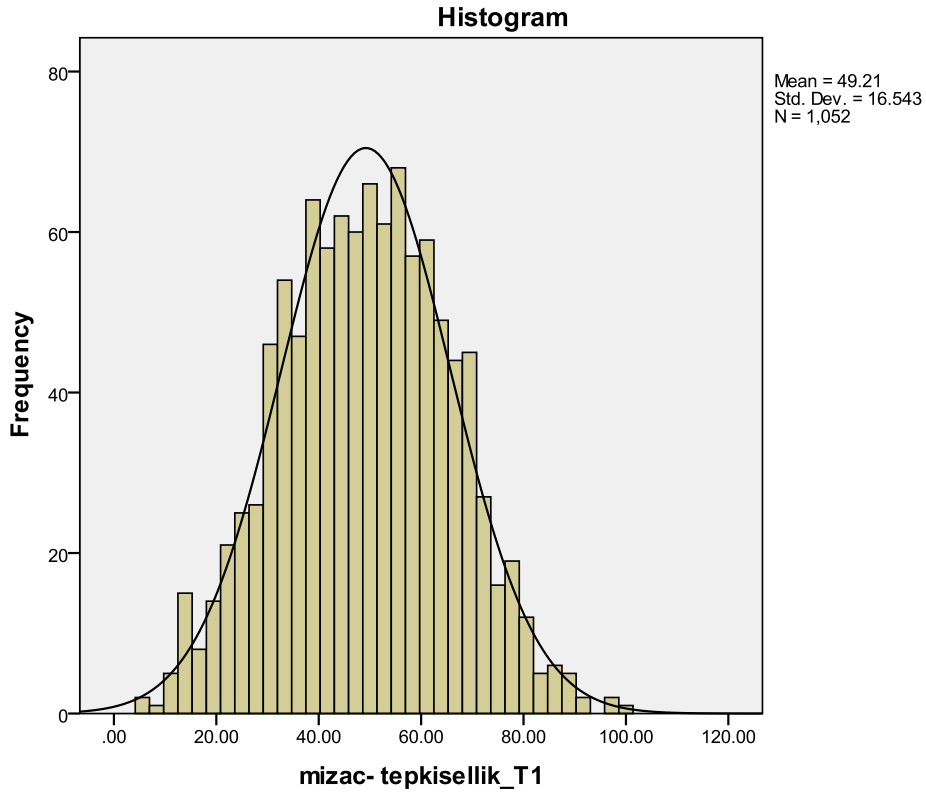

Figure 3.1. The distribution of reactivity in the sample

In this research, to examine whether this cut off functioned to represent highly reactive children, answers of the mothers to selected questions of reactivity measure were checked. The questions were:

- When upset or annoyed with a task, my child throws it down, cries, slams doors etc
- When my child is angry about something, it is difficult to sidetrack him/her
- When shopping together, if I do not buy, what my child wants (i.e sweet, clothing)

  s/he cries and yells.

Seventy percent of the mothers of children with high reactivity on average rated the items below as 5 or 6; but only twenty percent of the mothers of children with low reactivity

rated as 5 or 6. Mothers of the children who were categorized as “highly reactive” assessed their children as generally intense, difficult to soothe and emotionally negative. That is, the cut off worked adequately to represent highly reactive children.

The reliability and validity analysis of reactivity subscale were conducted for ECDET study. The internal reliability score of the reactivity scale is .75 (Baydar et al., 2008). The discriminant validity of reactivity dimension was examined with the “s/he accepts changes without anger and sadness” item of Turkish version of Adaptive Social Behavior Inventory (Baydar et al., 2007). This item can discriminate the reactivity of children (F (4, 1047) = 27. 49, p<0.01). In addition, results showed that the “S/he screams or yells” item of Turkish version of Externalizing Behavior Inventory (Baydar et al., 2007) can discriminate the reactivity of children (F (4, 1047) = 56.45, p<0.01).

The Short Temperament Scale for Children- TR provided some advantages to measure child temperament. In the first wave, the ECDET study used 25 different assessments to examine child development and its ecology; thus there was limited time for each measure. STSC-TR estimated temperamental characteristics of children during this limited time. Also, the reliability and validity analysis showed that this measure gave reliable and valid information about the temperamental characteristics of children. In addition, as a mother-report measure, STSC-TR can reflect temperamental characteristics of children accurately because mother can observe the behaviors of children across time and context. Laboratory assessments measure child temperament based on observations in a specific time period, but mother report measures are based on overall behavioral style of children. Therefore, STSC-TR is a good and parsimonious measure of child temperament.

Along with its advantages, there were some limitations of using STSC-TR to measure child temperament. Mother reports could be biased. The mothers do not have a normative basis to evaluate behaviors of their children. Furthermore, how mothers perceive child behavior could be affected by their own psycho-emotional states such as depression and stress. This may add some subjectivity to the temperament assessments. In conclusion, as a mother-report measure STSC-TR had some limitations to measure temperamental characteristics of children.

3.1.3.3 Parenting measures

"*The Child Rearing Questionnaire*" was a mother report measure of parenting behaviors. Originally, Child Rearing Questionnaire was developed by Sanson (1994) and the measure was expanded by Paterson & Sanson (1999). The Turkish version of the scale was adapted for the ECDET project (Yagmurlu & Sanson, 2009). The questionnaire consisted of 30 items of 5 point Likert scale where frequencies of parenting behaviors were measured. The questionnaire included 4 subscales; expectation of obedience ("I expect my child to do what is asked without objection"), punishment ("When my child don't behave, I give physical punishment e.g. slap", warmth ("I have very close and intimate moments with my child"), and inductive reasoning ("I explain the reasons of the rules to my child").

The Turkish adaptation of "*HOME Observation Scale*" (Baydar & Bekar, 2007) had 52 items and it was used to measure the quality of home environment. The original scale (Bradley & Caldwell, 1984) was based on observation and unstructured interviews but for all large sample applications of this inventory, observation and structured interviews were preferred. Thus, interview items were structured in order to be practical for application and coding.

The Turkish version of HOME observation scale consists of seven subscales, but in the present study four of these subscales were used: language stimulation (α=0.84; e.g. "The mother taught or is teaching the child basic courtesy clauses like please, sorry, thank you"), responsivity (α=0.82; e.g. "The mother kept the child close to herself at least 5 minutes during the visit), academic stimulation (α=0.82; e.g. "Do you help your child to learn the colors?"), and use of harsh discipline to the child (α=0.61; e.g. "Primary caregiver used physical punishment during the visit") (Baydar & Bekar, 2007). Observational measures were preferred in this study to represent positive parenting. Because responsiveness and language stimulation subscales of HOME observation scale were successful in measuring positive parenting, warmth and inductive reasoning subscales of Child Rearing Questionnaire were not used. Punishment subscale of Child Rearing Questionnaire was used to measure maternal disciplinary style together with punishment subscale of HOME because they represented maternal punishment better together than any single measurement.

In the current study, the items of "language stimulation", and "responsiveness" subscales were used to create a positive parenting variable that represented positive characteristics of mother-child interaction. Similarly, the items of "use of harsh discipline" subscale were used with the items of mother-report punishment scale to measure punitive forms of maternal disciplinary behaviors. "Academic stimulation" subscale was used to refer specifically to maternal teaching behaviors. Maternal academic stimulation was considered different from positive parenting due to its strong association with cognitive outcomes. This differentiation is necessary to identify distinct effects of specific parenting behaviors.

Provision of materials (α=0.91; e.g. "The child has toys with different colors, size and shapes"), and variety of stimulation (α=0.55; e.g. "Did you go to somewhere else (the village, or another city) with your children last year?") and "the quality of physical

environment" subscales were not included in this study because they were strongly related to SES in this sample.

Three new parenting variables were created with the items obtained from these two questionnaires; positive parenting (HOME responsivity, HOME language stimulation), punishment (HOME punishment, Child Rearing Questionnaire Punishment), and academic stimulation (HOME academic stimulation).

The new punishment variable was created with the intention of representing physical punishment and excluding mild forms of parental control. With this aim, the items eliciting physical punishment were selected among the items of HOME punishment scale and punishment scale of Child Rearing Questionnaire. Some items asked for an observer such as; "The mother punished her child physically during the visit"; some items were directly asked to the mother such as; "When my child don't behave, I give physical punishment e.g. slap".

As stated above, some items were expected simple "yes-no" answers and to respond some others mothers selected one suitable answer for them among several options. Therefore, all the chosen items were recoded to make them similar. For example, if an item with multiple responses had only one response that contains physical punishment, that response was recoded as 1 and others were recoded as 0. Thus, all items represented physical punishment and became similar in coding.

After that, a factor analysis was conducted. One item was extracted because of very low loading, which was below .2. Punishment explained 32.8% of the joint item variance as a factor. Finally, the reliability and validity analyses were conducted. The validity testing of the new punishment variable was done by examining its correlation with variables of similar constructs. New punishment variable was correlated to SES ($r=-.27$, $p<.001$), mother-report

maternal obedience demanding (r=.29, p<.001) and maternal hostility (r=.23, p<.001). The Cronbach Alpha was .82 for the new punishment scale.

HOME language stimulation items seemed to reflect more parental support than academic stimulation such as; "Parent encourages child to talk and takes time to listen". Therefore, its items were added to HOME responsiveness and a positive parenting scale was created. Second, it was expected that positive parenting and academic stimulation were moderately correlated but still distinct. Both variables referred to the positive and supportive parenting but they focused on different aspects of parenting. To understand whether the results were in line with these two expectations, a factor analysis was conducted. The analyses showed that the items of both scales loaded on two different factors. Therefore, they were distinct constructs, as expected (see Table 3.1).

