The Relationship between Expressive Language Skills, Internal State Words, and Classroom Behavior Problems in Young Children at Social Risk

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Dedication

This dissertation is dedicated to my grandson Logan. He provided play and perspective, and continually reminded me that this dissertation is about the children. It is also dedicated to all of the young children at social risk in the United States and around the world, who face the challenges of each day with courage and resolve. They are truly my heroes.

Abstract

Background: Social-emotional and language development appear to interact during early childhood. Children with language delays/disorders tend to exhibit more behavior problems than children without language delays/disorders. In addition, knowledge and use of internal state words has been found to predict self-regulation in young children. Young children at social risk experience an increased probability of language delays/disorders as well as behavior problems. The purpose of this study was to explore whether expressive language skills in general and knowledge and use of internal state words in particular are related to behavior problems in young children at social risk.

Methods: A total of 59 3-to-5-year-old monolingual English-speaking participants who attended one of four preschool sites serving low income families completed the study protocol. Two of the four participating sites accepted child referrals from programs serving families experiencing identified social risk factors (i.e., addiction, child maltreatment). Information gathered for each of the 59 children included overall expressive language skills, internal state word knowledge and use, nonverbal intelligence, teacher behavior problem ratings, and noncompliance to teacher directives.

Results: Expressive language skills were negatively associated with behavior problems as rated by teachers and measured by noncompliance to teacher directives. Expressive language skills negatively predicted both measures of behavior problems, controlling for preschool program and nonverbal intelligence. Knowledge and use of internal state words did not appear to be related to behavior problems when controlling for overall expressive language skills.

Conclusion: Results suggest an inverse relationship between expressive language skills and behavior problems in young children at social risk

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Children growing up in poverty in the United States are at increased risk for delays in the development of language (Hart & Risley, 1995) and behavior/ conduct difficulties (Campbell, 1995; Harden et al., 2000; Stacks & Goff, 2006). Language deficiencies as well as behavior problems put students at increased risk for later difficulties in school settings and may limit academic achievement (Forness et al., 1998; Hart & Risley,1995). In general, young children growing up in poverty experience the increased probability of exposure to environmental factors that represent challenges to optimal development. These environmental factors may include lack of a stable home and consistent caregivers, the threat of violence in the neighborhood, and parental risk factors such as addiction, mental health issues, and neglect or abuse (Shaw, Ownes, Vondra, Keenan, & Winslow, 1996). Research on neurobehavioral development in the young child (Committee on Integrating the Science of Early Childhood Development, 2000) as well as differences in school readiness skills across young children according to socioeconomic groups (Hart & Risley, 1995) have prompted an increase in early childhood programs serving children in poverty. As of 2005, nearly half (47%) of all 3-to-5 year old children in poverty in the United States were enrolled in an early childhood program (Preschool Curriculum Evaluation Research Consortium, 2006). Classroom behavior may be an important variable in determining the impact of such programs upon children's long-term academic and life success.

The described study is conceptualized within the dynamic systems theory of human development. Dynamic systems theory specifies the interrelationship between the development of social-emotional and language systems (Lewis & Douglas, 1998).

Indeed, Kaiser and colleagues found a significant association between behavior and language development in 3-year-old children attending Head Start programs (Kaiser, Cai, & Hancock, 2002). Research has also shown a relationship between the use of words to describe internal states (i.e., perceptual, physiological, emotion and affect, desire, cognition, moral judgment, and obligation) and the subsequent development of executive function in young children (Carlson, Mandell, & Williams, 2004). These higher-level cognitive processes, in turn, appear to be inversely related to behavior problems (Eisenberg et al., 2009).

This dissertation investigates whether there is a relationship between expressive language skills and use of internal state words and behavior problems in 3-to-5-year-old children who are at social risk. On a theoretical level, the determination of the nature of these relationships provides information on the interfaces between language and social-emotional development. On a practical level, it may provide information about a possible role for expressive language skills in decreasing or preventing classroom behavior problems in young children at social risk.

The literature review has three main sections. The first section provides an overview of dynamic systems theory and describes the relevance for the current study. The second section summarizes research on behavior problems in young children. Finally, the literature review concludes with a summary of relevant research on the relationship between language development and behavior problems in young children, including knowledge and use of internal state words and its impact upon the development of executive function. The principal investigator (PI) provides a theoretical rationale for a

hypothesized relationship between expressive language development in general and, more specifically, internal state words, and behavior problems in young children.

The dissertation goes on to describe a study involving 59 3-to-5-year-old children at social risk. Children were assessed for overall expressive language skills as well as knowledge and use of internal state words. The study investigated possible relationships between these language measures and level of behavior problems as reported by teachers and direct observations of noncompliance to teacher directives. Evidence for relationships between language measures and behavior problem measures is presented and implications are discussed.

Dynamic Systems View of Human Development

A dynamic systems theory (DST) of human development specifies relationships both within and between variables from multiple levels of organization. This view accommodates investigations of development across different developmental domains (Ford & Lerner, 1992; Pianta & Walsh, 1996). Diagnosis and treatment of young children with delays or disorders of language, social-emotional development, and other developmental domains historically has approached each domain as a separate entity. An unintended consequence has been that such diagnosis and treatment tends to view language impairment and other developmental difficulties in isolation. "Areas of development are often conceptualized like beads on a string-connected, but not necessarily intertwined....a conceptual barrier between language impairment, social problems, and more serious social-emotional difficulties has proved to be particularly

robust" (Brinton & Fujiki, 1993, p. 194). In keeping with a DST approach to human development that recognizes interdependence and interactions between domains, recognition of the interfaces between social-emotional and language development has increased during the past two decades.

Human development consists of changing relationships between variables at different levels (Ford & Lerner, 1992). These include variables within the child as a developing system as well as between the child and his or her environment. Reoccurring interactions between and across internal and external components result in increasingly complex forms of behavior (Evans, 2007). For example, a two-year-old experiencing the physiological sensation of hunger may react by throwing herself on the floor and crying. A consequence of this behavior may be that the care provider says the word "hungry" as she gives the child a cracker. The toddler's increasing neurological development and associative learning provides the ability to interpret the physiological state as hunger and to eventually use appropriate words to ask for food in lieu of the infant response of crying.

The social environment, then, constitutes an essential aspect of both language and social-emotional development. Adult input that characterizes a level of interaction proximal to but just above the child's current level of function (Vygotsky, 1986) facilitates significant system reorganizations (Lewis & Douglas, 1998). Consequently, 'phase transitions' occur at unstable points of turbulence where the child's former level of function interfaces with a new, as yet unstable pattern (Lewis & Douglas, 1998). Hart and Risley (1995) found that young children growing up in poverty have access to fewer

instances of language interactions with adults. From a DST perspective, such limitations may result in fewer opportunities for the child to achieve system reorganization and both language as well as social-emotional aspects of more mature behavioral schema.

The developing child is an inherently interactive system that actively influences his or her own development. Just as adult interactions influence the child, the child evokes reactions from the adults with whom he or she interacts. These reactions constitute feedback that in turn influences the child's development (Ford and Lerner, 1992; van Geert and van Dijk, 2002). For example, young children at social risk may provide hostile responses in a preschool environment that are based upon interactions in a stressful home environment. These child responses may then receive negative teacher feedback that reinforces rather than reduces defensive interactions that are not conducive to positive relationships at school (Pianta & Walsh, 1996; Tobin, 1991).

Behavior Development

Behavior episodes that consist of units of purposeful actions comprise all aspects of human activity (Ford & Lerner, 1992) and larger series of responses unified by an over-arching goal that extend over varying periods of time. Behavior episodes incorporate biological, perceptual, cognitive, language, emotional, and motor functions and are nested in schemata that may become habituated when episodes are routine or repetitive. Like the behavior episodes that comprise them, schemata combine motor, cognitive, and affective schema, along with biological components (Ford & Lerner, 1992). System components that typically include inter-domain elements are elicited by an external variable or variables. A behavior episode for young children may consist of withdrawn or

aggressive behaviors in response to aversive environmental input. Use of verbal communication intended to respond to and to modify the environment through expressions of affect, wants, and needs may be an alternative schemata. A DST framework offers the potential to investigate aspects of development previously viewed and studied as separate domains, such as behavior and language, as a unified and dynamic process. Hypotheses about interactions between domains, such as the current study's hypotheses about the relationship between expressive language, internal state language, and classroom behavior in young children at social risk, are the product of a DST view of human development (Thelen & Smith, 2006).

Interfaces and Interactions between Cognition and Emotions

Cognitive and emotional aspects of human development operate together and function as part of a control system for human action. Cognition may be defined as the processing and appraisal of information (Fischer & Bidell, 2006). Emotions function in a biasing or constraining manner to inhibit or facilitate action tendencies according to whether they appraise input as threatening or beneficial. As with language, emotions shape actions and thought and are grounded in social interactions (Fischer & Bidell, 2006).

A DST view of social-emotional development includes the child's mastery of a series of developmental challenges (Pianta & Walsh, 1996). Early challenges include the infant's regulation and modulation of physiological arousal and the establishment of effective attachment relationships through caregiver-child coactivity, achievement of self reliance during the toddler/preschool period, and an expanded ability to access both

environmental and internal resources in goal-directed behavior during the preschool and elementary school years. An increasing ability to use language to mediate interactions and to represent thought and action, in contrast to the predominant use of preverbal behavior that characterizes earlier levels of development, is essential to access environmental as well as internal resources, as well as foundational to the acquisition of literacy and social cognition. Academic success rests upon representational capacities and may be compromised if less mature behavioral responses are not adequately supplanted by use of effective verbal communication (Pianta & Walsh, 1996). Recent research on early development of the higher-order, self-regulatory functions of the prefrontal cortex known as executive function has identified the role of words used by toddlers to describe internal states as predictive of executive function during the preschool years (Carlson et al., 2004). In this dynamic interaction between self-regulation and language, language may provide an anchor for self-regulation. In turn, self-regulation facilitates an arousal state that is conducive to using language rather than inappropriate or interfering behaviors to negotiate challenging situations in the preschool environment.

A DST framework specifies language development as a "continual process of simultaneous changes in interactions" between the environment and both cognitive and physical aspects of the child as a developing, self-organizing system" (Evans, 2007, p. 131). Van Geert and Steenbeek (2005) describe a dynamic systems model of cognitive development as a 'prescription' for the evolution of a future state of development according to an explicit model or set of rules. A DST approach to language acquisition includes the study of both internal (i.e., the child) and external (i.e., his or her

environment) components in context-specific interactions and goes beyond quantitative measurement of discrete behaviors (van Geert & Steenbeek, 2005). It therefore provides an appropriate context for the investigation of representations such as behavior problems, measures of overall expressive language development, and internal state words, as will be described later. Developmental investigators espousing a DST approach maintain that the specific relationships between parameters and patterns (such as behavior and language use) may be formally defined and quantified in order to explore their relationships over time (van Geert & Steenbeek, 2005).

Acquisition of language, then, is based upon the self-organization of a variety of factors that include cognitive precursors, social information and interaction, and adaptations of language that adults provide to young children (i.e., 'motherese,' MacWhinney, 1998; zone of proximal development, Vygotsky, 1986). Previous learning results in selective attention for particular types of information and limits the selection of learning hypotheses available to the child. These learning hypotheses, in turn, facilitate or constrain the development of language (van Geert, 2009). The importance of selective attention may be at least a partial explanation for language acquisition differences/delays for children whose neurological and behavioral status has adapted to a hostile and/or non-stimulating environment, as learning constraints may reside in both biological and sociolinguistic aspects of system interaction.

Social-emotional Development

Lewis and Douglas (1998), investigators of emotional developmental within a DST framework, define emotional development as a "sequence of self-organizing interactions

between emotions and cognitions" (p. 160) and assert that emotional and cognitive development are partially dependent systems. Emotions are affective states, recognized as specific feelings, that are physiologically similar across individuals and cultures.

Children of the same age may differ in their responses to environmental input due to differences in their interpretation of emotions (Lewis & Douglas, 1998). For example, young children's typical responses to an unwelcome request to pick up toys may range from withdrawal or aggression to verbalizations providing information on the child's state of frustration at terminating play. Emotional interpretations of social interactions of a stressful/traumatic nature may be unresolved. The lack of resolution, then, prompts the system to re-experience the emotion in order to keep the system activated and expending energy toward continuing self-organization until it achieves resolution (Lewis & Douglas, 1998). For children at social risk, unresolved emotional themes may compete with other forms of systemic development for attention (Lewis & Douglas, 1998). Such competition may result in constraints in their ability to focus on the development of skills targeted in preschool settings.

A 4-year-old boy for whom the researcher provided speech and language services became very agitated when she said she was angry with him for hitting her. He attempted to leave the room, repeatedly saying "Don't hurt me." This behavior may be viewed as an indication of his emotional interpretation of adult anger as occurring synonymously with physical harm to him. The incident was an opportunity to provide this child with an occasion of anger without harm and the possible impetus for reinterpretation of anger, its level of threat, and an alternative behavioral response. It also provided a model for the

use of verbal communication as an alternative to physical aggression. Developmentally, this type of exchange may be a potential point of reorganization for the child, during which new behavior schemata may emerge. Whereas an emotional state of anger previously accompanied physical acting out, a sufficient level of intervention potentially destabilizes this behavior and establishes the potential for emotions (such as fear or anger) to evoke the use of verbal communication to deal with a potentially aversive or threatening situation.

Behavior Problems in Young Children

For young children, it is important to differentiate between developmentally appropriate behavior (e.g., noncompliance indicating increased autonomy) and significant difficulties. Campbell (1995) provides the following components as indicative of a behavior disorder: 1) pattern of problematic behaviors (i.e., problematic behavior is typical); 2) problematic behavior pattern is somewhat stable (i.e., extends over a period of time); 3) problem behaviors are demonstrated across settings and with multiple individuals; 4) achieve a designated level of severity; and 5) interfere with child's ability to negotiate developmental challenges.

Behavior problems in young children as described and rated by parents and teachers can be broadly classified as externalizing behavior and internalizing behavior. EBs include behaviors typified by a lack of compliance with adult directives, over-activity, poor impulse control, problematic social relationships that may include aggression toward peers, and acting-out behaviors, including tantrums (Campbell, 1995; Harden et al., 2000; Stacks & Goff, 2006). IBs are defined as those that reflect states of anxiety,

depression, fearfulness, or social withdrawal (Campbell, 1995; Stacks & Goff, 2006). The development of behavior problems, both IB and EB, may be viewed as indicative of difficulties in the child's development of self-regulation (Cowan, Cowan & Mehta, 2009), which is the ability to monitor, evaluate, and modify one's emotional reactions to events (McCartney, Owen, Booth, Clarke-Stewart, & Vandell, 2004), and appropriate behavior schemata in response to events.

Prevalence of Behavior Problems in Young Children

A systematic review of pertinent research from 1980-1995 across cultures reports an overall prevalence of behavior problems at 10-15% of preschool children (Campbell, 1995). Several studies provide evidence of increased prevalence of behavior problems in young children growing up in poverty. A study of 155 4-year-old children from families whose income levels were below the poverty line found a prevalence rate of 15.8% of children for EB in the clinical range, based upon parent rating (Child Behavior Checklist/4-18, Achenbach, 1991a; Harden et al., 2000). Using the same parent rating checklist, Stacks and Goff (2006) found a prevalence rate of 20.6% among 63 4-year-old Head Start children with EB ratings in the clinical range and an additional 7.9% in the borderline range. Both studies found lower prevalence of IB, with Stacks and Goff (2006) reporting a prevalence of 3.2% and Harden and colleagues (2000) reporting a prevalence of 6.5%.

Studies of behavior problems in young children generally employ checklist ratings by parents and/or preschool teachers that have been standardized with cut-off criteria for clinical or significant ratings. While information gathered from both parents and teachers

has informed the literature regarding behavior problems in young children, researchers have found differences in ratings between informant groups. A meta-analysis by Achenbach and colleagues (1987) of 119 studies, including both clinical and nonclinical samples of children ages 18 months to 19 years, found low levels of agreement between parents and teachers (r = .27) and moderate agreement between mothers and fathers (r = .59, Achenbach, McConaughy, & Howell, 1987).