In the factor analysis, direct oblimin rotation was conducted since the factors were expected to be correlated (Tabachnick & Fidell, 2007). To determine the number of the factors, the scree plot was examined. Factor 1 (positive parenting) explained 36.7% of the item variance and factor 2 (academic stimulation) explained 10.6% of the item variance. The two factors cumulatively explained 47.4% of the joint item variance. There were three positive parenting items with low communalities (between .2 and .3) but because of their high loadings on the corresponding factor (positive parenting) and their theoretical importance, these items were kept.

Table 3.1

*Factor Analysis Result of Academic and Positive Parenting (*N = *1052)*

	Positive Parenting	Academic stimulation

Parent responds verbally to child's vocalizations or verbalizations	.84	
Parent answers child's questions or requests verbally	.84	
Parent's speech is distinct, clear, and audible	.83	
Parent encourages child to talk and takes time to listen	.74	
Parent converses with child at least twice during visit	.74	
Parent holds child close 10-15 minutes per day	.69	
Child is permitted choice in breakfast or lunch menu	.69	
Parent uses complex sentence structure and vocabulary	.66	
Parent uses correct grammar and pronunciation	.55	
Parent's voice conveys positive feelings toward child	.50	
Parent introduces visitor to child	.47	
Parent helps child demonstrate some achievement during visit	.44	
How many times each week would parent read a story to her/him?		.81
Child is encouraged to learn colors		.76
Child is encouraged to learn patterned speech		.76
Child is encouraged to learn numbers		.74
Child is encouraged to learn the alphabet		.72
Child is encouraged to learn spatial relationships		.71
Eigenvalues:	7.71	2.23
Explained Variance:	36.74	10.62

3.1.3.4. Control measures

In the literature, family income, maternal vocabulary and child sex were pointed out as related to cognitive abilities. There were many studies that suggested family income as one of the main predictors of cognitive development (Gerschoof et al., 2007; Linver et al., 2002; Mistry et al., 2004; Yeung, Linver, & Brooks-Gunn, 2002). For example; family socialization models indicated that the effect of income on child development stemmed from mainly parental moods, behaviors, and parent-child interactions. It was especially underlined and supported that family income had a greater impact on the children belonged to low SES families (Mistry et al., 2004).

Previous studies showed that maternal vocabulary could affect the cognitive ability of the child (Yeung et al., 2002). Hoff (2006) stated that the amount and quality (complex and variety of words) of maternal speech differentiated children in terms of verbal abilities.

In addition, gender could be a factor in the variations of cognitive ability (Ramchandani et al., 2010). Girls tend to have a slight advantage over boys in the early stages of vocabulary development (Bornstein, Haynes, & Painter, 1998).

Therefore, these factors were controlled in the current research to prevent possible confounding effects of these variables.

The cognitive ability of the mother was measured with Turkish Vocabulary Test (ACEP) (Gulgoz, 2004). Family income variable was a factor score in the current study and it was measured through three different indicators: the maternal report of the monthly per person expenditures of the family; the value of the residence of the family reported by the

mother in terms of actual or estimated monthly rent; and, the interviewer's rating of the quality of the physical environment of the residence and its immediate surroundings (Baydar et al., 2011). Families were classified according to their rank among other families. Families who were 30% of a standard deviation below the national mean value were classified as the families with low economic status. These families spent $75 per person monthly and families with high economic status spent $191 per person monthly.

3.2 The approach to data analysis

As a longitudinal study, ECDET provided assessments of parenting and verbal ability of the children at age 3 and at age 4. However, reactivity was measured only at age 3. This raised the issue of choosing the timing of the measures to use in the current study. The reactivity and parenting measures, The Short Temperament Scale and The Child Rearing Questionnaire, are parent report measures. Also, HOME scales partly depend on mother reports. Thus, at the first wave of the ECDET, reactivity and parenting were measured at the same time from the same informant, the mother. Therefore, these measures may include an informant bias.

To avoid the informant bias, reactivity score of children at age 3 and parenting scores at age 4 could be used. However, to test the differential susceptibility theory, it is important to collect objective information about their parenting styles from mothers despite reporting reactivity of their children concurrently. Therefore, reactivity and parenting scores of the children in the same wave should be used. This choice would have some implications in the current study. The negative affectivity of the mothers may affect their parenting and it may also affect their report of child reactivity. Thus, the estimates of this study may be overstated. Reactivity scores at age 3, parenting scores at age 3 and verbal ability scores at the age of 4

were examined. ANCOVA was chosen to test the moderating role of temperament in the association of parenting with verbal ability.

Chapter 4: Results

The findings of the current research are presented in this section. First, descriptive and bivariate analyses of the variables were presented. Then, the results of analyses of the moderating role of reactivity in the association of parenting with receptive and expressive language are presented in separate sections.

4.1 Descriptive and bivariate analyses

Table 4.1 provides descriptive information about the characteristics of the sample. As stated, the number of male and female children was close. Families from different SES groups and accommodation were represented in the research. In fact, the number of the families from low SES and mothers with low education level was higher than other groups to represent the general distributions in these areas in Turkey.

Table 4.1

Characteristics of the Sample

Characteristics	Sample N=1052
Age of children (in months)	41.4

	(4.26)
Female children (%)	44.6 %
Age of mothers (in years)	30.0 (5.73)
Mothers' level of education	
No education	11.3 %
Primary school	53.2 %
Middle school	8.4 %
High school	14.4 %
University	4.4 %
Mothers' socioeconomic status level	
Low SES (%)	37.0%
Middle SES (%)	36.5 %
High SES (%)	26.5 %
Urban originated mother (%)	54.0 %
Number of children	
One child (%)	28.2 %
More than 1 child (%)	71.8 %

Note: Values in parentheses indicate standard deviation values

The comparison of the mean scores of children with high and low reactivity in family characteristics and verbal outcomes are presented in Table 4.2. To test the significance of the mean differences of high reactive vs. low reactive children, F-tests were used. Highly reactive children had mothers with lower vocabulary scores than other children (F (1, 1051) =13.93,

$p<.01$). The mothers of children with high reactivity provided lower levels of positive parenting (F (1, 1051) =10.81, $p<.01$) and academic stimulation (F (1, 1051) =20.77, $p<.01$) than the mothers of children with low reactivity. In addition, they used more punishment than other mothers (F (1, 1038) =58.98, $p<.01$). Highly reactive children had lower mean scores in receptive vocabulary (F (1, 899) =8.35, $p<.01$) and in expressive language (F (1, 897) =7.58, $p<.01$) than other children. Thus, children with high reactivity were disadvantaged in terms of family characteristics, parenting that they received, and verbal ability. These results were in line with literature that indicated the negative influence of reactivity on parenting and on indicators of child development (Calkins et al., 2004; Jenkins et al., 2003; Van den Boom & Hoeksma, 1994). However, differential susceptibility theory proposed a potential positive influence of reactivity on child development under favorable conditions (Ellis et al, 2011). Thus, further analyses were needed to understand the nature of the association between reactivity and child development.

Correlations of the variables with one another except reactivity were reported in Table 4.3. Maternal vocabulary had moderate correlations with receptive vocabulary ($r=.36$, $p<.01$, respectively) and low correlations with expressive language ($r=.29$, $p<.01$). Although there was a low correlation between maternal vocabulary and expressive language, maternal vocabulary was controlled in this study because it was indicated as an important resource for the vocabulary of children in their primary environment (Hoff, 2006). In addition, positive parenting and academic stimulation had moderate positive correlations with receptive vocabulary ($r=.36$, $p<.01$; $r=.38$, $p<.01$, respectively) and low correlations with expressive language ($r=.28$, $p<.01$; $r=.29$, $p<.01$, respectively). Punishment had weak negative correlations with receptive vocabulary ($r=-.24$, $p<.01$) and expressive language ($r=-.23$, $p<.01$). Thus, all parenting variables were related to the cognitive outcomes in line with the

literature (Chang et al., 2009; Hurtado et al., 2008; Smith, 2000). In addition, there was a moderate correlation between receptive vocabulary and expressive language (r=.51, p<.01). This result was in line with past research, moderate correlations were common between measures of comprehension and production in the literature (Bates et al., 1988, Fenson et al., 1994; Fenson & Ring, 2000). Further analyses were needed to explore whether there was a moderating role of reactivity in the association of parenting with expressive and receptive vocabulary abilities.

The results indicated a trend of higher correlations of independent variables with receptive vocabulary than expressive language. This finding was in line with the literature because there were many studies that found a higher association of environmental factors such as parenting with receptive vocabulary than with expressive language (Raviv, Kessenic, & Morrison, 2004; Reznick, 1997).

Table 4.2

Mean Differences of Children with High and Low Reactivity in terms of Parenting and Verbal Outcomes

	High Reactive	Low Reactive	F	M

Maternal Vocabulary	7.69	8.94	13.93***	8.52
	(4.68)	(5.29)		(5.13)
Academic Stimulaiton	-0.19	0.09	20.77***	0
	(1.00)	(0.98)		(1)
Positive Parenting	-0.14	0.07	10.81***	0
	(1.06)	(0.96)		(1)
Punishment	0.32	-0.16	58.98***	0
	(1.09)	(0.90)		(1)
Receptive Vocabulary	-0.10	0.07	8.35**	0.01
	(0.89)	(0.88)		(0.88)
Expressive language	8.04	9.34	7.58**	8.90
	(6.74)	(6.69)		(6.73)

Note: Values in parentheses are the standard deviations. **p<.01, ***p<.001

Results showed that there was a low negative correlation between academic stimulation and punishment (r=-.29, p<.01) and between positive parenting and punishment (r=-22, p<.01, see Table 4.2). That is, neither positive parenting nor academic stimulation had a strong negative association with punishment. Thus, punishment was not the negative end of positive or academic stimulation; it was a distinct parenting practice. Although in research conducted with Anglo-American samples punishment was considered on the same continuum

with positive parenting practices to represent parenting quality (Belsky et al., 2010), in a Turkish sample this approach was not an option.

A recent study that compared US and Turkish parenting practices (Akcinar et al, 2011) supported this notion by indicating the coexistence of warmth and power assertive methods of control in Turkish culture. In that study, maternal warmth moderated the effects of both psychological and behavioral control on externalizing behaviors of the children only in the Turkish sample. High warmth served a protective role for the children to the power assertive methods of control. That is, Turkish parents who used high amount of control were not necessarily rejecting parents. They provided warmth and care in addition to control. . However, in line with Baumrind's typology, these kinds of mixed parenting practices could not be observed in US culture. Therefore, the potential interaction of punishment with warmth on child development was not studied in US research although it should be examined in collectivistic cultures such as Turkey.

Academic stimulation and positive parenting were moderately positively correlated (r=.51, p<.01). Academic stimulation was expected to be related to verbal outcomes more strongly than positive parenting because it constitutes a direct input into the language development of children. Further examination was needed to explore the contribution of these variables to the verbal abilities of children.

Table 4.3

Bivariate Correlations of the Predictor and Outcome Variables

	2	3	4	5	6
1.Maternal Vocabulary	0.39	0.40	-0.21	0.36	0.29
2.Academic Stimulation[a]	-	0.51	-0.29	0.38	0.29
3.Positive Parenting[a]		-	-0.22	0.36	0.28
4.Punishment[a]			-	-0.24	-0.23
5.Child's Receptive Vocabulary				-	0.51
6.Child's Expressive Language					-

Note: Correlations are significant at the 0,01 level (2-tailed).
[a]These measures are factor scores. For details of their computation, please see chapter 3.

Because family wealth and child sex variables were categorical, their associations with reactivity were examined with Chi square tests (see Table 4.4). Results showed that there was a significant association of wealth with reactivity ($\chi^2(2, 1017) = 21.75$, $p<.001$). That is, most children with high reactivity had families with low (40.5%) and medium (40.8%) economic status, and 18.7 % of them belonged to families with a high economic status. However, most children with low reactivity had families with medium (41.2%) and high (30.3%) economic status. Only, 28.5% of the children with low reactivity belonged to families with low economic status. That is, high economic status was more apparent in the families of children with low reactivity than families of children with high reactivity. Conversely, low economic status was more apparent in the families of highly reactive children than families of children with low reactivity.

Table 4.4

Chi Square Test to Examine The Association of Wealth with Reactivity (N=1017)

Economic Status	Reactivity		χ^2
	Low Reactivity	High Reactivity	
Low	192	139	21.75***
	(28.5%)	(40.5%)	
Medium	278	140	
	(41.2%)	(40.8%)	
High	204	64	
	(30.3%)	(18.7%)	

Note: $p < .001$

The association of child sex with temperamental reactivity was examined (see Table 4.5). There was no significant association between child sex and reactivity (χ^2 (2) = 0.36, *ns).*

Table 4.5

Chi Square Test to Examine The Association of Sex with Reactivity (N=1052)

Economic Status	Reactivity		χ^2
	Low Reactivity	High Reactivity	
Girl	318	151	0.36
	(45.2%)	(43.3%)	
Boy	385	198	
	(54.8%)	(56.7%)	

The associations of family wealth and child sex with other variables were examined via F tests. Results showed that family wealth had substantial associations with parenting variables and child outcomes (see Table 4.6). That is, mothers in families with high economic status had a larger vocabulary than other mothers (F (2, 1016) =170.25, $p<.001$). In addition, families with high economic status provided more academic stimulation (F (2, 1038) =158.61, $p<.001$), more positive parenting (F (2, 1016) =123.19, $p<.001$), and less punishment (F (2, 1003) =28.03, $p<.001$) than other families. In addition, the children of families with high economic status had higher receptive vocabulary scores (F (2, 868) =137.34, $p<.001$) and higher expressive language (F (2, 866) =55.22, $p<.001$) than other children. Thus, family wealth was controlled in this study.

Table 4.6

Mean Differences in Parenting and Verbal Outcomes by Economic Status

	Economic Status				
	Low	Medium	High	F	df
Maternal Vocabulary	5.70	8.33	12.44	170.25***	2
	(3.73)	(4.26)	(5.45)		
Academic Stimulaiton	-0.58	0.04	0.68	158.61***	2
	(0.84)	(0.90)	(0.85)		
Positive Parenting	-0.58	0.13	0.53	123.19***	2
	(1.12)	(0.84)	(0.60)		
Punishment	-0.26	0.00	0.33	28.03***	2
	(1.04)	(0.94)	(0.90)		
Receptive Vocabulary	-0.54	0.12	0.56	137.34***	2
	(0.88)	(0.76)	(0.62)		
Expressive language	6.00	9.51	11.79	55.22***	2
	(6.23)	(6.61)	(6.06)		

Note: *** = p<.001

The association of child sex with other variables was presented in Table 4.7. Results showed that child sex had no significant association with maternal vocabulary (F (1, 1051)

=3.42, *ns*). Child sex had a significant association with academic stimulation (F (1, 1051) =5.47, $p<.05$) and punishment (F (1, 1038) =4.36, $p<.05$) but not positive parenting (F (1, 1051) =1.87, *ns*). That is, families provided more academic stimulation and less punishment to girls than boys. In addition, there was no difference in receptive vocabulary between girls and boys (F (1, 899) =0.82, $p<.01$). However, results showed that girls had higher expressive language than boys (F (1, 897) =7.82, $p<.05$). Although there was no association between sex and receptive vocabulary, sex was controlled in this study because empirical evidence showed that gender affected language comprehension and expression (Ardilla et al., 2011; Tzuriel & Egozi, 2010).

Table 4.7

Mean Differences in Parenting and Verbal Outcomes by Child Sex

	Child Sex			
	Boy	Girl	F	df
Maternal Vocabulary	8.26	8.85	3.42	1
	(5.04)	(5.23)		
Academic Stimulaiton	-0.19	0.09	5.47*	1
	(0.98)	(1.00)		
Positive Parenting	-0.03	0.04	1.87	1
	(1.01)	(0.98)		
Punishment	0.05	-0.07	4.36*	1
	(1.04)	(0.93)		
Receptive Vocabulary	-0.01	0.04	0.82	1
	(0.90)	(0.87)		
Expressive language	8.35	9.59	7.62**	1
	(6.74)	(6.67)		

Note: * = p<.05, ** = p<.01

4.2 The effects of the predictor variables on receptive language ability

As presented in Chapter 2, the moderating role of temperamental reactivity in the association of parenting with receptive vocabulary was examined. Parenting behaviors (academic stimulation, positive parenting, and punishment), family characteristics (family wealth, maternal vocabulary) and child characteristics (reactivity, gender) were used to predict receptive vocabulary scores of children. To model the association of these variables with receptive vocabulary, ANCOVA was used.

Prior to the analyses testing the moderated effects of reactivity on the indicators of language development, an ANCOVA model including the main effects of all predictors on receptive vocabulary was estimated (see Table 4.8). Family wealth, maternal vocabulary and child sex were used in previous research to account for the variability in language outcomes of children (Gerschoff et al., 2007; Hoff, 2006; Morisset et al., 1995; Yeung, Linver, & Brooks-Gunn, 2002). Results showed that family wealth ($F (2, 860) = 43.19$, $p<.00$, $\eta p^2 = .09$) and maternal vocabulary ($F (1, 860) = 9.29$, $p<.00$, $\eta p^2 = .01$) had significant positive effects on receptive vocabulary but not child sex ($F (1,860) = 0.45$, *ns*). In addition, there was no direct effect of reactivity on receptive vocabulary when parenting variables were accounted for in the model ($F (1,860) = 0.00$, *ns*).

The results showed that all parenting variables were significantly associated with receptive vocabulary (see Table 4.8). It was expected that academic stimulation would have a stronger positive effect on receptive vocabulary than positive parenting because academic stimulation constituted a direct input on cognitive abilities. However, the effects of positive parenting, academic stimulation and punishment on receptive vocabulary were almost the same ($F (1, 860) = 7.27$, $p<.00$, $\eta p^2 = .008$; $F (1,860) = 8.60$, $p<.00$, $\eta p^2 = .010$; $F (1,860) =$

9.17, $p<.011$, $\eta p^2 = .01$, respectively). Thus, each parenting variable predicted a unique part of variance in receptive vocabulary outcome.

Table 4.8

Main Effects of The Predictors on Receptive Vocabulary (N=860)

	F	df	p	ηp²
Wealth	43.19	2	0.00	.092
Maternal Vocabulary	9.29	1	0.00	.011
Sex	0.45	1	0.50	.001
Reactivity	0.00	1	0.99	.000
Academic stimulation	8.60	1	0.00	.010
Positive Parenting	7.27	1	0.00	.008
Punishment	9.17	1	0.00	.011

Note: $R^2 = .29$

To examine how the predictor variables were associated with receptive vocabulary, estimated coefficients of these variables were presented at Table 4.9. It showed that positive parenting and academic stimulation had positive influence on receptive vocabulary (B=.085; B=.095, respectively), but punishment had a negative impact on receptive vocabulary (B= -.082).