Greitens and colleagues (2004) compared ratings of teachers and parents on problem behaviors of 5- and 6-year-old children in Flanders, Belgium. Fathers, mothers, and teachers rated a total of 424 children, including a nonclinical subsample and a subsample of children identified with behavior problems at an earlier age. Parents rated their child's behavior problems on a Dutch version of the Child Behavior Checklist (Verhulst, van der Ende, & Koot, 1996) and teachers provided ratings on a Dutch translation of the Teacher Report Form (Achenbach, 1991b). Reported measures included a total problem (TP) score as well as EB and IB scale scores. Classifications of children according to scale norms cutoff scores were borderline, clinically significant, or normal. Results included a high degree of agreement between mothers and fathers (TP r = .64, IB r = .57, EB r = .68). Agreement between parents and teachers was low to moderate (mother/teacher TP r= .33, IB r = .21, EB r = .4; father/teacher TP r = .33, IB r = .20, EB r = .38). Mothers reported 20.3% of children with significant behavior problems, fathers reported 15.35%, and teachers reported 8.5%. These findings are consistent with other studies that report a lower incidence of behavior problems reported by non-parental

caregivers as compared to parents, particularly mothers (Lee, Elliott, & Barbour, 1994; Sawyer, Baghurst, & Mathias, 1992).

Verhulst and Akkerhuis (1989) speculate that differences in ratings between teachers and parents may reflect the specific interactional impact of the child's environment on behavior as well as differences in perceptions of child behavior. While diagnosis and intervention measures for individual children would appear to benefit from information gained across informants, an examination of behavior problems and language, along with implications for preschool and childcare settings, requires information gained by informants in these environments. Therefore, the current study employed teacher ratings to measure child behavior problems within the preschool or daycare classroom. As research findings suggest that behavior ratings by teachers yield lower incidences of behavior problems than parental behavior ratings, the use of teacher ratings in the current study may also provide a more conservative estimate of behavior problems than the use of parent ratings.

A number of studies have examined the question of whether young girls and boys growing up in poverty differ in terms of prevalence of behavior problems. An examination of these studies yields mixed findings. Harden and colleagues (2000) found that for a group of 155 4-year-old children entering Head Start, twice as many girls as boys were rated by parents as having EB in the borderline or clinical range, 15% of boys versus 32% of girls ($p < .02$). Teacher ratings of behavior problems (Caregiver-Teacher Report Form for Ages 2-5, Achenbach, 1997) for 332 3-year-old Head Start children yielded gender differences for total behavior problems ($p < .01$), IB ($p = .02$), and EB

scores ($p < .01$; Kaiser et al., 2002). The percentage of boys with total behavior problem scores within the clinical range was 39%, and girls was 22%. In regard to IB scores, 34% of boys and 25% of girls scored within the clinical range. For EB, 39% of boys and 25% of girls scored within the clinical range. In contrast, Stacks and Goff (2006) did not find a significant difference between boys and girls for either EB or IB in a group of 63 4-year-old Head Start children. As gender differences in behavior problem ratings were found in several studies, the current study compared ratings for male and female participants.

Findings on co-occurrence of EB and IB would appear to differ according to the population of preschool children sampled. Pianta and Caldwell (1990) did not find an association between EB and IB problems in a random sample of middle income children. For a low income population of 2- to 4-year-old children, however, Rose, Rose, and Feldman (1989) found significant levels of co-occurrence between EB and IB ($r = .68$, $p < .01$). Likewise, for a low income group of 3-year-olds, Kaiser and colleagues (2002) found that while girls and boys differed in percentages of co-occurrence, the majority of both boys and girls with behavior problems in the clinical range (52% boys and 66% girls) were below clinical cutoff scores for both EB and IB.

In summary, an examination of research regarding the prevalence of behavior problems in young children suggests that there is a higher prevalence among young children growing up in poverty as compared to young children at middle and high income levels. Parents report higher rates of behavior problems as compared to teacher ratings. Studies report mixed findings in terms of gender differences as well as the co-occurrence of EB and IB.

Factors Related to Behavior Problems

Researchers have found a strong association between growing up in poverty and behavior problems in children (e.g., Sanson, Smart, Prior & Oberklaid, 1993; Bolger, Patterson, Thompson & Kupersmidt, 1995). Individual factors that tend to occur more frequently within the environment of young children growing up in poverty appear to have a greater impact upon behavior problems than growing up in poverty per se (Shaw et al., 1996). These individual factors include various aspects of childrearing and socialization, attachment status, and a variety of family characteristics associated with IB and EB in young children (Campbell, 1995).

Harden and colleagues (2000) found that EB ratings (Child Behavior Checklist, Achenbach, 1991a) were negatively correlated with the amount of time the child spent with his or her father ($r = -.25$, $p < .01$), as well as with level of family organization ($r = -.21$, $p < .01$). Increased time spent with the child's father as well as increased elements of family organization were associated with decreased ratings of EB. Conversely, increased parent symptoms of depression and hostility($r= .42$, $p = .00$), measures of family conflict ($r = .3$, $p < .01$), and exposure to violence ($r = .25$, $p < .01$) were associated with increased ratings of EB.

Ackerman, Kogos, Youngstrom, Schoff, and Izard (1999) investigated the effects of family instability on the behavior problems of young children in poverty. Participants were 169 Head Start children, predominantly African American, with a mean age of 5 years. Multiple regression analysis was conducted with parents' Child Behavior Checklist (Achenbach, 1991a) as the dependent variable and the following independent variables;

an instability index, family conflict and cohesion, caregiver negative emotionality, ethnicity, and gender measures entered simultaneously. This model predicted 26% of the variance in IB scores and 28% of the variance in EB scores. The model did not predict teacher Child Behavior Checklist ratings of behavior problems, however. The family instability index, including number of residence and caregiver changes, was the only significant predictor of Head Start teacher ratings of both EB and IB, predicting a significant 4% of the variance in rating scores ($p = .02$).

Behavior problems, Attachment, and Interactions Between Risk Factors

Theory of attachment.

Bowlby (1969) posited the attachment status of infant to primary caregiver as a significant factor in human development. Current research on attachment focuses upon the interactions between attachment status and other factors in determining long-term behavioral outcomes. Attachment refers to "an affectionate tie that one person forms to another specific individual" (Ainsworth, 1969, p. 971). The primary attachment relationship in Western cultures is between infant and mother (as the traditional primary caregiver). Attachment is believed to occur through the establishment of a neurophysiologic representation that provides a continuing inclination to seek proximity with and to direct other attachment-related behaviors toward the attachment figure. Bowlby described attachment as consisting of a complex system composed of a number of subsystems that interact to promote survival. These systems provide for crying, smiling, sucking, clinging, and following and are activated or deactivated by stimuli from the caregiver that facilitate interaction between infant and mother (Bowlby, 1969).

Bowlby's concept of attachment was strongly influenced by Waddington's (1977) ideas about the self-organizational properties of complex systems and the resulting tendencies toward a preferred state, tenets of a DST of human development (West, Sheldon-Keller, & Weiss 1994). Current research continues to reflect a dynamic approach in its investigations of interactions between attachment status and other risk factors and the long-term effects of such interactions. A number of studies have examined associations between attachment classification during infancy and the development of IB and EB during the preschool years. The concept of maternal sensitivity strongly reflects a DST view in its inclusion of infant as well as maternal behavior dyadic interactions (Sroufe & Sampson, 2000). Attachment theory specifies that variations in the attachment relationship are believed to reflect the quality and consistency of early care. Inconsistent, neglectful, or hostile responses to the infant's signals of internal states such as hunger, cold, and fatigue may create withdrawn or aggressive behavior in response to these states during the infant's later development . During childhood and into adulthood, expectations and responses in peer or partner relationships may be heavily influenced by the nature of the individual's first significant relationship with his or her primary caregiver (Sroufe, Egeland, Carlson, & Collins, 2005).

The Strange Situation (Ainsworth & Wittig, 1969) is a procedure used to classify infant attachment status that consists of a series of separations and reunions with the mother or primary caregiver. It includes a play period with the mother present, followed by the mother's departure and the introduction of a stranger. This protocol continues to be used to determine attachment classifications for children at 12 and 18 months of age.

Attachment classification is based heavily upon the infant's reaction to reunion with the mother.

Attachment classifications include secure;, insecure, anxious-resistant; insecure, anxious-avoidant; and disorganized. Children who are anxious-resistant typically become distressed by separation and desire contact with their mother upon reunion, but are not effectively comforted by their mother. The child typically exhibits contact-seeking behaviors along with angry and rejecting behaviors. During play, resistant children demonstrate restricted exploration of the environment, with as well as without their mother's presence. Mothers of resistant children tend to demonstrate low sensitivity and psychological awareness on parenting indexes (Sroufe et al., 2005). Insecure, anxious-avoidant children may or may not be upset by separation from their mother. Their behavior is distinguished by active avoidance of their mother upon reunion. As a group, mothers of children with this attachment classification have been found to have negative feelings in regard to motherhood and appear to be tense and irritable (Sroufe et al., 2005). Ainsworth et al. (1978) found that these mothers held their babies as frequently as other mothers, but did not as a rule pick up their baby when he or she signaled the desire to be held.

Attachment theorists posit that attachment-based internal working representations and behavior problems may be mediated by emotional regulation skills (Cassidy, Marvin, & MacArthur Attachment Working Group, 1992; Thompson, 1994; McCartney et al., 2004). Disorganized attachment is the result of incoherent behavior on the part of the caregiver or when the caregiver poses a threat to the infant. Infants with severely

maltreating caregivers have been observed to exhibit contradictory and unfocused behaviors upon reunion, such as head banging and crawling in circles (Main & Solomon, 1990). This behavior reflects a disturbance in the infant's evolving development of self-regulation (Vondra et al., 2001). In contrast, children with secure attachment are observed to explore the environment freely in the presence of their mother, at times "checking in" visually or by proximity. They may or may not be upset by separation. Upon reunion, they exhibit consistently positive affect behaviors, are promptly reassured and settled, and return to the exploration of play items (Ainsworth et al., 1978).

Attachment and behavior problems in young children.

In keeping with a DST view of development, insecure attachment alone is not viewed as directly causing behavior problems or disorders: there are multiple pathways to and from behavior problems and disorders (Sroufe, 1990) and risks and influences are believed to interact in the development of behavior problems (Greenberg, Speltz, & DeKlyen, 1993). Burgess, Marshall, Rubin, and Fox (2003) investigated the association between attachment classification at 14 months (Strange Situation) with behavior problems at 4 years of age for 172 participants. Behavior was assessed by direct observation as well as maternal Child Behavior Checklist ratings (Achenbach & Edelbrock, 1991), and analysis indicated a trend toward a main effect of attachment classification for EB ($p < .1$). Post hoc analysis indicated that the effect of attachment classification on EB was due to higher scores for children with avoidant attachment on the aggression subscale of Child Behavior Checklist. No effect of attachment classification was found for IB.

Vondra and colleagues (2001) also examined the stability of attachment classification from infancy to the preschool years, along with overall child development and temperament, as these relate to behavior problem ratings, for a group of 223 low income mother and child dyads. Forty-five percent of the children demonstrated stability of attachment classification from 12 to 18 months (as determined by Strange Situation analysis and coding). The authors used a different mode of classification for the children at 24 months, and considered attachment classification to be stable if the same classification was found at either 12 and 24 months, or 18 and 24 months. Using this criteria, 45% of the children had stable classifications. Vondra and colleagues (2001) interpreted these percentages as demonstrating a modest degree of attachment stability. They also concluded that attachment classifications for low income children appear to be less stable than for middle income children, for whom a stability incidence of 75% has been reported (Belsky, Campbell, Cohn, & Moore, 1996). The number of children classified with insecure attachment increased from 12 to 18 months and from 18 to 24 months. Post hoc analysis indicated that the increase was due to an increase in number of anxious-resistant classifications. Children classified as insecurely attached at 24 months demonstrated significantly more behavior problems than securely attached children. Classification predicted 11% of variance in EB ($p < .01$) and 8% of IB variance ($p < .01$). Research regarding the relationship between attachment status and behavior problems in young children, then, indicates that insecure attachment puts children at increased risk for behavior problems.

A number of researchers have explored associations between attachment classification and behavior problems in preschoolers within the context of multiple risk models. NICHD Study of Early Child Care investigated behavior problems in a group of 1,015 children (Achenbach, Edelbrock, & Howell, 1987) when their children were 3 years old. Multiple assessment measures from 12 to 36 months were grouped as attachment-related, child characteristics, and maternal management. While Strange Situation attachment classification of infants at 12 to 18 months constitutes the original (and still definitive) assessment of attachment, other measures have been developed in order to determine classification of attachment status for older children as well as attachment stability over time. Attachment-related measures utilized by McCartney and colleagues (2004) included Strange Situation at 15 months, the Attachment Q set (classification by observational sorting of characteristics of mother and child interaction, Waters & Deane, 1985), and classification by a Modified Strange Situation (Cassidy et al., 1992) for children at older ages. Mothers rated their children's behavior (Achenbach, Edelbrock, & Howell, 1987) at age 3. A multiple regression model with all assessment measures included as independent variables predicted 24% ($p < .01$) of IB. Significant predictors included secure attachment at 36 months ($p < .05$) and maternal education ($p < .01$) as negative predictors, and maternal rating of child temperament as difficult at 6 months ($p < .01$) and self-rating of maternal depression ($p < .01$) as positive predictors. The model accounted for 22% ($p < .01$) of variation in EB ratings. Boys with insecure attachment were at increased risk for EB as compared to insecurely attached girls ($p = .05$). These findings indicate that while secure attachment and higher levels of maternal

education decrease the risk for behavior problems in young children, maternal depression and maternal ratings of their child's temperament as difficult during infancy are associated with increased risk for behavior problems.

A DST view of early behavior development views the child as part of a family system of interactions. Cowan and colleagues investigated the attachment history of parents and its links to problem behaviors in kindergarten children within a sample of 27 mother/father/child family groups (Cowan, Cohn, Cowan, & Pearson,1996). Parents were classified by their representations of early attachment history with their own parents as secure, insecure-dismissing, or insecure-preoccupied on the Adult Attachment Interview (Main, 1996). They also reported on marital conflict. Researchers directly observed marital interactions and derived parenting style ratings for each parent-child dyad. Teachers rated child behavior in the fall and spring of kindergarten on the Child Adaptive Behavior Inventory (Schaefner & Hunter, 1983), which includes scales for IB and EB. Parents' attachment history did not correlate with their child's behavior ratings. Latent variables were created to include parents' attachment history, marital quality, and parenting style. Attachment history, marital quality, and parenting style variables for fathers predicted 69% of child variance in EB ($p < .01$) and 41% of IB ($p < .1$) as reported by teachers. Mothers' variables predicted 39% of child EB variance ($p < .1$), and 60% of variance in IB ($p < .01$).

In order to further investigate associations between parental attachment history and parenting characteristics on behavior status of young children, Cowan and colleagues (2009) longitudinally studied 100 predominantly middle income, two-parent families

starting a year before children entered kindergarten (mean age = 4.9 years). Measures included the Couple Attachment Interview (Silver, Cohn, Cowan, & Cowan, 1990), the Adult Attachment Interview (Main, 1996), couple interaction coding by direct observation, ratings of mother/father/child interactions, and designation of parenting style by observation of parent/child dyad interaction. The child outcome measure was the Child Adaptive Behavior Inventory teacher ratings (Cowan & Cowan, 2002) at the end of first grade (mean age = 6.9). A structural equation model including all attachment and interaction measures predicted 33% of variance in IB ($p < .05$). Direct observation variables were not predictive when attachment classifications were entered first. Observation variables alone predicted a significant amount of variance (26%, $p < .01$). All variables predicted 47% of the variance in EB ($p < .01$). Attachment variables accounted for 15% of the variance (p not reported). Unlike IB, interaction variables explained 35% variance ($p < .01$), contributing a significant amount of predictive power to the model. Results from this study indicate that parental attachment history and attachment status as a couple as well as observable elements of parent-child interactions contribute to the status of behavior problems in young children. Authors speculate that the transmission of parental working models of relationships to children's behavior outcomes occurs by way of interactions between parent and child.