Table 4.9

Estimated Coefficients of the Predictor Variables for Receptive Vocabulary

Predictors	B
Wealth (Low)	-.733**
Wealth (Medium)	-.248**
Wealth (High)	Comparison Category
Sex (Girl)	-.035
Sex (Boy)	Comparison Category
Reactivity (Low)	-.001
Reactivity (High)	Comparison Category
Maternal Vocabulary	. 019*
Academic Stimulation	.095*
Punishment	-.082*
Positive Parenting	.085*

Note: *p < 0.05 **p < 0.001.

Previous analysis gave information about how different dimensions of parenting were associated with receptive vocabulary of children. However, it was still unknown how these parenting dimensions influenced the effects of each other on receptive vocabulary. In addition, it was unknown whether the effects of these parenting practices on receptive vocabulary varied depending on child reactivity. Possible interactions between parenting

variables in predicting receptive vocabulary were tested first. Then, two-way interactions of reactivity with parenting variables on receptive vocabulary were examined.

Results showed that the interaction of punishment with the remaining two dimensions of parenting on receptive vocabulary were significant (F (1,860) =7.08, $p<.01$, ηp^2 =.008, F (1,860) =5.48, $p<.05$, ηp^2 =.006, respectively). However, there was no interaction effect of academic stimulation and with positive parenting on receptive vocabulary (F (1,860) = 1.18, *ns).*

Table 4.10

The Results of ANCOVA for Predicting Receptive Vocabulary (N=860)

	F	df	p	ηp²
Wealth	42.40	2	0.00	.091
Maternal Vocabulary	9.57	1	0.00	.011
Sex	0.79	1	0.37	.001
Reactivity	0.00	1	0.95	.000
Academic stimulation	9.25	1	0.00	.011
Positive Parenting	3.78	1	0.05	.004
Punishment	8.79	1	0.00	.010
Punishment*Positive Parenting	7.08	1	0.00	.008
Punishment*Academic stimulation	5.48	1	0.01	.006
Academic stimulation*Positive Parenting	1.18	1	0.27	.001

Note: R^2= .30

The interaction effect of positive parenting with punishment on receptive vocabulary was displayed in Figure 4.1. It showed that children benefited from positive parenting when their parents used low levels of punishment. When the punishment level was high, positive parenting could not predict a difference in receptive vocabulary. This finding was parallel to the results of the study of Akcinar et al., 2011 on Turkish parenting. Both this study and the current study pointed the necessity to consider the coexistence of warmth and punishment to examine parent-child interaction and its effects on child outcomes in Turkish families. And both studies found support for this particular aspect of Turkish parenting practices. However, the former study found that maternal warmth had a protective role against the undesirable effect of parental control on behavior problems of children. Current study found that there was no protective role of positive parenting against high punishment for receptive vocabulary. Positive parenting could be beneficial for receptive vocabulary only in low punishment condition.

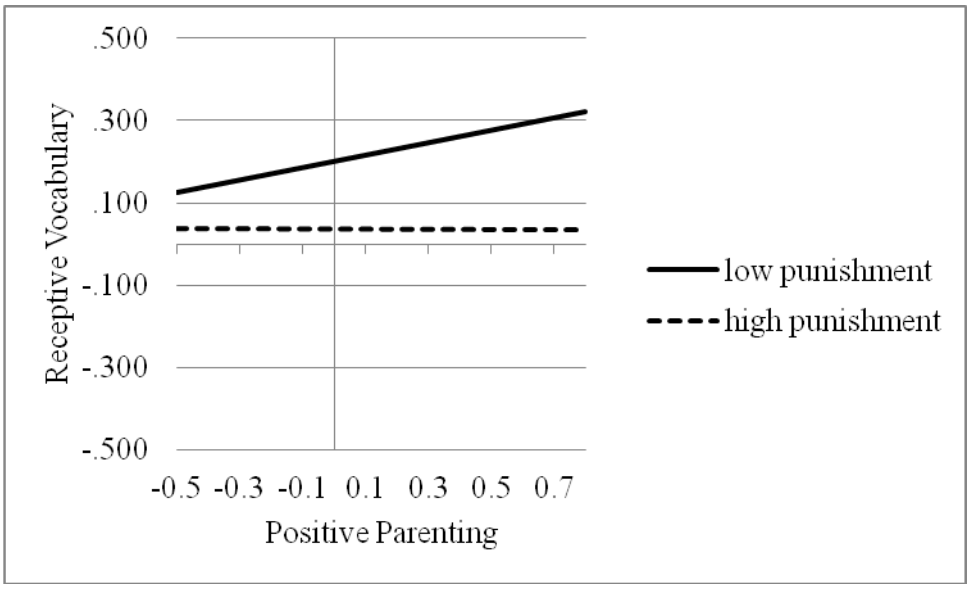

Figure 4.1. The interaction of punishment with positive parenting in predicting receptive vocabulary.

The interaction effect of academic stimulation with punishment on receptive vocabulary is examined in Figure 4.2. Different from positive parenting, academic stimulation had a protective role when punishment was high. When punishment was high, the absence of academic stimulation was associated with severe disadvantage for the receptive vocabulary of children. When punishment was high, high academic stimulation predicted a positive difference in the receptive vocabulary skills of children. In other words, high academic stimulation was associated with a decrease in the negative effects of high punishment on receptive vocabulary. Children who experienced a high level of punishment had levels of receptive vocabulary that were comparable to those with low level of punishment only if they received very high levels of academic stimulation. However, when punishment was low, academic stimulation did not predict either positive or negative difference on receptive vocabulary. Specifically, when the parent did not use much of physical discipline, the influence of academic stimulation on receptive vocabulary was not as prominent as the other condition. However, when physical punishment was an accepted and often used method of discipline for the parent, high academic stimulation was strictly necessary for verbal abilities of the children.

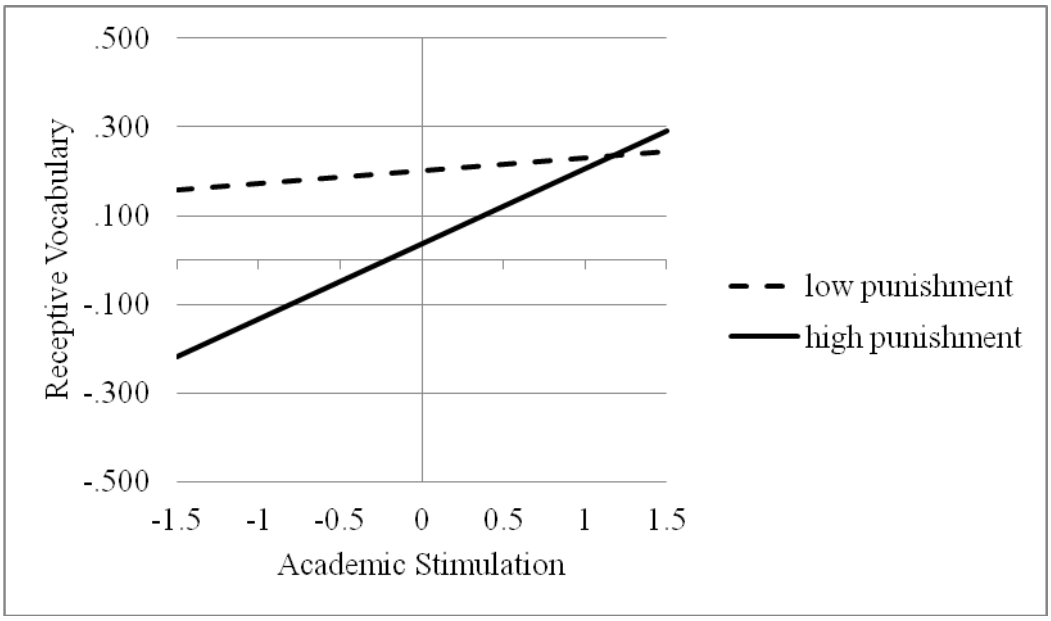

Figure 4.2.The interaction of punishment with academic stimulation predicting receptive vocabulary

Next, the two way interactions of reactivity with parenting variables were included in the analyses (see Table 4.11). There was an interaction between reactivity and academic stimulation in predicting receptive vocabulary (F (1,860) =6.22, $p<.05$, $\eta p^2 = .007$). That is, the effect of academic stimulation on receptive vocabulary was not the same for all children; it varied with the reactivity level of children. However, there were no interaction effects of reactivity with positive parenting and punishment (F (1,860) = 2.40, *ns;* F (1,860) = 1.26, *ns* respectively) on receptive vocabulary.

Table 4.11

The Results of ANCOVA for Predicting Receptive Vocabulary (N=860)

	F	df	p	ηp²
Wealth	40.49	2	0.00	.087
Maternal Vocabulary	10.89	1	0.00	.013
Sex	0.60	1	0.43	.001
Reactivity	0.00	1	0.93	.000
Academic stimulation	12.85	1	0.00	.015
Positive Parenting	2.70	1	0.10	.003
Punishment	8.26	1	0.00	.010
Punishment*Positive Parenting	4.93	1	0.02	.006
Punishment*Academic stimulation	3.62	1	0.05	.004
Academic stimulation*Positive Parenting	0.96	1	0.32	.001
Reactivity*Punishment	1.26	1	0.26	.001
Reactivity*Academic stimulation	6.22	1	0.01	.007
Reactivity*Positive Parenting	2.40	1	0.12	.003

Note: R^2= .30

To understand the nature of the interaction effect of academic stimulation with reactivity on receptive vocabulary, an interaction plot was prepared with estimated means (see Figure 4.3). When highly reactive children lacked academic stimulation, they fell behind their counterparts. However, when there was a high level of academic stimulation, highly reactive children benefited from it more than their counterparts. That is, negative and positive environmental factors were associated with a higher difference in receptive vocabulary for

highly reactive children than other children. Thus, this interaction supported the differential susceptibility theory.