In summary, current research on environmental contributors to behavior problems indicates that in addition to lack of secure attachment, parental factors including minimal amount of time spent with child, limited maternal education, maternal depressive

symptoms, high levels of reactivity, and family conflict represent risk factors for the development of behavior problems during early childhood.

Long-term Outcomes of IB and EB During Early Childhood

Children with behavior problems identified in early childhood tend to exhibit a variety of difficulties at later ages (Campbell, 1995). Campbell and Ewing (1990) investigated children identified at 3 years of age with behavior problems through direct observation and maternal report. Of 32 children with behavior problems at age 3, almost half of the children (15) continued to display behavior problems at age 6. Maternal reports on the Swanson, Nolan, and Pelham Teacher and Parent Rating Scale, a measure of student attention deficit disorder (Pelham & Bender, 1982), and the Child Behavior Checklist (Achenbach & Edelbrock, 1983) at age 6 predicted EB problems at age 9. Teacher ratings (Teacher Report Form, Achenbach & Edelbrock, 1986) of behavior problems at age 9 were significantly higher for children identified with persistent behavior problems at age 6 than a control group of children ($p < .01$). Infant temperament, child behavior at age 3, and maternal behavior ratings at age 6 predicted 38% of variance of IB problems at age 9 ($p < .01$). Infant temperament, socioeconomic status, observation scores at age 3, degree of negative maternal control at age 3, and Life Experiences Survey (Sarason, Johnson, & Siegel, 1978) scores at age 6 predicted 46% of the variance in EB at age 9 ($p < .01$). Teacher ratings of EB at age 9 were predicted by teacher ratings of EB and IB at age 6 (different teachers). Teacher ratings at 6 did not predict IB teacher ratings at age 9.

Ackerman and colleagues (1999) found that at entrance to first grade, preschool behavior predicted parental EB ratings (26% of variance, $p < .01$) and parental reactivity (4%, $p < .01$). Preschool behavior (14%, $p < .01$), family conflict (3%, $p < .01$), and parental reactivity (2%, $p < .01$) predicted parental IB ratings. Preschool behavior (4%, $p < .05$), family instability (5%, $p < .05$), and lack of family cohesion (5%, $p <. 05$; Ackerman et al., 1999) predicted teacher IB ratings.

Mesman, Bonger, and Koot (2001) conducted a longitudinal study of 294 children from ages 2 to 3 to ages 10 to 11 in the Netherlands. Parents rated their children's EB and IB with the Child Behavior Checklist (Achenbach, 1992; Koot, Van den Oord, Verhulst, & Boomsma, 1997, Dutch Version) at ages 2 to 3, 4 to 5, and 10 to 11. At ages 4 to 5 and 10 to 11, teachers completed the Caregiver-Teacher Report Form (Achenbach, 1997, translated to Dutch). As researchers found significant differences between girls and boys ($p < .05$) and between parent and teacher ratings ($p < .05$), they analyzed results separately for these four groups. Results for boys and girls included no significant differences in prevalence of behavior problems at 2 to 3 years of age. Boys between the ages of 4 and 5 as well as 10 and 11 years of age had significantly higher EB ratings than girls ($p < .01$) for both parent and teacher report. Boys also scored higher on IB ($p = .02$), but the difference was not as great. At age 4 to 5, both parent and teacher report predicted a high degree of variance in both EB and IB at age 10 to 11 years. Parent ratings predicted 39% of variance in IB and 43% of EB for boys (p not reported). Teacher ratings predicted 29% of variance in EB, and 14% of variance in IB (p not reported). The same ratings significantly predicted EB and IB in girls, but accounted for

less variance (parent report=13% IB, 25% EB; teacher report=8%, IB, 22% EB, p not reported).

Egeland, Kalkoske, Gottesman, and Erickson (1990) identified 27 4.5- to 5-year-old children with high levels of behavior problems through observational behavior coding and teacher rating (Preschool Behavior Questionnaire, Behar & Stringfield, 1974; Behavior Problem Scale, Erickson & Egeland, 1981), and included 22 children without behavior problems as a control group. A number of outcome measures were administered at the end of grades 1, 2, and 3. Children identified as having behavior problems at 4.5 to 5 years of age continued to have significantly more behavior problems (as identified by teacher ratings) at the end of grades 1 ($p = .05$) and 2 ($p < .01$), and more behavior problems at the end of grade 3 ($p < .05$). Children identified with behavior problems at 4.5 to 5 years of age also had significantly lower mean scores on the Peabody Individual Achievement Test (Dunn & Markwardt, 1970) at the end of first and second grade ($p \leq .05$).

More research has been conducted on EB in early childhood than IB, with more variation in reporting for IB as well as less explained variance. Rubin, Hymel, and Rose-Krasonor (1991) investigated social withdrawal, a key aspect of IB, longitudinally. A group of 180 kindergartners were observed in free play in their school environment and with same sex peers in a laboratory during grades 2 and 4. A total of 14% of the children were identified as socially withdrawn in kindergarten. During grade 2, 67% of the children identified in kindergarten continued to be identified as socially withdrawn. At grade 4, 69% of the socially withdrawn children had been identified in grade 2, and there

was 54% stability in identified children between grades 2 and 5. Significant correlations between social withdrawal over time were as follows: kindergarten to grade 2, r = .25; grade 2 to 4, r = .53; grade 2 to 5, r = .38; grade 4 to 5, r = .4. The correlation between social withdrawal in kindergarten and grade 5 was not significant. Rubin and colleagues (1991) also determined that during kindergarten, socially withdrawn children were not perceived as exhibiting a behavior problem on the basis of teacher behavior rating or peer ranking. However, at grade 2, socially withdrawn children were identified as such by peers (Revised Class Play, Masten, Morison, & Pelligrini, 1985) and were rebuffed during play when they attempted to take a more directive role. Social withdrawal during kindergarten predicted self-reported loneliness in grade 4 and self-reported depression in grade 5 (statistics not reported).

Tremblay, Pihl, Vitaro, and Dobkin (1994) conducted a study of 1,034 boys from low income households in Montreal, all from homes speaking French. On the basis of teacher ratings (Preschool Behavior Questionnaire, Behar & Stringfield, 1974), boys were identified in kindergarten as exhibiting high or low degrees of impulsivity, anxiety, and social reward dependence. Researchers omitted items assessing aggressive, antisocial, and oppositional behavior, as the study sought to identify underlying factors in early childhood contributing to long-term delinquent behavior, rather than the stability of delinquent behaviors. Boys subsequently rated themselves on a number of delinquent behaviors, including stealing, trespassing, drinking, vandalism, and fights. Those scoring above the 80th percentile for the group were considered delinquent. Impulsivity during kindergarten was the strongest predictor of later delinquent behavior in a logistic

regression analysis with the independent variables kindergarten impulsivity, anxiety, and low social reward ($p < .01$). Low anxiety and low social reward dependence were also significant predictors. While levels of delinquency increased between the ages of 10 to 13 years, the relationship between delinquency did not change in terms of the predictors.

Research conducted in multiple cultural contexts indicates that behavior problems in preschool and kindergarten tend to persist during childhood and adolescence. Persistent behavior problems may result in lower academic achievement and/or delinquency.

While behavior problems during early childhood appear likely to persist beyond the preschool years, positive changes in the home environment may ameliorate behavior problems. Campbell and Ewing (1990) conducted a follow-up study of children identified at age 3 with behavior problems (through maternal report and direct observation). Of the 29 children remaining in the study through ages 6 and 9, 15 children had persistent behavior problems. These children were compared to the 14 children whose behavior had improved as well as a comparison group of 25 socially competent children. Children with persistent problems had more subsequent life stressors as indicated on the Life Experiences Survey (Sarason, Johnson, & Siegel, 1978), and children with persisting behavior problems at age 6 (Caregiver-Teacher Report Form, Achenbach, 1986) tended to continue to have problems at age 9 ($p < .01$) as compared to the socially competent children. Researchers found no differences between the improved group of children and the control group at age 9.

In another longitudinal study of young children with behavior problems, Egeland, Kalkoske, Gottesman, and Erickson (1990) followed children with behavior problems identified at ages 4.5 to 5 years of age. A comparison of children with persistent problems and children with improved behavior in grade 3 revealed that improved children had fewer life stresses as measured on the Life Experiences Survey ($p = .04$). Children with improved behavior also had higher home ratings on an observer inventory and maternal interview that assessed emotional climate, presence of stimulating materials, etc (HOME inventory) at the end of first grade ($p = .04$). Maternal depression scores for improved children were initially higher at age 4, but improved significantly at grade 2 ($p = .02$) as compared to children whose behavior did not improve (Egeland et al., 1990).

Follow-up studies on children identified with behavior problems during early childhood indicate that these children are at increased risk for persisting and possibly escalating behavioral difficulties. Behavior problems during early childhood do not dictate the certainty of continued problems, however. Research findings on children who decreased behavior problems over time indicate that healthy and appropriate environmental home changes promote positive behavioral changes.

Language Development and Behavior Problems

The recognition that challenging behaviors in severely developmentally delayed and autistic individuals may function as communicative signals has led to the development and validation of intervention programs that provide alternative forms of communication (Brinton & Fujiki 1993). Such programs are designed to establish more effective and

socially acceptable means to communicate wants and needs (e.g., Reichle & Johnston, 1993). It may be equally important to understand the relationships between language skills and challenging behaviors in higher-functioning populations (Brinton & Fujiki, 1993). A number of studies have examined these associations in young children.

An examination of data collected as part of the National Survey of Children's Health, a randomized telephone survey conducted in 2003 (Long, Gurka, & Blackman, 2008), found a significant association between parental concerns regarding behavior problems and language development. The survey included a randomized cross section of homes in different geographical areas and with varying income levels. The vast majority (93%) of surveys were conducted in English. The remaining 7% of the surveys were conducted in Spanish. The survey asked parents of 27,350 children between the ages of 10 months and 5 years, 11 months the following: 1) Are you currently concerned about how your child makes speech sounds and how your child understands you? 2) Are you currently concerned about how your child behaves? The most affirmative response was "a lot" and the least affirmative "not at all," and the relationship between these two responses to the behavior and language questions was examined. A series of chi square analyses ($p = .05$) yielded the following associations between language and behavior concerns: 54% of parents who had a lot of concern about behavior also had a lot of concern about language for children from 10 months to 3 years of age. Only 1% of parents who had a lot of concern about behavior had no concern about language. For children from 3 to 5 years, 54% of parents who had a lot of concern about behavior also had a lot of concern about language. Only 2% of parents who had a lot of concern about

behavior for their 3 to 5-year- old children had no concern regarding speech or language comprehension.

A longitudinal study by Carson, Klee, Lee, Williams, and Perry (1998) examined the relationship between language development and behavior problems in children from the ages of 2 to 3 in a group of 64 children in middle income, monolingual English-speaking families with a continuous distribution of scores on the Language Development Survey (Rescorla, 1989). Seventeen of the children screened positive for possible language difficulties and 47 screened negative. Researchers assessed all children with the Infant Mullen Scales of Early Learning (Mullen, 1989) at 2 and 3 years of age, and obtained language samples. All parents completed the Child Behavior Checklist 2-3 (Achenbach, 1992) at both ages.

Linear regression analysis indicated that the expressive language scale (Language Expression Organization) of the Mullen Scales obtained at age 2 negatively predicted both the IB scale scores ($R^2 = .20$, $p < .01$) and the total Child Behavior Checklist score ($R^2 = .18$, $p < .05$) at age 3. All language measures, including all Mullen scale scores as well as mean length of utterance from language samples, accounted for 21% of the total variance of Child Behavior Checklist total score (p not reported). At age 3, Language Receptive Organization (Mullen Scales) negatively predicted IB scale scores ($R^2 = .27$, $p < .01$) and Child Behavior Checklist total scores ($R^2 = .25$, $p < .01$). Language measures accounted for 35% of the variance in Child Behavior Checklist total scores (p not reported). Study limitations include self-selection in return of initial surveys and a reduction in sample size from ages 2 to 3. For

children with concurrent language and behavior problems, authors advise that an integrated approach to intervention be taken.

A study examining associations between behavior problems as measured on the Child Behavior Checklist and semantics, syntax, phonological discrimination, and speech production in Dutch 5-year-old children provided the opportunity to obtain information on children developing a language other than English. Van Daal, Verhoeven, and van Balkom (2007) randomly selected 71 children receiving services for language impairment and conducted assessments across the four language areas. Researchers found significant differences across all assessments between these children and age norms. Parents of the children completed the Dutch version of the Child Behavior Checklist (Verhulst, Koot, Akkerhuis, & Veerman, 1990) and rated 40% of the language-impaired children within the borderline or clinical range. Significant associations ($p \leq .05$) between language scores and Child Behavior Checklist total problem scores are as follows: syntax: $r = -.26$; semantics: $r = -.36$; phonology: $r = -.4$. IB was also associated with semantics ($r = -.34$) and phonology ($r = -.28$). EB was associated with phonology discrimination ($r = -.21$). There were no significant correlations between speech and behavior problems. It would appear, then, that all aspects of verbal ability measured (vocabulary, grammar, and speech sound discrimination), with the exception of speech, demonstrated an inverse relationship to behavior problems for children with language impairments.

A study by Kaiser et al. (2002) used teacher ratings of behavior problems in its investigation of the relationship between language skills and behavior in young children. A total of 332 3-year-old children from 14 Head Start classrooms received language

assessments with the Preschool Language Scale-3 (PLS-3, Zimmerman, Steiner, & Pond, 1992) and the Peabody Picture Vocabulary Test-III (PPVT-III, Dunn & Dunn, 1997). The PPVT-III is a standardized measure of receptive vocabulary skills and the PLS-3 is a standardized measure of overall receptive and expressive language skills. Teachers provided ratings of behavior problems (Caregiver-Teacher Report Form for Ages 2-5, Achenbach, 1997).

As a group, the participants scored below the standardized norms on the PLS-3, with 36% of boys and 27% of girls below a standard score of 80 (1.3 standard deviations below the mean). A greater percentage of boys (33.9%) than girls (22.8%) also demonstrated a standard score at or below 80 on the expressive communication section ($p = .03$). Children with behavior problem scores in the borderline or clinical range were more likely to have language scores at or below a standard score of 80 on the PLS-3. Gender differences in the degree of overlap between behavior problems and language scores were also found ($p < .05$). Boys with total problem behavior scores in the borderline or clinical range were 50% more likely to have language scores at or below a standard score of 80. Thirty-five percent of girls with problem behavior scores in the clinical range also had a PLS-3 standard score of 80 or below. A hierarchal linear model was used to analyze data (with children nested under teacher). PLS-3 scores were found to predict total behavior problem scores ($p < .01$); a 1 point increase in PLS standard score (including receptive and expressive subscores) was associated with a .13 point decrease in teacher behavior problem rating. In addition, investigators report that teachers with less experience were found to rate children significantly higher on behavior

problems than teachers with more experience ($p < .01$). This study determined that overall language skills predict teacher behavior ratings for 3-year-old children from low income households. The current study also employed teacher ratings as a measure of behavior problems in the classroom and included information on years of teacher's experience for the present study in order to control for a potential association between teacher experience and behavior problem ratings. In addition, the current study sought to provide more specific information on the relationship between language and behavior problems in its focus on expressive language and knowledge and use of internal state words and its inclusion of young children who may be experiencing increased levels of social risk.

Behavior Problems and Expressive Language Delay

Research suggests, then, that there is a relationship between language development and behavior problems in young children. A number of studies have more specifically investigated a potential relationship between expressive language and behavior problems in young children. Caulfield, Fischel, DeBaryshe, and Whitehurst (1989) examined the relationship between expressive language delay and behavior in 68 children from 24 to 32 months of age. One-half of the study participants were identified as having an expressive language delay by scoring 2.5 standard deviations or more below age mean on the Expressive One-Word Picture Vocabulary Test (Gardner, 1981) and scores no more than one standard deviation below the mean on the PPVT-R (Dunn & Dunn, 1983) and the Leiter International Performance Scales (Leiter, 1976). Children in the control group scored at or within one standard deviation on all three measures and were matched with

Researchers coded child and maternal behaviors from direct observations of mother/child interactions. Mothers also completed the Eyberg Child Behavior Inventory (Eyberg, 1980), a questionnaire with IB and EB scale scores as well as an overall behavior problem score. Analysis of behavioral observations of the children indicated that children with expressive vocabulary delay exhibited more behavior problems overall ($p < .05$), while no differences between maternal behavior were found. However, no group differences were found on maternal report of behavior problems. Authors speculate that parents of children with expressive language delay may have reduced expectations for their children in terms of their behavior.

A study by Fagan and Iglesias (2000) of children enrolled in Head Start programs examined the relationships between language input of fathers, expressive communication skills, and behavior problems of children. Dyadic interactions between fathers and children were taped in the fall and coded for C units (i.e., independent clauses), mean length of utterance (MLU) and mean length of turn (MLT). Type-token ratios (TTR, the ratio between number of unique words and number of total words) were also computed. Behavior assessment consisted of teacher ratings on the Social Skills Rating System (Gresham & Elliott, 1990) in the fall and spring. Structural equation analysis indicated that father's MLT predicted spring EB, negatively mediated by child MLT. Father's MLU and child MLU were associated, and child MLU negatively predicted EB in the fall. Child MLT negatively predicted EB in both the fall and spring, and EB in the fall predicted spring EB. The multiple regression model predicted 40% of the variance in EB in the spring (p not reported). Gender was not a significant pathway with these other

variables present. However, girls had significantly higher TTRs than boys and also exhibited significantly lower EB and IB scores in the spring. Results indicate, then, that child participant MLU and MLT were negatively associated with EB in both the fall and spring. They were also negatively associated with IB in the spring.

Horwitz and colleagues (2003) selected a random sample of children born at Yale-New Haven Hospital between 1995 and 1997. Participants were 1,189 children from 18 to 39 months of age without health or developmental risk factors at birth, predominantly white, with family incomes approximately 200% or more above Federal poverty level. Parents had sufficient mastery of English to complete forms and/or interviews. Horwitz and colleagues (2003) found that 13% of the children from 18 to 23 months exhibited a language delay. Correlates of language delay included youngest child (birth order), maternal education at high school or below, low income, minority and single parent status, presence of parental depressive symptoms (self-report), high level of parenting stress (self-report), and low family expressiveness (self-report; Horwitz et al., 2003). At 24 to 29 months, 15% of the children were reported to exhibit expressive language delays, but these were no longer associated with some of the correlates at 18 to 23 months, including single parent status, birth order, parental depressive symptoms, and family expressiveness. At 30 months and older, family expressiveness was again associated with expressive language delay ($p = .05$).

To summarize, a handful of studies show that expressive language delays/disorders are associated with behavior problems in young children. However, only one study (Carson et al., 1998) examined and found a relationship between overall expressive

language at age 2 and behavior problems at age 3 for children with language skills within normal limits. All participating children in the study were from middle income families. The current study sought to provide information on the relationship between expressive language skills and behavior problems for young children growing up in poverty and at varying levels of social risk for both language delays/disorders and behavior problems utilizing teacher behavior ratings as well as information on behavior obtained through direct observation.

Behavior and Language Problems: Common Factors

A number of variables found to be predictive of expressive language delay (Horwitz et al., 2003) have also been found to predict behavior problems in young children. These include maternal education at high school or below (McCartney et al., 2004) , parental depressive symptoms (Egeland et al., 1990), lack of time with father (Harden et al., 2000), and high levels of reactivity, family conflict, and/or stress (Cowan et al., 2009).

As previously discussed, there appears to be an association between attachment status and behavior problems in young children (McCartney et al., 2004). Van IJzendoorn, Dijkstra, and Bus (1993) conducted a meta-analysis that examined the relationship between attachment and language development. The meta-analysis was restricted to the broad categories of secure versus insecure attachment because many studies did not provide data to include the insecure and avoidant subcategories of insecure attachment. Inclusion in the meta-analysis required infant attachment classification utilizing the Strange Situation (Ainsworth et al., 1978) or related

procedures. Seven studies on the relationship between attachment and language competence were identified. Dates of publication ranged from 1975 to 1990. Language measures included number of words used, narratives, word imitation, mean length of utterance, and standardized assessment. Ages of children when language measures were administered ranged from 12 to 42 months. Van IJzendoorn and colleagues reported Pearson correlations between language outcomes and attachment status. The combined effect size across studies was large (Cohen's d = .59).

It would appear, then, that a significant association exists between behavior problems and language delays/disorders. In addition, factors that put young children's language development at risk have also been found to be associated with behavior problems. The current study sought to contribute to an understanding of the relationship between expressive language skills and behavior problems by determining whether overall expressive language skills in young children at social risk both with and without language delays/disorders are related to behavior problems.

Internal State Words

The knowledge and use of words that young children use to describe attributes, desires, beliefs, knowledge, perceptions, and intentions may be a significant link between expressive language development and the presence or absence of behavior problems (Kofsky-Scholnick & Hall, 1991). This vocabulary corpus, known as internal state words, contributes to the regulation of self as well as social interactions. Conversely, a psychological deficit in use of words describing feelings and emotions, those internal state words that express affect, is referred to as 'alexymithymia' (Lemche, Klann-Delius,

Koch, & Joraschky, 2004). In keeping with a dynamic view of the interactions of development domains, alexymithymia is viewed as "rooted in a deficit of mental representation at the emotion-cognition interface" (Lane et al., 1996, as cited by Lemche et al., 2004, p. 367).

From ages 2 to 5, the young child's ability to self-regulate behavior increases under the influence of the parental attachment relationship (Shore, 2000, as cited in Juen et al., 2007) as a fundamentally regulatory relationship. A mother's interpretation of aggressive behavior on the part of a toddler as communicative of the need for reassurance in a stressful situation (Juen, Peham, Juen, & Benecke, 2007) may result in her verbal communication of this interpreted state to the toddler and provide the transmission of internal state words that in turn enables the child to develop self-regulatory skills and the ability to interpret the behavior of others. The child's subsequent knowledge and use of these words as part of behavior schemes in stressful situations is tangible evidence of increasing levels of self-regulation. The PI's 2-year-old grandson, after crying briefly at his parent's departure, was observed to say "I better stop crying." This verbal expression of his own internal state and his intentions concerning it appeared to actually calm him as he expressed his intentions to be calm.

Development of Internal State Words

Linguistic factors.

Bretherton and Beeghly (1982) conducted a longitudinal study of the development of internal state word use by 20 middle income children. Mothers indicated which of 73 words or phrases their children used at 10, 13, 20, and 28 months of age. Words were

categorized as perception (e.g., see, hear, smell), physiology (e.g., hungry, sleepy), emotion and affect (e.g., happy, sad, hug), volition and ability (e.g., want, need), cognition (e.g., think, know), or moral judgment and obligation (e.g., good, naughty). Mothers indicated whether the child was referring to him or herself or to others. Bretherton and Beeghly (1982) also videotaped the children in a play and book session with their mother and tallied the internal state words children used. While the number of words directly observed was significantly lower than words by maternal report, correlations within each internal state word category between children's demonstrated use during the videotaped sessions and mothers' checklist of words was strong ($r=.92$, $p < .01$). At 28 months, the mean number of internal state words was 37.2 (SD = 15.8, range=0 - 48). Repeated measures ANOVA results indicated a significant effect for category ($p < .01$). Post hoc analysis revealed that desire, physiology, and perception words had significantly higher percentages of usage than affect and moral judgment/obligation words ($p < .01$). Use of cognitive state words was significantly lower than affect and moral judgment/obligation (statistics not reported). On average, children applied 67% of their internal state words to both themselves and others. Those words not used for both were used for self ($p < .01$).

More recent studies focus on a subset of internal state words that includes the categories desire, cognition, affect, and moral judgment. These are referred to as mental state language. Bartsch and Wellman (1995) analyzed language samples of 10 English-speaking monolingual children (CHILDES database) from 18 months to 6 years of age. Major findings were that children make reliable references to desire at around 2 years of

age. Desire terms (e.g., want, need) reach a peak in production around 3 years of age. Earliest references were to their own desires, followed by references to the desires of others.

Ferres (2003) compared these findings with monolingual English children to a sample of monolingual Spanish-speaking children, using the CHILDES database. He examined transcripts of 17 children, recorded under varying circumstances, across four age groups: 21 to 25 months, 26 to 30 months, 31 to 35 months, 42 to 47 months. The only verb that occurred in the corpus for desire was 'querer' (want). This finding corresponded to the predominance of 'want' as the key verb for desire in English (Bartsch & Wellman, 1995). By 23 months, the children in Ferrar's analysis were making frequent references to desire. Percentages of total desire utterances across the time points were: .65%, .9%, 1.5%, and 1.3%. This finding would appear to support Bartsch and Wellman's (1995) finding that desire terms increase around 2 years of age, reach a peak around 3 years of age, and then stabilize. However, the finding that desire references to self appear before desire references to others does not appear to be supported. Desire references to others at 23 months constituted 39% of all desire references, with an increase of only 5% over the other three time points.

In another study of monolingual Spanish-speaking children, Pascual, Aguado, Sotillo, and Masdeu (2008) analyzed the use of desire and cognition terms in 25 3-to-5-year-old children. Across language samples in 6-month intervals, 3% of utterances were desire or cognition terms. As in Ferres' (2003) study, 'querer' (want) was the most commonly used term across both desire and cognition utterances, occurring in over 50%

of the total number of utterances and in 99% of desire utterances. The most frequent cognition verb was 'saber' (know), found in more than 30% of all utterances across the two categories. Other frequently-used cognition verbs were 'recordar' (remember), 'creer' (believe), 'pensar (think), and 'parecer' (seem, look like). These constituted 11% of all desire and cognition utterances. At age 3, children used more desire utterances than cognition utterances ($p < .05$, non-parametric sign test). At age 5, however, cognition utterances were more frequent than desire utterances ($p < .05$). References to self for the two categories remained constant across ages, whereas other references increased over time ($p < .01$). The number of desire references to self and other differed only at age 4, when desire references about others were greater than desire references to self ($p = .16$). For cognition utterances, a greater number of self references as opposed to other references were found at 3 years, 6 months ($p < .05$) and 4 years, 6 months ($p < .05$). These findings on self versus other references for cognition utterances are consistent with findings of Bartsch and Wellman (1995) that, unlike desire terms, a preponderance of self references persists during the preschool years.

Tardif and Wellman (2000) examined the transcripts of 10 monolingual Mandarin-speaking children recorded in natural family settings over a 6 month period, starting when the children were between 21 and 23 months old. At 21 months, 2% of total utterances contained verbs of desire or cognition, and by 27 months, the percentage had risen to 5%, higher percentages than those of either English or Spanish-speaking children. The earliest and most prevalent verb was 'yao4' (want) and was the sole verb used for desire or cognition at 21 months. The next verbs to appear also coded desire. In addition,

all 10 children were found to code their own desires before coding desire in references to others ($p < .05$). However, cognitive utterances referring to others appeared before utterances of self- reference for 4 of the 8 children, with 2 children demonstrating the first self and other cognitive references during the same session.

Development of desire and cognitive verbs was also examined in the CHILDES transcripts of 8 Cantonese children (Lee & Wong, 1998; Lee et al., 1995, as cited by Tardif & Wellman, 2000) ages 17 to 44 months. Desire and cognition terms comprised a total of 1% of total utterances at 20 months, and increased to almost 5% at 40 months. As in other studies cited, the most frequent verb was the equivalent of 'want' ('jiu3'). Cognitive terms were infrequent and were found initially at around 36 months. Seven of the eight children began self references before other references for both desire and cognition terms, and all eight children produced more self than other references across categories ($p < .01$). It would appear, then, that children across cultures acquire internal state words in similar developmental sequences. During earliest word acquisition, labeling of physical states and expression of desire predominates. The description of mental states soon follows, and has been the focus of much of the recent research on internal state words.

Review of the literature on internal state words also included a search for an appropriate methodology to elicit internal state words from 3-to-5-year-old at risk child participants in the current study. For children younger than this age group, such as investigated by Bretherton and Beeghly (1982), parent inventories of their children's use of internal state words was an appropriate tool. Internal state words as identified by

parents were found to have a high degree of correlation (r = .92) with the smaller corpus of internal state words identified in elicited language samples. For the current study, a different means of assessing children's contextual use of internal state words was needed, as internal state word expressive vocabularies in children from 3-to-5-years of age may be too large for valid assessment through parent report. Limitations on study resources precluded the acquisition and analysis of spontaneous language sampling that was sufficiently extensive to provide exhaustive identification of internal state words across settings. A search of relevant literature as well as inquiries to members of InfoChildes, a listserv for child language research, located a study by Shiro (2003) that investigated evaluative words, a corpus of words that overlaps significantly with internal state words (Bretherton & Beeghly, 1982). For this study of low income 6-to-11-year-old children in Venezuala, Shiro used a 10 minute video version of the picture book *Picnic* (McCully, 2003) that portrays the separation and reuniting of a young mouse with her family. The PI determined that the video was potentially too long for the 3-to-5-year-old children in the current study. However, the pictures and content of the picture book appeared to be appropriate for 3-to-5-year-old children. The PI developed a script to accompany *Picnic* (McCully, 2003), and the method to elicit internal state words in context was a narrative task that consisted of children retelling the story. Methodology for determining use of internal state words in children has included parent report for children ages 2 and under, analysis of spontaneous language samples (including those available from the Childes database), and narratives in the form of story retell. The

current study used story retell in order to investigate contextual use of internal state words in 3-to-5-year-old children.

Nonlinguistic factors.

In addition to determining the chronological development of internal state word knowledge and use, a DST approach seeks to investigate the processes and variables that contribute to internal state word acquisition. These processes appear to be impacted by several nonlinguistic factors, including attachment status and the presence or absence of maltreatment. A cross sectional study of young children in Germany (Lemche et al., 2004) investigated the relationship between development of internal state words and attachment status. Participants were 42 mother-child dyads, predominantly middle income, and balanced for gender. Attachment status was determined by the Strange Situation protocol (Ainsworth & Wittig, 1969). Researchers videotaped the dyads when children were 17, 23, 30, and 36 months in free play sessions that included a brief mother-child separation, transcribed children's language, and coded transcriptions for internal state words. They found that word counts for all internal state categories were greater for securely-attached children at all time points ($p < .05$), with these exceptions: negative emotion words (e.g., sad, angry) were more frequent in insecure/avoidant children at 30 months, and in disorganized children at 36 months. An overall index of development (Bailey Mental Development Index, 1969) correlated with overall verbosity, but not use of internal state words.

Cicchetti and Beeghly (1987) investigated use of internal state words among 20 maltreated children (including abused, neglected, and abused/neglected) at 31 months of

age as part of the Harvard Child Maltreatment Project. Receptive vocabulary skills (PPVT-R, Dunn & Dunn, 1983) did not differ between the maltreated children and a control group of children matched for age, gender, and low SES. However, maltreated children produced fewer different words ($p < .01$) and had a lower mean length of utterance ($p < .01$). They also used proportionally fewer internal state words than non-maltreated children (statistics not reported). Maltreated children used proportionally fewer utterances coding physiological states and negative affect. Use of internal state words among non-maltreated, low income 31-month-old children was similar to use for middle income children at a slightly younger age (28 months). Low income children used fewer moral judgment/obligation terms than middle income children. Consistent with Bretherton and Beeghly's findings, maternal reports on children's use of internal state words was consistent with direct measures ($r= .5$, p not reported). While the maltreated group produced the same number of total utterances and utterances referring to others as the non-maltreated group, they produced fewer utterances referring to self ($p < .01$, Coster, Beeghly, Gersten, & Cicchetti, 1989). The current study explored whether knowledge and use of internal state words in young low income children was related to classroom behavior problems. The information from previous research on the impact of maltreatment/abuse on knowledge and use of internal state words is relevant, as two of the current study's participating sites received referrals of maltreated children.

Differences appear to exist between the use of internal state words and other expressive language measures for adolescents as well as young children. McFadyen and Kitson (1996) compared the discourse of 20 abused and non-abused low income

adolescents with a mean age of 15 years. They did not find differences in receptive vocabulary skills (PPVT-R (Dunn & Dunn, 1983). Expressively, abused adolescents produced significantly fewer T units (i.e., independent clauses, $p < .05$) and proportionately fewer utterances referring to self, both action utterances ($p < .01$) and utterances referring to internal states ($p < .05$). Proportion of utterances referring to others was similar between groups. The finding in both young and older maltreated participants of fewer self references poses a departure from the pattern found in non-maltreated children of an initial preponderance of references to self, followed by an increase in references to others over time. These findings signal a possible marker of common and persistent challenges in both social-emotional and language development for maltreated individuals.