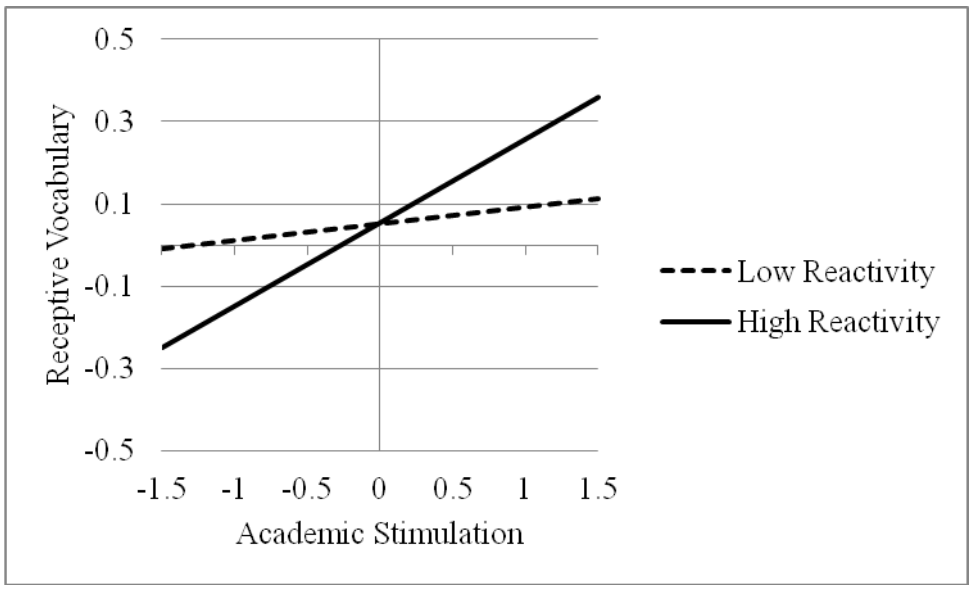

Figure 4.3. The interaction of reactivity with academic stimulation in predicting receptive vocabulary

Differential susceptibility theory proposed that highly reactive children were affected from environmental stimuli more than other children. Thus, highly reactive children could react differently to the presence of both punishment and warmth as compared to other children.

Results of the current study showed that academic stimulation influenced the effect of punishment on receptive vocabulary and punishment influence the effect of positive parenting on receptive vocabulary. Therefore, it should be tested whether the interaction effect of punishment with other parenting practices on receptive vocabulary varied for children with high and low reactivity.

First, the three way interaction between reactivity, academic stimulation and punishment was included in the analysis (see Table 4.12). There was no three way interaction between reactivity, punishment and academic stimulation in predicting receptive vocabulary (F (1,854) =1.21, *ns*).

Table 4.12
The Results of ANCOVA for predicting Receptive Vocabulary (N=860)

	F	df	p	ηp²
Wealth	40.03	2	0.00	.087
Sex	0.55	1	0.45	.001
Maternal Vocabulary	10.76	1	0.01	.013
Academic stimulation	13.06	1	0.00	.015
Punishment	8.32	1	0.04	.010
Positive Parenting	6.93	1	0.09	.008
Reactivity	0.02	1	0.87	.000
Punishment*Positive Parenting	4.72	1	0.03	.005
Punishment*Academic stimulation	3.56	1	0.05	.004
Reactivity*Punishment	0.75	1	0.38	.001
Reactivity*Academic stimulation	6.58	1	0.01	.008
Reactivity*Punishment*Academic Stimulation	1.21	1	0.27	.001

Note: R^2=.30

Next, the three way interaction between reactivity, punishment and positive parenting in predicting receptive vocabulary was examined (see Table 4.13). Results showed that there was a significant three-way interaction between reactivity, positive parenting and punishment in predicting receptive vocabulary (F (1,860) =5.52, $p<.05$, ηp^2 =.006). That

means, the interaction effect of positive parenting with punishment on receptive vocabulary depended on the reactivity level of children.

Table 4.13
The Results of ANCOVA for predicting Receptive Vocabulary (N=860)

	F	df	p	ηp²
Wealth	40.56	2	0.00	.088
Sex	0.72	1	0.39	.001
Maternal Vocabulary	11.37	1	0.01	.013
Academic stimulation	11.76	1	0.01	.014
Punishment	8.75	1	0.03	.010
Positive Parenting	8.86	1	0.03	.010
Reactivity	0.08	1	0.77	.000
Punishment*Positive Parenting	4.32	1	0.03	.005
Punishment*Academic stimulation	3.86	1	0.05	.005
Reactivity*Punishment	0.53	1	0.46	.001
Reactivity*Academic stimulation	5.59	1	0.01	.007
Reactivity*Positive Parenting	1.03	1	0.31	.001
Reactivity*Punishment*Positive Parenting	5.52	1	0.01	.006

Note: R^2=.30

The three way interaction effect of reactivity with positive parenting and punishment on receptive vocabulary was examined via an interaction plot (see Figure 4.4). When there was a high level of punishment, highly reactive children could not benefit from positive parenting. However, the level of receptive vocabulary of children with low reactivity was high when there was high positive parenting despite high levels of the punishment. That is, highly

reactive children were uniformly at risk when there was high punishment regardless of positive parenting. When there was a low level of punishment and a high level of positive parenting, there was no difference between children with high and low reactivity in terms of receptive vocabulary. That is, highly reactive children benefited from positive parenting more than other children. However, receptive vocabulary scores of highly reactive children were not better than the scores of other children which was a necessary condition for the differential susceptibility theory. These results supported diathesis-stress theory which indicated that highly reactive children were vulnerable to negative environmental influences.

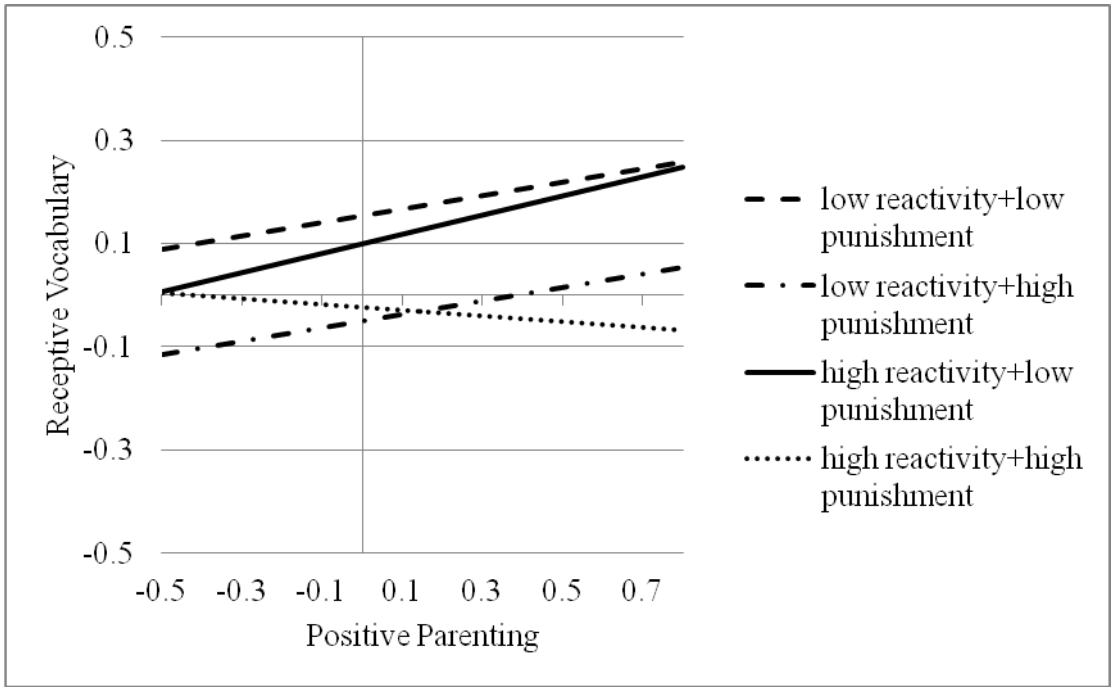

Figure 4.4 The interaction of reactivity with punishment, and positive parenting predicting receptive vocabulary

These results showed that although there was a conditional interaction effect of reactivity with positive parenting on receptive vocabulary, there was an unconditional interaction between reactivity and academic stimulation. Regardless of the punishment

condition, academic stimulation was helpful for highly reactive children. Children with high reactivity benefited from academic stimulation more than other children. That is, highly reactive children were more susceptible to environmental influences than children with low reactivity. However, there should be low punishment for highly reactive children to benefit from positive parenting because power assertive control methods were negative for highly reactive children and it hindered the beneficial effect of positive parenting. Thus, children with high reactivity were more vulnerable to negative environmental influences in line with diathesis stress theory. Also, these results supported the cross-cultural studies which indicated that it was necessary to consider the coexistence of warmth and punishment in Turkish families (Kagitcibasi, 1989; Akcinar et al., 2011).