Internal state words and executive function.

Since the development of the inventory of internal state words, there has been extensive research on the development of executive function in young children. Executive function consists of higher order self-regulatory cognitive processes that include control of attention and responses, resistance to task interference, and delay of gratification, and is associated with operations of the prefrontal cortex (Carlson et al., 2004). Carlson and colleagues conducted a longitudinal study of 81 typically developing 2- to 3-year-old children. Mothers completed the Internal States Language Questionnaire (ISLQ, Bretherton & Beeghly, 1982) and the MacArthur Communicative Development Inventory (MCDI), Toddler Short Form (Fenson et al., 2000), a measure of expressive vocabulary, at 24 months. At 39 months, examiners administered the PPVT-III (Dunn &

Dunn, 1997). Direct measures of executive function at 24 months included a reverse categorization task (e.g., little objects in big container), a multi-location search task (modified A-not-B), a shape stroop task (child asked to point to small object embedded in larger, more salient object), and snack and gift delay tasks. At 39 months, executive function tasks administered included an advanced version of reverse categorization, a reverse stroop task, snack delay, a version of Simon Says, hand game (Luria, 1964), tower building (turn taking), whisper (inhibition), and gift delay.

At 24 months, the executive function composite score was positively associated with the MCDI ($r = .61$, $p < .01$), and there was a strong association between the ISLQ and the MCDI ($r= .83$, $p < .01$). At 39 months, PPVT-III scores were associated with executive function task composite score ($r = .41$, $p < .01$). Controlling for age, sex, and verbal ability, ISLQ was associated with executive function composite score at 24 ($r = .38$, $p < .01$) and at 39 months ($r = .47$, $p < .01$).

Thus, the use of internal state words as reported by mothers appears to be related to executive function as measured by the ability of young children to delay gratification and/or suppress a dominant response. More recently, studies have investigated the link between elements of executive function and IB and EB.

Effortful Control and Its Relationship to Behavior Problems

Valiente et al. (2006) investigated the relationship between children's effortful control and problem behaviors in a 4-year longitudinal study. Effortful control is the "ability to inhibit a dominant response to perform a subdominant response" (Rothbart & Bates, 1998, p. 137). This definition fits many of the executive function tasks as

described previously, including reverse categorization, delay of gratification tasks, and reverse stroop tasks. Indeed, Eisenberg et al. (2009) describe effortful control as a component of executive function and operationalized effortful control as a puzzle completion task. The puzzle was not visible to the children and they were instructed to put the puzzle together without seeing it. However, children were able to easily remove the visual barrier during puzzle completion. A total of 181 children (4 years, 7 months to 8 years old at time 1), including children with scores at borderline or clinical levels on the Child Behavior Checklist (Achenbach, 1991a) and the Teacher Report Form (Achenbach, 1991b) and a control group, were assessed at 3 time points over a 6-year period. Results at time 2 included a negative correlation between the proportion of time children persisted on the puzzle task without looking and both teacher($r = -.70$, $p < .01$) and maternal reports ($r = -.27$, $p < .05$) of EB and teacher reports of IB ($r= -.18$, $p < .05$). That is, increased effortful control on the puzzle task was associated with lower parent and teacher behavior problem ratings. However, maternal reports of IB were positively correlated with the persistence measure ($r = .21$, $p<= .01$). At time 3, the persistence measure for the puzzle task correlated only with teacher report of EB ($r = -.24$, $p < .05$). Overall results indicate that effortful control, an aspect of executive function, was negatively associated with behavior problem ratings for children between the ages of 5 and 8 years.

Olson, Sameroff, Kerr, Lopez, and Wellman (2005) examined the role of effortful control in EB in young children, while controlling for adverse family factors. Participants were 220 middle income 3-year-olds with an over-representation of children with

parental ratings of borderline or clinical EB (Child Behavior Checklist, Achenbach, 1991a). Six tasks behaviorally measured effortful control: slow/fast variations of motor responses, turn-taking on a tower-building task, three delay of gratification tasks, and a whisper (inhibition of voice) task. A composite score on these tasks was negatively correlated with maternal ($r = -.21$, $p < .05$), paternal ($r = -.37$, $p < .05$) and preschool teacher ($r = -.28$, $p < .05$) ratings of EB. That is, children who did better on the tasks requiring effortful control had lower ratings of behavior problems. In addition, parents were asked to rate their children on items from the Child Behavior Questionnaire (Ahadi, Rothbart, & Ye, 1993), believed to assess dimensions of child temperament associated with effortful control. With parenting behaviors found to contribute to EB (e.g., punitive discipline, marital conflict) controlled for, a composite variable of behavioral performance and temperament ratings of effortful control predicted maternal EB ratings ($R^2 = .17$, $p < .01$). A regression analysis that included the effortful control behavioral variable without the temperament ratings was not included in the analysis (Olson et al., 2005). While effortful control as measured on the six tasks was associated with behavior problem ratings of EB, researchers did not report whether task performance, as distinguished from the composite variable, predicted EB ratings.

The study by Carlson and colleagues (2004) suggests a positive relationship between children's use of internal state words and the development of executive function. Furthermore, recent research suggests an inverse relationship between aspects of executive function (i.e., effortful control) and behavior problems in 3-year-old children (Olson et al., 2005). That is, children who do well on tasks designed to assess effortful

control have lower behavior problem ratings. These findings have motivated the current study's investigation of a possible direct relationship between internal state words and behavior problems in young children. In keeping with a dynamic systems theory of child development, Pianta and Walsh (1996) describe the development of mature behavioral schema that incorporate increasingly mature forms of language as alternatives to withdrawal and/or aggression during stressful or adverse situations. The knowledge and use of words to describe internal states may comprise an important aspect of these schema. As such, the current study investigated whether knowledge and use of internal state words is inversely related to behavior problems in a group of 3-to-5-year-old children at social risk.

Study Purpose and Research Questions

A limited number of previous studies indicate a negative relationship between expressive language skills and behavior problems in young children (e.g., Caulfield et al., 1989; Horwitz et al., 2003; Carson et al., 1998). Such studies have tended to focus on the relationship between expressive language and behavior problems for middle income children and/or children with language delays/disorders. The current study explored a possible relationship between expressive language skills and classroom behavior problems for young children at social risk across a spectrum of expressive language skills.

Children's use of internal state words is associated with their performance on executive function tasks (Carlson et al., 2004). Furthermore, performance on executive function tasks that require effortful control is inversely related to behavior problems in

young children (Olson et al., 2005; Valiente et al., 2006). The evidence for a relationship between the development of internal state words and executive function and a subsequent relationship between executive function and behavior prompted the investigation of a possible direct relationship between knowledge and use of internal state words and behavior in young children at increased risk for delays in language development (Hart & Risley, 1995) as well as behavior problems (Campbell, 1995; Harden et al., 2000; Stacks & Goff, 2006).

The purpose of the current study was to examine the relationship between classroom behavior problems and the expressive language skills of young children growing up in households below the poverty level and at varying degrees of social risk. In addition, for this group of children, this study investigated the possibility of a relationship between classroom behavior problems and a specific aspect of expressive language, knowledge and use of internal state words. There were three primary research questions.

1. Is there a relationship between expressive language skills and classroom behavior problems in a group of 3-to-5-year old children at social risk? If so, what is the nature of the relationship between expressive language skills and classroom behavior problems?

The null hypothesis is that expressive language skills are not related to classroom behavior problems in young children at social risk. The alternative hypothesis is that classroom behavior problems and expressive language skills are related. This hypothesis is supported by previous research. Expressive language skills at age 2 negatively predicted behavior problems at age 3 for a group of middle income children (Carson et

al., 1998). In addition, 24-32-month-old children with expressive vocabulary delays had a higher incidence of behavior problems (Caulfield et al., 1989).

2. Is there a relationship between the ability to use internal state words on a picture description task and classroom behavior problems in a group of 3-to-5-year-old children at social risk? If so, what is the nature of the relationship?

The null hypothesis is that performance on an internal state word picture description task is not related to classroom behavior problems. The alternative hypothesis is that performance on an internal state word picture description task is related to classroom behavior problems. This hypothesis is supported by findings of previous research that knowledge and use of internal state words was negatively associated with performance on executive function tasks for a group of children at ages 2 and 3 (Carlson et al., 2004). Performance on executive function tasks was inversely related to behavior problems in children ages 6 to 14 (Valiente et al., 2006).

3. Is the use of internal state words during a story retell task related to classroom behavior problems in a group of 3-to-5-year-old children at social risk? The study hypothesized that children who exhibit behavior problems use proportionately less internal state words during story retell than children without behavior problems. The null hypothesis was that the proportion of internal state words used during a story retell task is not related to participating children's behavior problems. Failure to reject the null hypothesis regarding prediction of behavior problems may indicate that internal state words function as a developmental interface between language and social-emotional development (Bretherton & Beeghly, 1982).

Methods

Participants

A total of 59 children ages 3;0 to 5;0 participated in the study. The mean participant age was 47 months (SD = 7; range = 35-59). A total of 28 girls and 31 boys participated. All children were monolingual speakers of English. Ethnicity by parent report was 38 African American, 13 Native American, 3 Hispanic, 2 Caucasian, and 3 multi-ethnic children. Prior to the initiation of the study, all procedures were approved by the University of Minnesota Internal Review Board for the Protection of Human Subjects as well as the administration of each of the four participating sites.

This investigator obtained a total of 71 signed parental consent forms for 3-to 5-year-old children attending four target daycare or preschool programs in a large urban area in the upper midwest. Recruitment efforts included the PI's direct contact with parents during pickup and drop off from the education center and at scheduled parent events, letters sent home with children, and/or teacher contacts with parents. Six children with signed consent forms left the program prior to data collection. Two children were excluded because they spoke a language other than English at home. Two children exceeded the upper limit of chronological age prior to testing, and were therefore excluded. One child was determined to be younger than 3 years, 0 months. Finally, one child was not able to successfully separate from the classroom caregiver to undergo testing.

All participants were recruited from one of four programs that served low income families in a large urban area in the upper midwest. Table 1 provides participating

children's ages, gender, and ethnicity (parent report) by site. Two of the programs received referrals from outside agencies of children experiencing social risk factors that included caregiver addiction, separation from one or more parents, and maltreatment. The target population sampled, then, was children from low socioeconomic families with varying degrees of social risk factors.

A total of 15 children who attended site 1 participated. This daycare was also located in proximity to a housing development for low income Native American families. All of the children who attended site 1 received government subsidies for tuition and free/reduced meals based on family income. A total of 28 children who attended site 2 participated in the study. Over 90% of attending children qualified for tuition subsidies and or/free or reduced-fee meals based on family income level.

Table 1.

Age, Gender, and Ethnicity of Participating Children by Site

	Age		Gender		Ethnicity				
Site	Mean	SD	Boys	Girls	Caucasian	Af Am	Nat Am	Hispanic	Multi
1	45	7	7	8	0	1	13	1	0
2	47	7	17	11	1	26	0	1	0
3	51	8	4	2	0	3	0	0	3
4	50	7	3	7	2	8	0	0	0
Total	47	7	31	28	3	38	13	2	3

Note. Mean ages are in months; Af Am = African American; Nat Am = Native American.

Site 3 served referred children and families who had experienced prolonged and multiple stress in their lives; that is, they were judged to be at risk for abuse and neglect. The center accepted self-referred families as well as families referred from the county social service agency, an organization serving homeless families, and local health clinics. Over 95% of participating families lived at or below the poverty line and qualified for free or reduced meals. A total of 6 children from this program participated in the study. Ten participants who attended site 4 participated in the study. All children attending this site also received tuition subsidies and free or reduced-fee meals based upon family income. Two addiction treatment programs in the metropolitan area referred children of participating parents to this site. Children of participants were typically separated from their parent during the parent's initial residential treatment. During the second phase of the program, when children and parents were reunited, parents and children were typically housed in a transitional group home. It may be the case, then, that study participants who attended sites 3 and 4 experienced additional social risk factors as compared to children who attended sites 1 and 2.

General Procedures

The following assessment measures were administered individually in a separate room to each participant at his or her program site: an assessment of expressive language skills, a brief assessment of nonverbal intelligence, an internal state word picture description task, and a story retell designed to elicit internal state words. In addition, each child was videotaped during a 25-30 minute structured classroom activity and a 25-30 minute unstructured activity. These recordings were coded for inappropriate and/or

interfering behavior as well as compliance with directives. In addition, the teacher of each participant completed a standardized rating scale of the child's behavior.

The PI as well as six trained research assistants administered assessment measures. Research assistants were graduate students pursuing a master's degree in speech and language pathology or a clinical doctoral degree in audiology from the department of Speech-Language-Hearing Sciences (SLHS) at the University of Minnesota. Students were trained in assessment measures and all participating assessors were able to demonstrate competence by successfully completing assessment and scoring of each measure with the PI. Video recording of children was conducted by the PI as well as three university students who were undergraduate majors in SLHS. Students were trained in the operation of the recording equipment as well as protocol for limiting inclusion of individuals who were non-participants and minimizing disruption of classroom activities.

Direct assessment measures were typically administered over two sessions on different days during a 2-week period. Sessions typically were 60 to 90 minutes in duration. Length of assessment session and number of sessions was modified as needed for individual children and their ability to participate. The internal state word picture description task was administered during the first assessment session, and the story retell task was administered during the second session. This protocol was followed in order to prevent priming on the internal state word picture description task from the internal state words used during the examiner's telling of the story. Teachers were provided with the Caregiver-Teacher Rating Form (CTRF, Achenbach & Rescorla, 2000) on the first day of direct task administration, and requested to return the completed form to the PI within 10

days. A follow-up request for the scale was made if it was not returned during that time frame, with a goal of scale completion within 14 days of the initiation of task administration. All direct measures were obtained on 51 of 59 (86%) participants within a 14-day time period (mean number of days = 8.32, SD = 6.26, range = 1-31). The teacher rating scale was returned to the PI within a 14-day period for 43 of 55 (78%) of participants. The mean number of days for data collection, including teacher rating scales, for individual participants was 11.91 (SD = 10.47, range = 1-42 days). While the date of rating scale completion was requested on the CTRF form, many teachers neglected to provide this information. Therefore, the date when the PI collected the rating scale was used. Therefore, these means may over-estimate the number of days between the initiation of data collection and the completion of the teacher rating scale. The period of time for teacher completion of the rating scale at site 3 was increased by the closure of the center over the winter holiday period. Teachers of three of the six participants at site 3 returned their rating scales more than 30 days after the initiation of data collection. Teachers of the other three participants returned their forms within the 14-day time period.

Measures

The Preschool Language Scale-5, Expressive Communication.

The PI and research assistants administered The Preschool Language Scale-5 (PLS-5, Zimmerman, Steiner, & Pond, 2011), Expressive Communication (EC), to assess overall expressive language skills. The PLS is a widely-used assessment measure of language skills in young children with recent (2011) revisions and standardization on a

socioeconomically and ethnically diverse sample of children. While the PLS-5 also includes an auditory comprehension section, literature review indicated that expressive language may play a particularly important role in predicting both externalizing and internalizing behavior in young children (e.g., Carson et al., 1998). The PLS-5 EC was administered to determine the participants' overall expressive language. Starting points and standardized scores are designated for children in 6-month age increments. Children are provided with items to achieve a basal level of three correct responses and testing is discontinued when a ceiling of six incorrect items is reached. The PLS-5 has norms for children from 0 to 7 years, 11 months. The PLS-5 EC includes items to assess expressive vocabulary (naming of pictured objects), syntax, and language pragmatics through elicitation of spontaneous utterances. Administrators provided a raw score according to test protocol. They identified children on test forms by first name and first initial of last name. The PI collected test forms daily, assigned each participant a number as well as a letter designating site, verified raw scores, determined standardized scores as per test manuals for the participating child's chronological age, and entered this information in the project database. All 59 participating children completed expressive language assessment with PLS-5 EC. In order to determine the participants' knowledge and use of internal state words, the PI designed two experimental tasks.