4.3 The effects of the predictor variables on expressive language ability

As presented in Chapter 2, according to the conceptual framework for this research, the moderating role of temperamental reactivity in the association of parenting with expressive language was examined. In the literature, many studies found that environmental factors such as parenting predicted receptive vocabulary better than they predicted expressive language (Raviv et al., 2004; Reznik, 1997). Raviv et al. (2004) indicated with the evaluation of SEM models that the predicted variation was higher for receptive vocabulary than for expressive language (32% and 13% respectively). In addition, some researchers found that parent-child interactions predicted receptive vocabulary better than expressive language (Bee et al., 1982). The conceptual model of the current study was tested with expressive language to investigate whether there were differences between expressive language and receptive vocabulary. To understand the association of reactivity, parenting practices and family characteristics with the level of expressive language development, ANCOVA was used.

Prior to the analyses testing the moderated effects of reactivity on the indicators of language development, an ANCOVA model including the main effects of all predictors on expressive language was conducted (see Table 4.14). Results showed that the variables considered here predicted receptive vocabulary more strongly than expressive language outcome (R^2=.29 vs. R2 = .16). That is, child and family characteristics that were used in the current study were better predictors of receptive vocabulary than an indicator of expressive language development. This finding was in line with literature stated above.

Similar for receptive vocabulary, wealth and maternal vocabulary significantly predicted expressive language scores (F (2, 857) = 10.65, $p<.00$, ηp^2 =.025; F (1,857) = 8.46, $p<.00$, ηp^2 =.010, respectively). Also, the effect of the sex of the child was significant for expressive language as opposed to receptive vocabulary F (2, 857) = 4.37, $p<.00$, ηp^2 =.005). In addition, as expected, there was no direct effect of reactivity on expressive language scores (F (1,851) =0.00, *ns*). Similar to the results for receptive language, all parenting variables, i.e., academic stimulation (F (2, 857) = 5.14, $p<.05$, ηp^2 =.006, positive parenting (F (2, 857) = 4.16, $p<.05$, ηp^2 =.005 and punishment (F (2, 857) = 10.96, $p<.00$, ηp^2 =.013, were significantly associated with expressive language (see Table 4.14).

Table 4.14

Main Effects of The Predictors on Expressive language (N=857)

	F	df	P	ηp²
Wealth	10.65	2	0.00	.025
Maternal Vocabulary	8.46	1	0.00	.010
Sex	4.37	1	0.03	.005
Reactivity	0.00	1	0.99	.000
Academic Stimulation	5.14	1	0.02	.006
Punishment	10.96	1	0.00	.013
Positive Parenting	4.16	1	0.04	.005

Note: R^2= .16

To examine how the predictor variables were associated with expressive language, estimated coefficients of these variables were presented at Table 4.15. The coefficients showed that positive parenting and academic stimulation were positively associated with expressive language (B=.53; B=.60, respectively), but punishment had a negative influence on expressive language (B= -.74).

Table 4.15

Estimated Coefficients of the Predictor Variables for Expressive Language

Predictors	B
Wealth (Low)	-2.96**
Wealth (Medium)	-.896
Wealth (High)	Comparison Category
Sex (Girl)	-.889*
Sex (Boy)	Comparison Category
Reactivity (Low)	.002
Reactivity (High)	Comparison Category
Maternal Vocabulary	.147*
Academic Stimulation	.606*
Punishment	-.744*
Positive Parenting	.530*

Note: *p < 0.05 **p < 0.001.

Literature showed that the interaction of parenting with child characteristics predicted receptive vocabulary better than expressive language (Bee et al., 1982). In the current study, interaction of reactivity with parenting variables and also interactions between parenting variables were examined to predict receptive vocabulary. Results provided empirical support for these interaction patterns. There was a two-way interaction between reactivity and academic stimulation in predicting receptive vocabulary. In addition, there were

interactions between parenting dimensions in predicting receptive vocabulary such as punishment*positive parenting and punishment*academic stimulation. Thus, same interaction patterns were tested for expressive language to examine whether the conceptual model was valid. Thus, first, the interaction between parenting variables in predicting expressive language were examined. Then, the interactions of reactivity with parenting practices to predict expressive language were included to the analyses.

The results of the model with the two way interaction effects of parenting variables were presented in Table 4.16. There was an interaction between academic stimulation and positive parenting in predicting expressive language (F (1,857) =4.93, $p<.05$, $\eta p^2 = .006$).

Table 4.16

Two-way Interactions predicting Expressive language (N=857)

	F	df	p	ηp²
Wealth	11.09	2	0.00	.026
Maternal Vocabulary	9.28	1	0.00	.011
Sex	4.10	1	0.04	.005
Reactivity	0.00	1	0.95	.000
Academic Stimulation	7.27	1	0.00	.009
Positive Parenting	0.08	1	0.77	.000
Punishment	10.06	1	0.00	.012
Punishment*Positive Parenting	0.00	1	0.98	.000
Punishment*Academic Stimulation	0.83	1	0.36	.001
Academic Stimulation*Positive Parenting	4.93	1	0.02	.006

Note: $R^2 = .16$

To understand the nature of the interaction, an interaction plot was prepared by using the estimated means. The interaction showed that when there was low academic stimulation positive parenting had a positive effect on expressive language. Children who lacked both positive parenting and academic stimulation had the lowest levels of expressive language. If there was low positive parenting, high academic stimulation was associated with a positive difference in expressive language, but when there was high positive parenting; the increase in expressive language was smaller than previous condition (see Figure 4.6). That is, the combination of high academic stimulation and low positive parenting was better than other possible parenting practices. That is, academic stimulation seemed to have a stronger influence on expressive language than positive parenting. In addition, high positive parenting and high academic stimulation could be too much for a little child to handle.

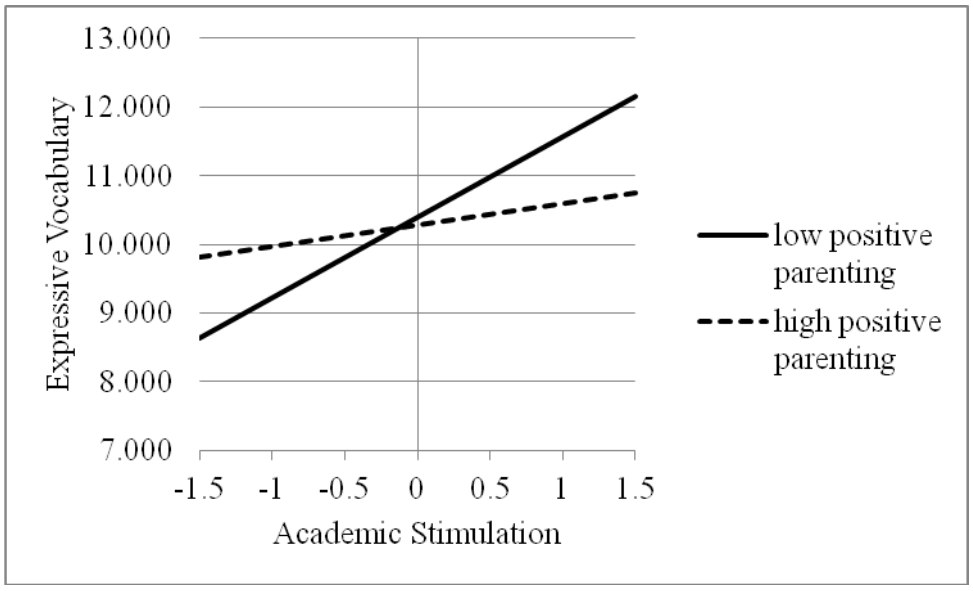

Figure 4.6 The interaction of positive parenting with academic stimulation predicting expressive language

The results of the two way interactions between reactivity and parenting practices and between parenting dimensions that predict expressive language were presented in Table

4.17. These results were substantially different from those for receptive vocabulary. There were no significant interaction effects of reactivity with parenting variables on expressive language (F (1,857) = 1.01, ns, F (1,857) = 1.99, ns, F (1,857) = 3.16, ns, respectively).

Table 4.17

Two-way Interactions predicting Expressive Language (N=857)

	F	df	P	ηp²
Wealth	10.54	2	0.00	.024
Maternal Vocabulary	9.91	1	0.00	.012
Sex	4.18	1	0.04	.005
Reactivity	0.00	1	0.94	.000
Academic stimulation	8.95	1	0.00	.011
Positive Parenting	0.00	1	0.91	.000
Punishment	10.23	1	0.00	.012
Punishment*Positive Parenting	0.11	1	0.73	.000
Punishment*Academic stimulation	0.25	1	0.61	.000
Academic stimulation*Positive Parenting	4.81	1	0.02	.006
Reactivity*Punishment	1.01	1	0.31	.001
Reactivity*Academic stimulation	1.99	1	0.15	.002
Reactivity*Positive Parenting	3.16	1	0.07	.004

Note: R^2= .17

To test the three way interactions, first the interaction between reactivity, punishment and academic parenting in predicting expressive language was examined (see Table 4.18). Then, the three way interaction of reactivity with punishment and positive parenting to predict

expressive language was examined (see Table 4.19). Last, because an interaction of positive parenting with academic stimulation was found, the three way interaction between reactivity, positive parenting and academic stimulation was also examined (see Table 4.19).

Results showed that there was not a three-way interaction between reactivity, academic stimulation and punishment in predicting expressive language (F (1,857) =.41, ns), similar to the case for receptive vocabulary.

Table 4.18

The Results of ANCOVA predicting Expressive language (N=857)

	F	df	p	ηp²
Wealth	10.96	2	0.00	.025
Sex	4.17	1	0.04	.005
Maternal Vocabulary	9.52	1	0.00	.011
Academic stimulation	8.19	1	0.04	.010
Punishment	11.13	1	0.01	.013
Positive Parenting	0.13	1	0.71	.000
Reactivity	0.00	1	0.95	.000
Punishment*Academic stimulation	0.43	1	0.51	.000
Academic stimulation*Positive Parenting	4.57	1	0.03	.005
Reactivity*Punishment	1.02	1	0.31	.001
Reactivity*Academic stimulation	0.44	1	0.50	.001
Reactivity*Punishment*Academic Stimulation	0.41	1	0.51	.000

Note: R^2=.17

The results of the three way interaction of reactivity with punishment and positive parenting was presented in Table 4.19. Results showed that different than receptive vocabulary, there was no three way interaction effect of reactivity with punishment and positive parenting on expressive language (F (1,857) =.08, *ns*).

Table 4.19

The Results of ANCOVA predicting Expressive language (N=857)

	F	df	p	ηp²
Wealth	11.36	2	0.00	.026
Sex	4.09	1	0.04	.005
Maternal Vocabulary	8.90	1	0.03	.010
Academic stimulation	7.40	1	0.07	.009
Punishment	11.47	1	0.01	.013
Positive Parenting	0.00	1	0.92	.000
Reactivity	0.00	1	0.95	.000
Punishment*Positive Parenting	0.30	1	0.57	.000
Academic stimulation*Positive Parenting	5.82	1	0.01	.007
Reactivity*Punishment	1.99	1	0.15	.002
Reactivity*Positive Parenting	1.32	1	0.25	.002
Reactivity*Punishment*Positive Parenting	0.08	1	0.77	.000

Note: R^2=.16

Results showed that there was no three way interaction effect of reactivity with punishment and positive parenting on expressive language (F (1,857) =.00, *ns*). Thus, the conceptual model of this research about the interaction of reactivity with parenting variables

to predict verbal ability was not supported for expressive language outcome. Also, the specific cultural finding (positive parenting-punishment interaction) that was found for receptive vocabulary was not replicated for expressive language outcome.

Table 4.20

The Results of ANCOVA predicting Expressive language (N=857)

	F	df	p	ηp²
Wealth	10.46	2	0.00	.024
Sex	4.40	1	0.03	.005
Maternal Vocabulary	9.53	1	0.02	.011
Academic stimulation	9.27	1	0.02	.011
Punishment	11.90	1	0.01	.014
Positive Parenting	0.02	1	0.96	.000
Reactivity	0.01	1	0.96	.000
Academic Stimulation*Positive Parenting	6.29	1	0.01	.007
Reactivity*Academic Stimulation	2.97	1	0.08	.004
Reactivity*Positive Parenting	1.90	1	0.16	.002
Reactivity*Academic Stimulation*Positive Parenting	0.00	1	0.97	.000

Note: R^2=.16

Chapter 5: Discussion

It is important to consider child characteristics to study developmental outcomes of children because they are influential on how children interact with their environment (Bronfenbrenner, 1992; Heckman, 2006; Lerner, 1995). Temperamental reactivity was conceptualized as an important child characteristic that regulated the interaction of children with their environment (Sanson & Rothbart, 1995). Diathesis-stress theory viewed reactivity as a risk factor for child development because highly reactive children were affected from negative conditions in the environment more than other children (Monroe & Simons, 1991). Recently, differential susceptibility theory developed the existing conceptualization of reactivity from the perspective of positive psychology. According to this theory, highly reactive children were influenced by both adaptive and maladaptive conditions in the environment more than other children (Pluess & Belsky, 1997; 2010). That is, reactivity was a plasticity factor rather than a risk factor as diathesis-stress theory indicated. The main purpose of this study was to investigate this hypothesis of children's differential susceptibility to environmental conditions. A sample of 1052 children between the ages of 3 to 4 was used, to study the moderating role of reactivity in the association between parenting and verbal abilities of children.

5.1 Summary of the findings:

This study showed that reactivity was not a component of temperament that influenced verbal ability of children directly. The direct association of attentional component of temperament with cognitive development was conceptually and empirically supported by previous research (Coplan et al., 1999; Lawson & Ruff, 2004; Usai et al., 2009). On the other hand, emotional aspects of temperament, especially reactivity, were conceptualized to affect

cognitive development through influencing the child's relationship with the environment (Pluess & Belsky, 2009, 2010). Differential susceptibility literature showed that reactivity was an expression of the susceptibility of the individuals to environmental effects. Thus, the reactivity level of individuals regulated the extent to which environment could contribute and detriment their development (Ellis et al., 2011). Building on this literature, in the current study, the role of reactivity was conceptualized as the moderator of the association of the parenting behaviors with expressive and receptive vocabulary. This research identified two interactions between reactivity and parenting practices in predicting receptive vocabulary. These interactions showed that temperament had a moderating role in the association of parenting practices with receptive vocabulary in early childhood.

It was found that reactive temperament moderated the association of academic stimulation with receptive vocabulary. In other words, the effect of academic stimulation on receptive vocabulary varied depending on child reactivity. Highly reactive children performed worse than their counterparts when there was low academic stimulation, but they performed better than other children in the presence of high academic stimulation. This finding suggested that highly reactive children benefited from academic stimulation more than other children; i.e., they were more sensitive to this environmental influence. This result supported the theory of differential susceptibility.

The current research also examined the interaction between two types of parenting behaviors, namely, punishment and positive parenting in predicting receptive vocabulary. In addition, this research tested whether this interaction effect was moderated by reactivity in predicting verbal abilities. Results showed that power assertion was detrimental for both children with high and low reactivity but this negative influence of power assertion was

stronger for highly reactive children than others. Positive parenting was a partially protective factor for children with low reactivity against power assertion. That is, receptive vocabulary levels of these children were higher when there was high positive parenting despite high power assertion. However, children with reactivity could not benefit from the supportive effects of positive parenting when there was a high level of punishment. Nonetheless, highly reactive children were able to function as well as others when parenting involved low levels of punishment combined with a high degree of positive parenting.

This result is important for three reasons. First, it supported the literature about parenting practices in collectivistic societies that indicated the coexistence and interaction of controlling/power assertive and positive parenting practices in predicting child outcomes (Akcinar, 2011; Chao, 1994; Kagitcibasi, 2007; Liu et al, 2005). In the studies based on samples from the US, it was often found that a high level of punishment excluded warmth and high level of warmth excluded punishment. For example, parents who used a high level of punishment were assumed to be lacking warmth (Bornstein, 1995). Therefore, only the main effects of punitive and warm parenting behaviors were studied in the literature (Chen, Liu, & Li, 2000; Domitrovich & Bierman, 2001; Gerschoff, 2002; Harrist & Waugh, 2002). In some studies, the two dimensions of parenting were combined as if the opposite ends of the same spectrum of behaviors (Belsky et al., 1998; Gerschoff et al., 2007; Linver et al., 2002; Pluess & Belsky, 2009, 2010). However, cross cultural literature on parenting practices indicated that warmth and punishment coexisted in collectivistic cultures such as the Turkish society and that the effects of these two dimensions of parenting could interact in influencing child outcomes (Kagitcibasi, 1996, Rudy & Grusec, 2001). For example, recent research that studied the comparison of the US and Turkish cultures in terms of controlling and warm behaviors of parents found that maternal warmth moderated the effects of both psychological

and behavioral control on externalizing behaviors of the children only in the Turkish sample (Akcinar et al, 2011). The original studies that tested the differential susceptibility theory regarded punishment and positive parenting practices as the two opposite poles of a single dimension of parenting behaviors, in line with the dominant parenting literature in the US (Bornstein, 1995; Maccoby & Martin, 1983). Therefore, it was not possible to test the interaction of the two underlying dimensions or the interaction of each dimension with reactivity.

Second, the three way interaction between reactivity, positive parenting and punishment was a new finding in differential susceptibility and parenting literature. Because punishment and positive parenting could not coexist in the US culture, the presence of a three-way interaction between positive parenting, punishment and reactivity in predicting child outcomes could not be examined in previous studies. This result indicated that the effect of one parenting variable on an outcome variable could vary depending not only on characteristics of the child but also on the cultural context of the family. As differential susceptibility suggested, positive parenting practices, in this research academic stimulation, predicted receptive vocabulary depending on child reactivity and highly reactive children benefited from academic stimulation more than other children. Furthermore, the effect of another positive parenting practice (positive parenting) on receptive vocabulary varied depending on punishment level in addition to child reactivity. It could be speculated that this result may point to parental acceptance rejection theory. Highly reactive children could not benefit from positive parenting because they could feel rejected due to high level of punishment more so than other children. Therefore, the cultural context could have influenced the findings of this study.

Third, highly reactive children could not "exceed" their counterparts when there was a high level of positive parenting and a low level of punishment, a result which was contrary to what differential susceptibility theory predicted (Ellis et al., 2011). This result indicated that children with reactivity were vulnerable to negative environmental influences. In other words, they were at risk when they were in an environment characterized by a high level of power assertion and a low level of positive parenting. It could be suggested that they were not able to process and interpret parental warmth because parental negativity was prominent in their processing of the parental behavior. It is possible that in the presence of parental power assertion anxiety about the negativity may overwhelm the possible co-existence of parental warmth. Thus, the presence of parental warmth may not reduce the negative effects of power assertion when children are highly reactive. This finding is supportive of the diathesis-stress theory that considers "difficult temperament" to be a risk factor for child outcomes. Highly reactive children are more sensitive to this particular negative aspect of the environment and this appears to be cross culturally supported.