Internal state words (ISW) picture description task.

The PI developed a picture description task with a sentence completion or question cue to elicit the corpus of internal state words developed by Bretherton and Beeghly (1982). Participants completed a total of 47 items. An example of items is: What is the

girl in the picture doing? (target response: crying). How do you think this girl feels (target response: sad). Appendix A provides the list of verbal elicitation cues and target responses. Two internal state word items, "real" and "funny," were omitted prior to administration to study participants, as pictures and cues did not elicit these words from a majority of respondents when the task was administered to 12 adults during a pilot procedure of the task items. As some words were semantically very similar (e.g., "look" and "see"), more than one word qualified as a target response for some items (e.g., The boy is seeing/looking/watching.) Internal state words were presented according their category in the following order: perceptual (e.g., see, hear, smell), physiological (e.g., hungry, sleepy), emotional and affective (e.g., happy, sad, hug), volition and ability (e.g., want, need), cognition (e.g., think, know), and moral judgment and obligation (e.g., good, naughty). The number of correct responses for 57 of the 59 participating children was included for analysis. Task administration was terminated for 2 of the children. One child did not provide any verbal responses for the items, and many of the other child's responses were unintelligible.

In order to provide a non-internal state word control measure for the level of vocabulary of the internal state words, the PI matched 19 non-internal state words for word class, imageability, and word frequency with internal state words. Imageability (the ease with which a word gives rise to a sensory mental image) and word frequency information was obtained from a database developed by Bird, Franklin, and Howard (2001). This database includes imageability ratings from the Medical Resource Council lexical database (Coltheart, 1981) and the combined written and spoken frequency counts

from the CELEX Database (Baayen, Piepenbrock, and Gulikers, 1995). The PI chose this database for its inclusion of adjectives, as many target internal state words were adjectives. The means for the target internal state words and the control words were not significantly different for word frequency (internal state words m = 2.47, non-internal-state-words m = 2.41, p = .44) and imageability (internal state words m = 422, non-internal-state-words, m = 436, p = .60).

The PI developed picture and sentence completion or question cues for each of the 19 non-internal state word items. Prior to the study, she administered these items to 12 adults. Criterion for inclusion in the study was that each word be the majority response across adults: that is, at least 7 of the 12 adults produced the word in response to the picture/verbal cues. Fourteen of the 19 non-internal state word items elicited the target response for the majority of adults. These non-internal state word items were then included in the ISW picture description task when it was administered to the 59 participating children. Non-internal state words were interspersed among internal state word items and in proximity to their matched internal state word. Following administration of the task to the 59 children participating in the study, the PI eliminated three more non-internal state word items, as the target response was not the most frequent response from the participating children.

Mean imageability for the matched words was; non-internal state words, 452.5; internal state words 448.9 (t = -.497; critical t = 2.26; p = .63). Mean frequencies were 2.42, non-internal state words; 2.62, internal state words (t = 1.61; critical t = 2.23; p = .14). In order to increase the probability that internal state words and non-internal control

match words were samples of the same population of words in terms of frequency, the corpus of internal state words and non-internal state matches was further reduced to eight matched pairs. These are: hear/call, smell/sweep, want/find, dream/shape, good/new, can/go, mean/give, sleep/feed. Categories of internal state words represented in the matched word pairs were perception, physiology, volition/ability, cognition, and moral judgment/obligation. No internal state words from the emotion/affect category were retained. Imageability and frequency for internal state words and their non-internal state word control match items are listed in Appendix B. Control item cues are listed in Appendix C. Mean imageability for the eight matched word pairs was non-internal state words, 4.16, internal state words 4.20 ($t = -.45$; critical $t = 2.45$; $p = .67$). Mean frequencies were 2.65, non-internal state words; 2.63, internal state words ($t = -.44$; critical $t = 2.36$, $p = .67$).

Administrators of the ISW picture task recorded target responses by circling them on the score sheet. They also transcribed non-target responses. If the child provided a response that was not the target response, the administrator provided the following cue: "What is another word that you could use?" All responses were determined to be correct or incorrect by the PI. Responses other than target responses for the internal state word items were determined to be acceptable and credit given if they 1) were consistent with the picture and 2) described an internal state. Responses that consisted of imitation of internal state words contained in the question or sentence completion cue were scored as incorrect. For the non-internal state word control matched items, synonyms of the target response were accepted as correct. Appendix F provides all responses on ISW picture

task items listed as acceptable or non-acceptable as well as percentage correct for each item.

Internal state word (ISW) story retell task.

Children also participated in a story retell task designed to elicit internal state words within a story context. The PI developed a script to use with the picture book *Picnic* (McCully, 2003) that incorporated the same corpus of internal state words (Bretherton and Beeghly,1982) as the picture description task (see Appendix D). One of six trained research assistants or the PI read the prepared script to each child individually as the child viewed the picture book. They then asked the child to retell the story while looking at each page of the book. Story retells were audio-recorded. The PI trained research assistants in eliciting narration according to the protocol of the Systematic Analysis of Language Transcripts (Miller, 2012).

The PI reviewed and stored audio recordings of story retells under anonymous participant codes. Trained undergraduate SLHS students at the University of Minnesota and the PI transcribed the story retells according to Systematic Analysis of Language Transcripts (SALT, Miller, 2012) utilizing SALT software and the Digital Voice Editor 3 (Sony, 2012). The proportion of number of different internal state words to the total number of different words in the story retell transcript was determined. Two individuals transcribed 13 of the 59 transcripts (.22). Inter-rater reliability was as follows: total number of utterances, 92, mean length of utterance-morphemes, .93, number of different word roots, .9, number of different internal state words, .89. The list of internal state words (Bretherton & Beeghly, 1982) utilized in the picture description task was used to

identify internal state words used in the story retell. Additional forms of the words (e.g., heard/hear) were accepted. The PI also identified and included additional internal state words (e.g., afraid/scared). Internal state words produced in mazes and abandoned or interrupted utterances were included. Analysis to determine mean length of utterance and total number of utterances for inter-rater reliability did not include incomplete utterances or mazes. SALT software recorded each internal state word used and its frequency. Children who used multiple productions of the same internal state word (e.g., He cried and cried and cried) received credit for a maximum frequency of two. Story retell narratives were included for analysis for 55 of the 59 participating children. Two children did not provide any verbal responses when asked to retell the story. Two other children did not meet a criterion of 70% intelligible utterances. One child's percentage of utterances containing no unintelligible words was 6%, and the other child's intelligibility was 50%. The study utilized two measures to determine the status of participants' behavior problems in the classroom.

Behavior coding.

Research assistants and the PI video-taped each of the participating children for 25 to 30 minutes during a structured activity and for 25 to 30 minutes during an unstructured activity. The PI defined structured activities as activities that were assigned to the child, and unstructured activities were activities that the child chose. Examples of structured activities included large group circle time activities such as weather, calendar, and music. Some structured activities were assigned to individual children. These included name printing and building with manipulative materials. Examples of unstructured activities

were free play and snack time. Two children left the program at site 1 before they were video-taped. Additionally, two children, one from site 1 and one attending site 2, were not video-taped during a structured activity. The PI devised a coding system for inappropriate or interfering classroom behaviors with the input of Joseph Reichle, Ph.D. The system also utilized aspects of the coding system as reported in a study of classroom behavior of young children by Webster-Stratton, Reid, and Stoolmiller (2008). Behavior was coded in 10-second intervals. Categories were: vocally/verbally inappropriate, out of assigned area, taking an object without permission, property aggression, and person aggression. An additional category, behavior incompatible with the task, was initially used to code structured activities. Coders also indicated the function of coded behavior as escape, attention, or tangible reward and child responses to teacher directives (both individual and group) as compliant or noncompliant. Response to directives was compliant if the child attempted to comply with the directive within 5 seconds. (For definitions of codes and coding instructions, see Appendix E.)

An additional group of seven trained undergraduate SLHS majors coded videotapes for behavior. Training included coding definitions and examples, joint coding practice, and the use of f4, a software program that marks time intervals and records designated codes (Dresing, Pehl, & Schneider, 2012). Initially, the PI determined inter-rater reliability as the overall percentage of agreed-upon time intervals and found it to be .9 across videotapes for 8 of the 40 participants for whom data was collected from September through December, 2011. The PI also determined inter-coder agreement separately for coded and non-coded intervals as well as Cohen's Kappa, a reliability

measure that takes into account probability of chance agreement. Inter-rater agreement on intervals identified as containing a directive as well as agreement on coding non-compliance of directives that were jointly identified was also determined. Table 2 provides percentages of agreement for each of these measures.

These measures indicated that inter-rater reliability for the identification of target behavior and directives was not acceptable. The PI then coded and re-coded structured and unstructured videos for six participants (11% of 57 participants) in order to determine intra-rater reliability and gain insight into reliability for the coding system. Kappa

Table 2.

Inter-rater Agreement for Behavior Coding, Fall 2011

Activity	Kappa	Coded	Uncoded	Directives	Noncompliant
Structured	.21	.17	.78	.39	.96
Unstructured	.20	.31	.97	.26	1.0

Note. Coded = agreement, coded intervals; Uncoded = agreement, uncoded intervals; Directives = agreement on identifying teacher directives; Noncompliant = agreement on coding compliance / noncompliance on jointly identified directives.

coefficients were .56 for structured videos and .85 for unstructured videos. Intra-rater Kappa coefficient when the category "incompatible behavior" was eliminated from the coding of the structured videos increased to .69.

Subsequently, the PI attempted a second time to obtain inter-rater reliability. During spring and summer, 2012, she re-trained two coders with the following modifications: the category "incompatible," a behavior code used only with structured videos, was eliminated. In addition, coders were trained to indicate questioned intervals; that is, they indicated intervals in which they were unsure of their coding decision. Intervals containing directives were designated by the PI. The PI coded all videos, and inter-rater reliability was determined between her coding and the student coder. Inter-rater reliability for videos of 12 of the 57 participants video-taped is provided in Table 3.

As an acceptable level of inter-rater agreement was not achieved for coding of behavior problem categories, this data was not included for analysis. However, inter-rater

Table 3.

Inter-rater Agreement for Behavior Coding, Spring 2012

Activity	Kappa	Kappa-?	Coded-?	Uncoded-?	Directives
Structured	.40	.47	.45	.96	.90
Unstructured	.40	.37	.30	.97	.93

Note. Kappa-? = kappa on intervals minus questioned intervals; Coded-? = agreement on coded intervals minus questioned intervals; Uncoded-? = agreement on uncoded intervals minus questioned intervals.

agreement for coding of compliance/non-compliance with directives was acceptable (.9 structured, .93 unstructured videos). Therefore, this data has been included as a measure

of classroom behavior problems. The PI computed the proportion of non-compliance to total number of directives for each child's structured and unstructured video segment. During unstructured activities that were videotaped, 43 of the 59 children received one or more teacher directive. During structured activities that were videotaped, 53 children received one or more teacher directive.

Caregiver-Teacher Report Form.

The teacher of each participant completed the Caregiver-Teacher Report Form (CTRF, Achenbach & Rescorla, 2000). The CTRF is a rating scale (0-2) of descriptions of behavior with separate standardized ranges for boys and girls of 'normal,' 'borderline,' and 'clinical' levels of a number of subscales under Internalizing Behavior (i.e., emotionally reactive, anxious/depressed, somatic complaints, and withdrawn) and Externalizing Behavior (i.e., attention problems and aggressive behavior). The total problem raw score consists of the Internalizing Behavior and Externalizing Behavior scores as well as scores from 34 items under a category of "other problems." An example of a scale item for internalizing behavior is item number 98: "Withdrawn; doesn't get involved with others." An externalizing behavior item is number 18: "Destroys property belonging to others." Examples of items under "other problems" are: item numbers 13: "Cries a lot" and 36: "Gets into everything." CTRF norms include children ages 18 months to 5 years of age.

A total of 15 teachers across the four sites completed a CTRF for each of the 59 participating children. The PI presented the CTRF to the teachers prior to data collection. All teachers had the opportunity to ask questions during this presentation, as well as

when forms were individually distributed and collected. The PI typically provided lead teachers in each classroom with the forms and asked them to complete them. However, in some cases an assisting teacher completed the form if she or he were most familiar with the child. This protocol was consistent with CTRF completion instructions that the caregiver most familiar with the child complete the form. At site 1, several children spent significantly more time with the assistant teacher, as they attended a program outside the classroom in the a.m. In the afternoon, the lead teacher typically left earlier than the assisting teacher. As a result, the assistant teacher spent more time with the children and she completed the CTRF. At site 3, children typically spent much of the day in very small groups. Therefore, a total of 4 teachers completed CTRF forms for the 6 participating children. Since prior research on the relationship between language and teacher behavior ratings in young children (Kaiser et al., 2002) found a relationship between teacher years of experience and child behavior ratings, teachers reported years of experience providing care to young children on the behavior rating form. One of the 15 teachers had 40 years of experience. As this number of years constituted an outlier in comparison with the other teachers' years of experience, the PI conducted data analysis excluding this teacher's years of experience. Sensitivity analysis indicated that no significant associations with other variables were omitted by excluding the outlier.

Leiter International Performance Scale-Revised Brief IQ.

Standard scores from the Brief IQ (Roid & Miller, 1997) were included in order to control for non-verbal abilities as a predictor of child behavior. All 59 participants completed the Brief IQ. Norms for measures included children from ages 2 to 5 in

increments of 2 months. The Brief IQ score consisted of the following subtests: figure ground, form completion, sequential order, and repeated patterns. The figure ground subtest required children to identify items in a composite picture as presented on individual cards. Form completion subtest items provided the child with pictures of segmented objects and required them to identify the intact objects in a composite picture. For the sequential order subtest, children followed an example and placed pictures in sequential order consistent with the order typified in the example. For example, one item consisted of pictures of the progression of sun moving behind a cloud. Repeated patterns subtest items included a repeating pattern of pictured shapes or objects and the child chose the order of shapes or objects to continue the pattern. Administrators provided a raw score according to test protocol and identified children on test forms by first name and first initial of last name. The PI collected test forms daily, assigned each participant a number as well as a letter designating site, verified raw scores, determined standardized scores for the four subtests, and converted scores to an overall nonverbal IQ. A participant score of 145 was eliminated from the dataset prior to analysis. Sensitivity analysis comparing correlations between the Brief IQ and other variables indicated no significant differences in associations.

Data Analysis

In order to determine potential relationships between language and behavior measures, statistical analyses were conducted at several levels. Teacher behavior ratings as measured by CTRF standard scores were determined to be normally distributed, as were all language measures. Two levels of analysis were conducted to investigate

relationships between overall expressive language, knowledge and use of ISW, and behavior problem measures. Preliminary analysis was conducted to determine mean differences and associations between the control measures and the language as well as behavior problem measures. These differences and/or associations could then be controlled for during analysis of the relationship between language and behavior problem measures. The first level of analysis employed correlations to determine associations between language measures and behavior problem measures. The second level of analysis determined whether language measures associated with teacher behavior problem ratings, controlling for other related variables, predicted behavior problem ratings.

Noncompliance proportions during structured and unstructured activities were not normally distributed, but rather approximated a log-linear curve. Therefore, nonparametric correlations (Kendall's tau rank correlation coefficient) were used to determine associations between language measures and noncompliance proportions. Logistic regressions were used to determine whether associated language measures predicted the likelihood of noncompliance. These regressions included control variables determined to be associated with language measures. Logistic regressions were also used to determine whether control variables had an effect upon the likelihood of noncompliance.

Results

Descriptive Statistics

Language measures.

Table 4 provides a summary of descriptive statistics for the three language measures: PLS-5 EC, ISW picture task, and ISW story retell. Number of correct responses on the PLS-5 EC was converted to a standard score that controlled for chronological age for each of the 59 participants. Sample mean standard score for the 59 participating children (95) was within one standard deviation of the normative sample mean of 100.

On the ISW picture description task, the internal state word item most frequently responded to correctly was "This girl feels (angry/mad)." All but 1 of the 57 participants provided a response that received credit. The item least frequently responded to correctly was "Hairy and warm. That is how the horse's nose (feels)." Three children (5%) received credit for their response on this item. Appendix F provides the percent of correct responses to each item on the task and a listing of all responses as acceptable or unacceptable. Mean percentages of correct responses for each of the six categories of internal state words are as follows: perception (8 items): 55%; physiology (6 items) 76%; emotion/affect (18 items) 70%; volition/ability (2 items) 27%; cognition (9 items) 28%; moral judgment/obligation (4 items) 67%. A comparison of mean number of correct responses on the 8 matched internal and non- internal state words found no significant difference (mean difference = -.3, 95% confidence interval = .11 to -.70; $p = .15$).

On the story retell, participants used a total of 57 different internal state words with

Table 4.

Descriptive Statistics for Language and Control Measures

Measure	N	Mean	SD	Range
Expressive language				
PLS-5 expressive communication standard scores	59	95.02	12.70	64-130
Internal state word				
Internal state word picture task correct responses (47)	57	27.91	7.83	8-39
Matched internal state words (8)		4.46	2.09	0-8
Matched non-internal state words (8)		4.16	2.20	0-8
Story Retell	55			
Number of different words		73.13	28	34-151
Number of different internal state words		6.73	3.56	1-18
Proportion of internal state words		.09	.03	.02-.15
Total number of internal state words		11	6.6	1-27
Control Measures				
Age (months)	59	47.25	6.94	35-59
Leiter Brief IQ standard scores	58	104.50	14.06	73-137
Teacher experience (years)	14	8.14	4.09	4-15

a total frequency of 606. The most frequently-used internal state word was "cry," used 75 times. The next most frequently-used internal state word was "want/wanna," used 72

times. See Appendix G for all internal state words used during story retell and their frequencies. Controlling for participant age, the number of different internal state words and number of different words used during story retell were highly correlated ($r = .81$, $p < .01$). A plot of the number of different internal state words used as a function of the number of different words used indicated a positive and linear relationship (see Figure 1). Linear regression analysis indicated that number of different words, controlling for participant age ($B = .13$, $p = .11$), predicted number of internal state words ($B = .79$, $p < .01$). However, the number of different internal state words used by participants who produced 58 or fewer different words, controlling for participant age, did not increase as number of different words increased ($r = -.15$, $p = .59$), and number of different words, controlling for age ($B = .24$, $p = .45$), did not predict number of different internal state words ($B = -.17$, $p = .59$). For this group of 17 children, the mean number of different internal state words used was 3.24 ($SD = 1.2$), and the mean proportion of different internal state words to different words (.08) was lower than the proportion (.10) for children who produced more than 58 different words ($F = 7.13$, $p = .01$). Children who produced 58 or fewer different words on story retell also had lower PLS-5 expressive communication scores (means = 89.90, 99.34, $F = 8.12$, $p < .01$) as well as ISW picture task scores (means = 24.82, 29.77, $F = 5.71$, $p = .02$).

PLS-5 EC scores were correlated with both ISW picture task scores ($r = .45$, $p < .01$) and ISW proportions on story retell ($r = .33$, $p = .01$). The correlation between ISW picture task scores and ISW proportions on story retell was not significant ($r = .30$, $p = .03$) at an adjusted probability level of significance of .02 (two-tailed, Bonferroni).

Figure 1.

Relationship between number of different internal state words and number of different words produced during story retell.

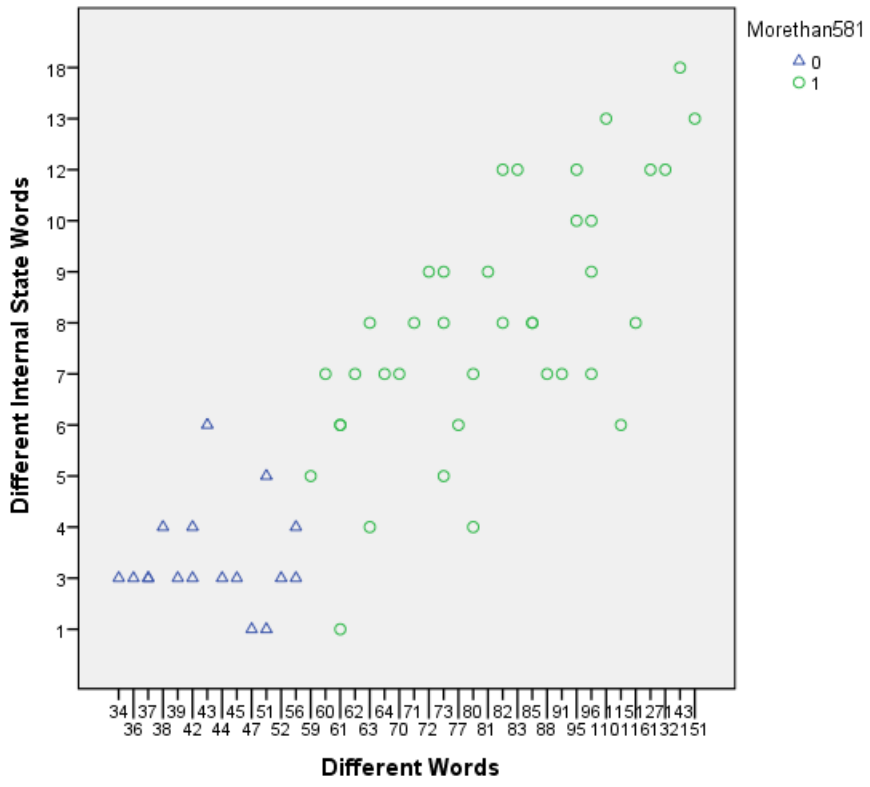

Figure 1. Diamonds represent data for children who produced 58 or less different words during story retell. Circles represent data for children who produced more than 58 different words during story retell.

Control measures.

Table 4 provides descriptive statistics for control measures. For the Leiter Brief IQ, a measure of nonverbal intelligence, the mean IQ score was 104.50 (SD = 14.06, range =

73-137). Participating children for the current study, then, on average, scored within 1 standard deviation of the normative mean of 100.

Classroom behavior problem measures.

Table 5 provides the descriptive statistics for the two classroom behavior problem measures, noncompliance to teacher directives and teacher behavior problem ratings (CTRF). In addition to statistics for the overall CTRF standard scores, Table 5 provides statistics for the internalizing and externalizing subscores. A cutoff score for borderline/clinically significant behavior ratings on the CTRF is specified as a standard score that is greater than or equal to 65, and a score greater than or equal to 70 as indicating clinically significant behavior. A standard score between 65 and 69 corresponds to the 93rd to 97th percentile of the sample of 78 children for whom the scale was normed (Achenbach & Rescorla, 2000). Twelve of the 59 children (20%) participating in the current study had a total problems standardized score of 65 or greater. Eleven children had internalizing subscores at or above a standard score of 65, and 13 children had externalizing scores at or above 65. The majority of children with borderline/clinically significant total problem scores also had clinically significant externalizing and internalizing scores. Of the 12 children with total problem scores at or above the borderline/clinical cutoff score of 65, 8 also had internalizing scores above the cutoff and 11 also had externalizing scores at or above the cutoff. One child had only an internalizing score above the cutoff, and 2 children only externalizing scores at or above the cutoff.

The mean number of teacher directives provided during unstructured activities was

Table 5.

Descriptive Statistics for Behavior Problem Measures

Measure	N	Mean	SD	Range
Noncompliance to directives				
Structured Activities	53			
Number of directives		11.75	10.04	1-44
Noncompliance proportion		.22	.23	.0-.91
Unstructured Activities	45			
Number of directives		4.89	4.37	1-22
Noncompliance proportion		.32	.34	.0-1.0
Caregiver-Teacher Rating Form standard scores	59	53.90	11.70	32-84
CTRF Internalizing standard scores		51.76	11	34-72
CTRF Externalizing standard scores		54.63	11.30	38-80

significantly less than the number provided during structured activities ($t = -3.88$, $p < .01$). Forty-five participants were given one or more directives during unstructured activities. Fifty-three participants were given one or more directives during structured activities. Noncompliance proportions for structured and unstructured activities were not correlated ($\tau = .11$, $p = .35$). Neither noncompliance proportions during structured activities ($\tau = .09$, $p = .34$) nor noncompliance proportions during unstructured activities ($\tau = .05$, $p = .64$) was correlated with CTRF standard scores. (Nonparametric correlations were conducted, as noncompliance proportions were not found to be normally distributed.) As noncompliance proportions during structured activities provided a larger sample both in terms of participants as well as number of directives,

noncompliance proportions during structured activities was chosen as the direct observation behavior problem measure used to investigate potential relationships with language measures.

These measures were analyzed at several levels in order to address the research questions: 1. Is there a relationship between expressive language skills and behavior problems in young children at social risk? 2. Is there a relationship between the ability to use internal state words on a picture description task and classroom behavior problems in young children at social risk? 3. Is the use of internal state words during a story retell task related to classroom behavior problems in a group of 3-to-5-year-old children at social risk? Preliminary analysis determined potential impact of control measures (age, Brief IQ, gender, site) upon the relationship between the three language measures (PLS-5 EC, ISW picture task scores, ISW proportion on story retell and the behavior problem measures (CTRF scores, proportions of noncompliance on structured activities). The PI also conducted an analysis to determine whether teacher years of experience was a factor in determining CTRF scores, as a previous study had found such a relationship (Kaiser et al., 2002).

Analysis

Associations between language and control measures.

See Table 6 for results of preliminary analysis on control variables, language measures, and behavior problem measures. Brief IQ standard scores were associated with PLS-5 EC standard scores ($r = .50$, $p < .01$) and between group differences in PLS-5 EC scores were found across sites.

Table 6.

Control Variables, Language Measures, and Behavior Problem Measures

Language Measure	Control Measure				
	Age[a]	Brief IQ[a]	Gender[b]	Site[b]	Tchr Exp
PLS 5-EC	.06	.50**	1.57	7.09**	
ISW Picture	.65**	-.02	1.29	1.18	
ISW Story	.20	.16	0.52	1.07	
Behavior Problem Measure					
CTRF SS	.16	-.24	0.60	5.80**	-.15
CTRF raw			0.37		
Noncompliance	.09	-.20*			

Note.PLS-5 EC = PLS-5 expressive communication standard scores; ISW Picture = ISW picture task correct responses; ISW Story = Proportion of different ISW words during story retell; CTRF SS = CTRF standard scores; CTRF raw = CTRF raw scores; Brief IQ = Leiter Brief IQ standard scores; Noncompliance = Noncompliance proportions during structured activities; Tchr Exp = Teacher experience (years).

[a] Values are Pearson correlations (r) for PLS5-EC, ISW Picture. ISW Story, CTRF SS. Value is Kendall's rank order correlation (τ) for Noncompliance. [b] Values are F statistic (ANOVA).

*p ≤ .05. **p ≤ .01.

In order to obtain more information about the difference in PLS-5 EC scores across sites, the PI conducted pairwise comparisons of mean differences in PLS-5 EC scores. Table 7 provides the results of this analysis.

The mean score for site 2, which 28 of the 59 children attended, was significantly higher than the mean score for sites 1 and 3 ($t = 3.51$, $p < .01$; $t = 3.76$, $p < .01$). Site 2, along with site 1, did not receive child referrals from social service programs serving families with identified social risk factors.

ISW picture task scores were related to child participant's age ($r = .65$, $p < .01$).

Table 7.

Differences in Mean PLS-5 EC Standard Scores Across Sites

Site	1		2		3		4	
	Mean Diff	t	Mean Diff	t	Mean Diff	t	Mean Diff	t
1 (m = 89.33, SD = 10.33)	_	_	12.27	3.51*	5.83	1.26	2.67	0.57
2 (m = 101.61, SD = 11.24)	12.27	3.51*	_	_	18.11	3.76*	9.61	2.23
3 (m = 83.50, SD = 7.26)	5.83	1.26	18.11	3.76*	_	_	8.50	1.46
4 (m= 92.00, SD = 13.00)	2.67	0.57	9.61	2.23*	8.50	1.46	_	_

Note. Mean Diff = Difference between PLS-5 EC standard score means.
*p ≤ .01 (Bonferroni adjusted).

This association is consistent with the fact that the picture description task was not a standardized measure. No other control measures were related to performance on the ISW picture task. No associations were found between ISW proportions on story retell and any of the control measures.

Associations between behavior problem and control measures.

Standard scores on the CTRF were not related to teacher years of experience ($r = -.15$, $p = .27$). CTRF scores were related to site ($F = 5.80$, $p < .01$). CTRF mean scores for participating children from site 2 were significantly lower than mean scores for sites 1 and 4 ($t = 2.73$, $p < .01$; $t = 3.63$, $p < .01$). Table 8 provides mean differences between CTRF standard scores across sites. Site 2, along with site 1, did not receive child referrals from programs serving families with identified social risk factors.

Proportions of noncompliance to directives during structured activities were not normally distributed, but rather approximated a log-linear curve. The PI employed nonparametric correlations and logistic regression analysis in order to determine relationships between noncompliance proportions during structured activities and control measures. Gender, which was not associated with any language measures, did not predict the likelihood of noncompliance ($B = .2$, $p = .3$, see Table 10). Logistic regression analysis with site entered as a sole predictor of the likelihood of noncompliance during structured activities indicated that children at site 2 were less likely to be noncompliant ($B = -.59$, $p = .03$, see Table 10). Brief IQ scores were associated with noncompliance proportions during structured activities ($\tau = -.20$, $p = .05$).

Preliminary analysis, then, determined that several control variables were related to language and behavior problem variables of interest. PLS-5 EC standard scores differed by site attended and were also associated with Leiter Brief IQ standard scores. ISW picture task scores were associated with chronological ages of participating children. CTRF standard scores and noncompliance proportions differed by site, and

Table 8.

Differences in Mean CTRF Standard Scores Across Sites

Site	1		2		3		4	
	Mean Diff	t	Mean Diff	t	Mean Diff	t	Mean Diff	t
1	_	_	10.27	2.73[a] *	1.23	0.21	2.43	0.52
(m = 58.27, SD = 12.73)								
2	10.27	2.73[a] *	_	_	11.50	2.63	12.70	3.63*
(m = 48.00, SD = 9.65)								
3	1.23	0.21	11.50	2.63	_	_	1.20	0.25
(m = 59.50, SD = 10.21)								
4	2.43	0.52	12.70	3.63*	1.20	0.25	_	_
(m = 60.70, SD = 9.08)								

Note. [a]Equal variances not assumed; Levene's t = 2.97; p = .12; Mean Diff = Difference between PLS-5 EC standard score means.

*p ≤ .01 (Bonferroni adjusted).

noncompliance proportions were negatively associated with Brief IQ scores.

Associations between expressive language, knowledge and use of ISW, and behavior problem measures.

Pearson product coefficient correlations (r) were conducted between language measures and teacher behavior problem ratings. As noncompliance proportions were not normally distributed, Kendall rank correlation coefficients (τ) were the correlation

measures for this behavior problem measure and language measures. The correlation between proportion of ISW used during story retell and CTRF standard scores was not significant ($r = -.05$, $p = .74$). The correlation between ISW picture task scores and CTRF standard scores, controlling for age of participant, was negative and significant ($r = -.34$, $p = .01$). Finally, the correlation between PLS-5 EC standard scores and CTRF standard scores was negative and significant ($r = -.38$, $p < .01$) for an adjusted level of significance of .02 (Bonferroni, two-tailed). The first level of analysis between language measures and teacher behavior problem ratings, then, determined that the participant's ability to use internal state words on a picture description task and behavior problems as rated by teachers, controlling for age of participant, was negatively correlated. Similarly, a negative correlation was found between PLS-5 EC scores and teacher ratings of behavior problems.

Noncompliance proportions during structured activities were correlated with PLS-5 EC standard scores ($\tau = -.31$, $p < .01$), but were not correlated with either ISW picture task scores ($\tau = -.11$, $p = .29$) or ISW proportions during story retell ($\tau = .02$, $p = .85$). Control variables found to be associated with PLS-5 EC standard scores (i.e., site, Brief IQ) were entered along with PLS-5 EC scores in a logistic regression model at the final level of analysis. Similarly, as nonparametric correlation analysis did not allow for determining the association between ISW picture task scores and noncompliance proportions controlling for age, a logistic regression model that included ISW picture task scores and age was also included for analysis.

Prediction of Behavior Problem Measures

Prediction of teacher behavior problem ratings (CTRF standard scores).