The limited evidence for the differential susceptibility theory can be attributed to two main differences between the previous research on differential susceptibility and this study. First, this thesis used a sample from a collectivistic culture with a different developmental ecology from the US culture. Cross-cultural studies showed important differences between individualistic and collectivistic cultures in parenting and the perception of parenting by children. For example, even when the parents in collectivistic cultures exercised high levels of control on their children, they were rated as non-rejecting (Kagitcibasi, 2007; Rohner, 2004; Rudy & Grusec, 2001; Wu et al, 2002). Participants of the studies in the differential susceptibility literature were mostly white American families with middle or high SES (Belsky et al., 1998; Bradley & Corwyn; Dopkins-Stright et al., 2008; Kochanska et al., 2011;

Pluess & Belsky, 2010; 2008; Poehlmann et al., 2011). There were some studies which did not support differential susceptibiltiy theory that included other social groups in the sample. For instance, Widom and Brzustowicz (2006) examined the effect of child maltreatment on antisocial behavior of young adults by using a biological marker of susceptibility. They found evidence for differential susceptibility evidence only in Caucasians, but not in African-Americans. White children who experienced abuse and carried a certain susceptibility marker showed a high tendency for violent and antisocial behaviors in adulthood than other white children who experienced abuse. However, there was no comparable gene-environment interaction evident for the African-American participants. Similarly, in an intervention study, maternal parenting (nurturance, communication, monitoring, and control) and adaptive strategies of youth were targeted to reduce risk behaviors in African-American youth (Brody et al., 2009; Brody, Beach, Philibert, Chen, & Murry, 2009). Research showed that in line with diathesis-stress model, intervention closed the gap in risk behaviors between youth who carried a susceptibility marker and others. "Susceptible" youth did not show fewer behaviors than others with the intervention as differential susceptibility theory would have predicted. That is, in African-American culture, there were inconsistent research findings with the differential susceptibility theory. In line with these results, the present research found limited evidence for the differential susceptibility theory in a non-American collectivistic sample.

The second explanation of the difference of the results of this study from previous literature was that, almost all of the differential susceptibility studies examined social development of the children (Aron, Aron, & Davies, 2005; Bakermans-Kranenburg & van Ijzendoorn, 2006, 2007, 2011; Bakermans-Kranenburg, van IJzendoorn, Pijlman, Mesman, & Juffer, 2008; Belsky et al., 1998; Blair, 2002; Boyce et al., 2006; Bradley & Corwyn, 2008; Cassidy, Woodhouse, Sherman, & Stupica, 2011; Kochanska, Philibert, & Barry, 2009;

Ramchandani et al., 2010). There has been little research that has tested the predictions of differential susceptibility theory for cognitive abilities (Dopkins-Stright et al, 2008; Kegel, Bus & van Ijzendoorn, 2011; Kochanska et al, 2011; Obradovic et al, 2011; Pluess & Belsky, 2010). Most of the latter research used academic outcomes as indicators of cognitive abilities (Dopkins-Stright et al, 2008; Kochanska et al, 2011; Obradovic et al, 2011). Academic competence was measured by asking teachers to evaluate children's achievement in the classroom. That is, there were no direct measures of cognitive or academic abilities of children. The teachers' evaluations could be influenced by student behavior and social skills. There were no consistent findings among the studies of academic competence that supported differential susceptibility theory. Kochanska et al. (2011) found that "susceptible" children showed the worst academic competence when there was low maternal sensitivity, but they performed the same as others in the presence of high maternal sensitivity. That evidence was supportive of the diathesis stress theory.

Belsky et al. (2010) used direct measures of cognitive ability in their longitudinal study in addition to behavioral outcomes. They found clear evidence for differential susceptibility when the outcome was behavior problems and social skills. However, highly reactive children did not exceed their counterparts in the presence of positive parenting in reading, math and vocabulary. One reason for this lack of support for differential susceptibility in cognitive abilities may be that parenting behaviors have different effects on social and cognitive abilities. Social abilities of children may depend on positive parenting to a greater degree than cognitive skills. On the other hand, cognitive abilities such as receptive vocabulary may depend more strongly on academic and verbal stimulation than social skills and positive behavioral development. Because positive parenting was used to predict cognitive outcomes in Belsky et al. (2010)' study, support for differential susceptibility in

cognitive outcomes could not be found. In line with this reasoning, current research could not support differential susceptibility when environmental factor was positive parenting and the outcome was indicative of cognitive abilities. This research found evidence for differential susceptibility when academic stimulation was the environmental factor that was studied and cognitive skills were directly assessed.

Similar to the present research, evidence supporting differential susceptibility was found in studies that investigated differential susceptibility in cognitive outcomes with predictors that were indicators of direct inputs to cognitive development. Among the studies which tested differential susceptibility with cognitive outcomes, Kegel et al. (2011) was the only one that found support to differential susceptibility theory with direct measures of cognitive outcomes. This study was designed to examine the effect of a computer program that helped children develop their literacy skills. They found that children who carried a susceptibility marker benefited more from the computer program than other children but they also performed lower literacy skills than other children when there was no computer program to support them. Similar to the current study, Kegel et al. (2011) found support to differential susceptibility theory by using direct measures of cognitive outcomes and an academically stimulating agent for environmental factor.

5.2 Contributions:

Differential susceptibility literature is relatively young and there is little research that indicates the cross-cultural validity of the theory. This study is the first research that studied differential susceptibility theory in a collectivistic society. This research not only provided evidence for differential susceptibility theory in a collectivistic culture but also suggested that this theory awaits cross-cultural validation.

The present study contributed to the limited differential susceptibility literature that studied cognitive abilities by using direct measures of these outcomes. Most of the evidence for differential susceptibility comes from the research that study social development as outcomes. Thus, the applicability of differential susceptibility to cognitive abilities was needed to be tested with different samples, different contexts, and different outcomes.

5.3 Limitations:

There were different susceptibility factors that showed how much environment could affect children. Some researchers used genotypes, some used biological indicators and some used temperament to represent susceptibility. In the current study, maternally reported temperamental reactivity was taken as an indicator of susceptibility. Research showed that temperament itself could be influenced by the environment (Rothbart & Bates, 2006). That is, measuring temperamental reactivity in early childhood may confound child's underlying reactivity with environmental influences. In this study, the information about children's reactivity was collected when the children were 3 years old. Thus, temperament of the children may partly have reflected their experiences until this age.

When temperament is used to indicate susceptibility, it could be advised to use both mother-report and direct assessments of reactivity to improve the validity of the temperament measure. Mother report could be biased and mothers could have difficulty in differentiating between reactivity and behavior problems. With this perspective, a direct assessment is needed to eliminate subjectivity. However, direct assessments provide information based on observations in a specific situation, but mother report measures are based on overall behavioral styles of children. Thus, a combination of these two approaches to measurement may increase the chance the validity.

In this study, receptive vocabulary was predicted well by the conceptual model unlike expressive language. The effect of parenting practices on expressive language did not depend on child reactivity. In addition, parenting behavior (positive parenting, academic stimulation, and punishment) predicted receptive vocabulary better than expressive language. These results were in line with the literature and some researchers suggested that different factors may have a role in the development of verbal abilities. Raviv et al. (2004) stated that environmental factors may have a stronger impact on receptive vocabulary than expressive language and maturation may be more predictive for the development of expressive language than receptive vocabulary. In addition, receptive vocabulary was easier to measure than expressive language. Therefore, measurement error may have a role in this discrepancy between the comprehension and production systems in language.

5.4 Future suggestions:

To understand verbal development of children, it is necessary to examine the developmental trajectories of this skill. As Bronfenbrenner indicated, both the individual and the developmental environment change over time. This study predicted verbal abilities of 4-year olds with the individual and familial characteristics when they were 3 years old. However, ECDET examines developmental ecologies of children for 5 years. That is, a longitudinal study that examines the moderating role of reactivity in the association of trajectories of parenting with trajectories of verbal development could be examined with these data. Thus, further study with this data could provide valuable information about the cross-cultural validity of differential susceptibility theory with a longitudinal perspective.

The selection of the susceptibility factor is important for differential susceptibility research. In the recent literature, there are three concepts that are measured as the

susceptibility factor: genotype, neurobiology and temperament (Ellis et al., 2011). In differential susceptibility literature, there was empirical support for all of these susceptibility factors (Ellis et al., 2011). However, it is not known whether the same children were indicated by these three methods as the susceptible individuals. Are the children who manifest more stress reactivity than others the same children who are categorized as temperamentally reactive and carry a susceptibility gene? Thus, the validity of different approaches to the measurement of reactivity may contribute to our understanding of this individual attribute.

Studies that examined differential susceptibility increased rapidly in recent years. However, these studies mostly studied the effects of differential susceptibility on social development of children in individualistic cultures. Behavior problems, prosocial development and mental health were the outcomes that were studied often. There was a lack of research that studied the moderating role of susceptibility factor in the association of environment with cognitive development. This study focused the indicators of cognitive ability as the outcome and had findings that did not support differential susceptibility. Thus, there is a need for more research that test differential susceptibility with cognitive outcomes.

There were differences between the findings for expressive and receptive vocabulary. Although the conceptual model was supported for receptive vocabulary, it was not supported for expressive language. There is a need for some conceptual or neuro-cognitive work to explain the differences in the factors that influence these two indicators of language development.

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