The final level of analysis consisted of a series of regressions to determine whether ISW knowledge and use and/or overall expressive language skills predicted noncompliance to teacher directives during structured activities, as well as teacher ratings of behavior problems. The PI conducted a series of linear regression analyses in order to determine whether language measures found to be associated with teacher behavior problem ratings (ISW picture task scores, PLS 5- EC scores) predicted CTRF scores, controlling for associated non-language measures. See Table 9 for analysis results. The first model determined that site, found to be associated with both PLS 5 EC standard scores and CTRF standard scores, did not predict CTRF scores when PLS-5 EC scores were also a predictor. This finding will be discussed further in the discussion section. The second model consisted of control measures found to be associated with PLS-5 EC scores and teacher behavior problem ratings. These included Brief IQ standard scores and site. The third model then introduced PLS-5 EC scores. These negatively predicted CTRF scores (B = -0.36, p =.02), controlling for Brief IQ and site. Model 4 added ISW picture task scores and age. PLS-5 EC scores again were a significant predictor (B = -.43, p = .02). That is, a one point increase in PLS-5 EC standard scores decreased CTRF behavior problem standard score by .43. ISW picture task scores did not predict CTRF scores (B = -.11, p =.59). A fifth and final model included ISW picture task scores, age, and PLS-5 EC scores as predictors in order to determine strength of a predictive model including only language measures associated with CTRF scores (and including age, as

ISW picture scores were not standardized). This model predicted the most variance of all models tested (Adjusted R^2 = .2). Again, PLS-5 EC scores were predictive, and ISW picture task scores did not predict CTRF scores when age and PLS-5 EC scores were controlled for. Linear regression analysis then, determined that, controlling for variables found to be associated with language measures and teacher behavior problem ratings, overall expressive communication scores negatively predicted behavior problem ratings. ISW word knowledge and use was negatively correlated with ratings, but did not provide additional prediction over and above overall expressive language skills.

Prediction of noncompliance to directives during structured activities.

As noncompliance proportions during structured activities were associated with PLS-5 EC scores, the PI employed logistic regression analyses to determine whether the

Table 9.

Predictors of Teacher Behavior Problem Ratings (CTRF standard scores)

Variable	Constant	Brief IQ	Site	PLS-5 EC	Age	ISW picture	Adjusted R^2
Model 1	83.61**		1.50	-.35**			
Model 2	70.71**	-0.21	0.08				.03
Model 3	83.75**	-0.01	0.12	-0.36*			.11
Model 4	82.74**	0.03	0.04	-0.43*	0.16	-0.11	.16
Model 5	87.10**			-0.44**	0.14	-0.08	.20

Note. PLS-5 EC = PLS-5 expressive communication standard scores; ISW Picture = ISW picture task correct responses; Brief IQ = Leiter Brief IQ standard scores.

*p ≤ .05. **p ≤ .01.

association between overall expressive language skills as measured by PLS-5 EC scores predicted noncompliance to directives during structured activities (see Table 10). The analysis employed a logistic regression model to predict log odds of a noncompliant event. The first model determined that gender, a control variable, did not predict noncompliance (B = .2, p = .30). As previous analysis had determined that the other control measures (age, Brief IQ, site) were associated with a language measure, these were included in successive models. Site was entered as a fixed effect in model 2. Attendance at site 2 was found to negatively predict log odds of noncompliance (B = -.59, p = .03). That is, attendance at site 2 decreased the likelihood of noncompliance during structured activities. With PLS-5 EC scores added in the third model, site continued to negatively predict noncompliance proportions (Site 1 B = -.61, p = .04), along with PLS-5 EC standard scores (B = -.04, p < .01). The fourth model added Brief IQ scores, as these correlated with noncompliance proportions during structured activities, as well as PLS-5 EC standard scores. Controlling for site and Brief IQ scores, PLS-5 EC scores negatively predicted the likelihood of noncompliance during structured activities (B = -.05, p < .01). A one point increase in PLS-5 EC standard scores decreased the odds of a noncompliant response to a teacher directive by $e^{-.05}$ or .95. Logistic regression to predict likelihood of noncompliance during structured activities was then conducted that included age and ISW picture task scores. ISW picture task scores negatively predicted the likelihood of noncompliance (B = -.05, p < .01), controlling for age. Finally, age, ISW picture task scores, and PLS-5 EC standard scores

Table 10.

Predictors of Noncompliance to Teacher Directives During Structured Activities

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Constant						
B	-1.27**	-0.79**	2.42**	1.09	-2.42**	0.35
95% CI	[-1.55, -0.99]	[-1.22-0.36]	[0.70, 4.14]	[-0.86, 3.04]	[-3.88, -0.97]	[-2.74, 3.44]
Gender						
B	0.2					
95% CI	[-0.18, 0.57]					
Age						
B					0.05**	0.03
95% CI					[0.02, 0.09]	[-0.01, 0.07]
Site 1						
B		-0.53	-0.61*	-1.01*		
95% CI		[-1.10, 0.04]	[-1.19, -0.04]	[-1.65, -0.37]		
Site 2						
B		-0.57*	-0.16	-0.34		
95% CI		[-1.10, -0.05]	[-0.73, 0.40]	[-0.92, 0.25]		
Site 3						
B		0.30	0.18	0.44		
95% CI		[-0.36, 0.97]	[-0.50, 0.85]	[-0.27, 1.14]		
Site 4						
B		-	-	-		
95% CI		-	-	-		
Brief IQ						
B				0.03**		
95% CI				[0.01, 0.04]		
PLS-5 EC						
B			-0.04**	-0.05**		-0.03*
95% CI			[-0.06, -0.02]	[-0.07, -0.03]		[-0.05, -0.00]
ISW Picture						
B					-0.05**	-0.02
95% CI					[-0.08, -0.02]	[-0.06, 0.02]
X^{2a}	1.08	11.64**	26.77**	34.07**	12.55	16.75**

Note. PLS-5 EC = PLS-5 expressive communication standard scores; Brief IQ = Leiter Brief IQ standard scores; ISW Picture = ISW picture task correct responses.

*p ≤ .05. **p ≤ .01.

were entered as predictors of the likelihood of noncompliance. Controlling for PLS-5 EC scores, ISW picture task scores did not predict noncompliance likelihood (B = -.02, p = .34). However, PLS-5 EC again predicted noncompliance (B = -.03, p = .05).

PLS-5 EC scores and borderline/clinically significant CTRF scores.

PLS-5 EC standard scores were found to negatively predict CTRF scores, controlling for site and nonverbal intelligence scores. In addition, a group difference in PLS-5 EC scores was found between those children with CTRF scores above or below the cutoff score for borderline/clinical significance (F = 3.88, p = .05). Only 1 child out of 12 with scores at or above the CTRF cutoff score had a PLS-5 EC standard score at or above the standardized test mean of 100. (See Figure 2.)

Summary of Results

Statistical analysis to address research questions regarding the relationship between behavior problems in young children at social risk and overall expressive language skills as well as knowledge and use of internal state words indicated that PLS-5 EC standard scores were negatively associated with CTRF standard scores, a measure of teacher behavior problem ratings. PLS-5 EC standard scores were also negatively associated with proportion of noncompliance to teacher directives during structured activities. Number of correct responses on the ISW picture task was also negatively associated with teacher behavior problem ratings, controlling for chronological age of the child. Proportion of different internal state words to number of different words used during story retell did not appear to be associated with either CTRF scores or noncompliance proportions.

Figure 2.

CTRF standard scores above and below borderline/clinical significance in relation to PLS 5-EC standard scores.

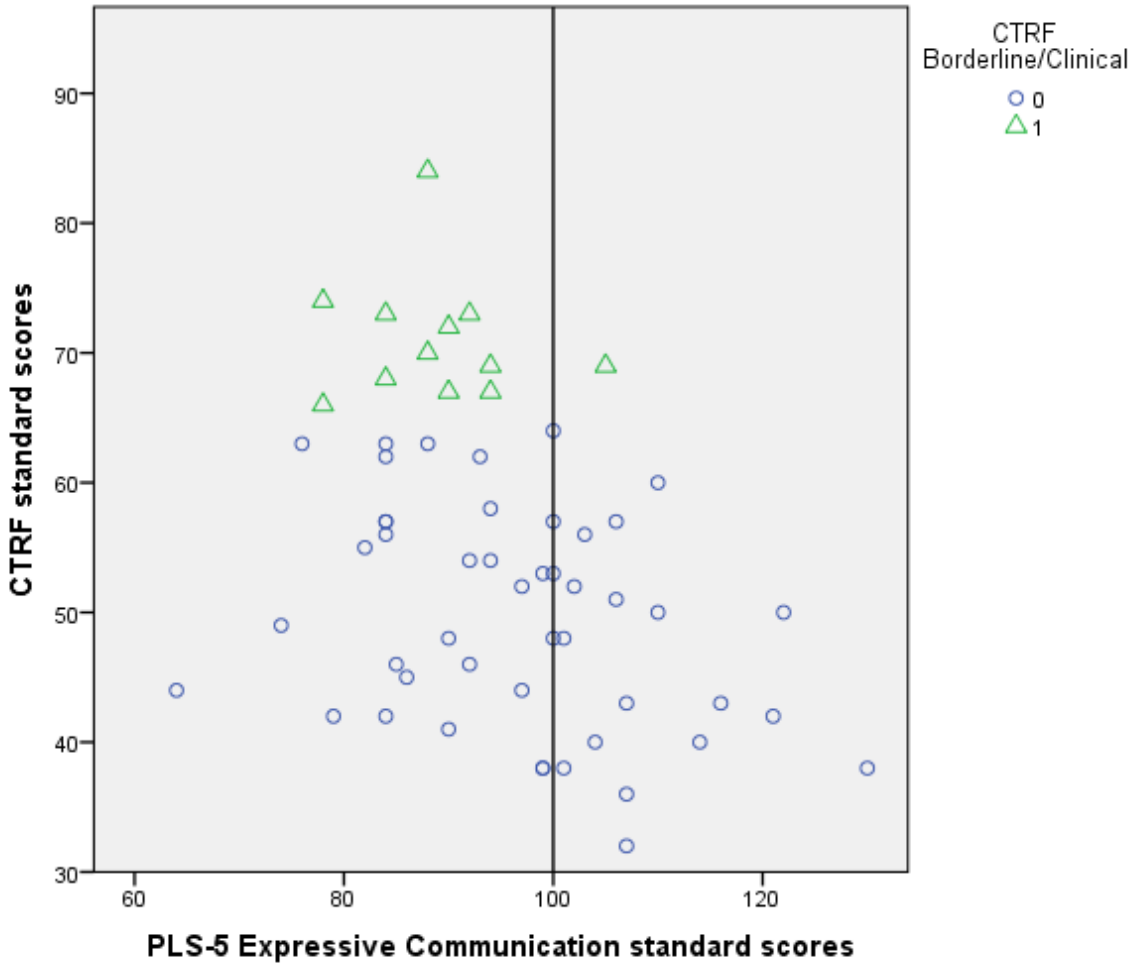

Figure 2. CTRF standard scores at or above borderline/clinical significance are designated by circles. CTRF standard scores below borderline/clinical significance are designated by triangles.

Controlling for Brief IQ scores, age, and site, PLS-5 EC scores negatively predicted both CTRF standard scores and noncompliance during structured activities. Mean PLS-5EC

scores were higher for children with CTRF scores that were below the borderline/clinically significant cutoff score. Controlling for PLS-5 EC scores as well as age, ISW picture task scores did not predict CTRF scores or noncompliance proportions during structured activities.

Discussion

Relationships Between Expressive Language and Behavior Problems

The current study investigated the relationship between classroom behavior problems and the expressive language skills of young children growing up in households below the poverty level and at varying degrees of social risk. Behavior problem measures included teacher behavior problem ratings (CTRF) as well as noncompliance to teacher directives during structured activities. Children from four sites were assessed for overall expressive language skills (PLS-5 EC), as well as knowledge and use of internal state words (picture description task, story retell). Measures to control for variables with potential relationships to language ability and/or behavior problem status included nonverbal intelligence (Leiter Brief IQ), age, site attended, gender, and teacher experience. Results as they relate to research questions are as follows:

1. Is there a relationship between expressive language skills and classroom behavior problems in a group of 3-to-5-year old children at social risk? If so, what is the nature of the relationship between expressive language skills and classroom behavior problems?

Study results indicate that overall expressive language skills appear to be negatively associated with classroom behavior problems as measured by teacher behavior problem ratings. Similarly, expressive language skills were negatively associated with proportion

of noncompliance to directives during structured activities. Expressive language skills negatively predicted both teacher behavior problem ratings as well as likelihood of noncompliance, controlling for age, nonverbal intelligence, and program the participants attended. That is to say, as expressive language scores increased, teacher behavior problem ratings, as well as the likelihood of noncompliant responses to teacher directives, decreased. PLS-5 EC scores also distinguished between children with CTRF scores above and below the cutoff score for clinical significance. Of the 12 children with teacher behavior problem rating scores at or above the cutoff score for borderline/clinical significance, only 1 child had an expressive language score that was at or above the standardized mean for the PLS-5 EC (see Figure 2).

2. Is there a relationship between the ability to use internal state words on a picture description task and classroom behavior problems in a group of 3-to-5-year-old children at social risk? If so, what is the nature of the relationship?

Controlling for age of the child, a negative association was found between the number of correct responses on a picture description task to elicit internal state words and teacher ratings of behavior problems. Performance on the ISW picture task was not associated with proportions of noncompliance to teacher directions. Controlling for age and overall expressive language skills, ISW picture task scores did not predict teacher behavior problem ratings or noncompliance proportions during structured activities. These findings suggest that the association between knowledge and use of internal state words and behavior problems is a function of the association between overall expressive language skills and behavior problems. Further evidence to suggest this conclusion is the

finding that there was not a difference between the mean number of correct responses on the ISW picture task for internal state words and non-internal state words matched for imageability and frequency.

3. Is the use of internal state words during a story retell task related to classroom behavior problems in a group of 3-to-5-year-old children at social risk?

The study did not find an association between proportion of internal state words used during story retell and the behavior problem measures (i.e., teacher behavior problem ratings, noncompliance proportions during structured activities). Number of different internal state words used during story retell demonstrated a linear relationship to total number of different words for children who demonstrated use of 58 or more different words. This finding suggests that the development of knowledge and use of internal state words is consistent with (and possibly dependent upon) the development of overall expressive vocabulary.

As previous studies found mixed results regarding the impact of gender upon behavior problem ratings of young children, the current study compared differences between boys and girls. For this sample of young children at social risk, teacher behavior problem ratings (CTRF standard scores) for boys and girls did not differ. Proportions of noncompliance to teacher directives during structured activities also did not differ for boys and girls.

Performance on PLS-5 EC as well as teacher behavior problem ratings (CTRF) differed across the four sites that participating children attended. Children at site 2, the largest site in terms of number of participants (28/59 children), had higher mean PLS-5

EC scores than children attending sites 1 or 3. Children at site 2, on average, also had lower teacher behavior problem ratings (CTRF standard scores) than children attending sites 1 or 4. Noncompliance to directives during structured activities was also predicted by site the child attended. Site 2 negatively predicted likelihood of noncompliance. Differences in CTRF ratings across sites appeared to be related to differences in PLS-5 EC scores across sites. When PLS-5 EC scores were entered in the linear regression model, site no longer predicted CTRF scores. However, site differences continued to predict noncompliance proportions during structured activities, controlling for both Brief IQ and PLS-5 EC scores. This difference may have been related to the fact that 2 sites did not receive referrals of children from families with identified social risk factors. Distinctions between these groups of children across programs serving the same low income neighborhoods indicates that children from low-income households may be a diverse population. Such distinctions are consistent with research findings that social risk factors, rather than poverty per se, pose challenges both to the development of language as well as other aspects of behavior schema that in turn promote learning in preschool settings.

Study Limitations

Measuring the knowledge and use of words that represent internal states of being in young children represents a significant challenge. By their very nature, many of these words are difficult to portray visually as part of a picture description task. While Bretherton and Beeghly (1982) were able to accurately determine the presence of these words as part of the expressive vocabulary of children at 24 months by parent report, the

size of vocabulary for children in the current study from ages 3 years to 5 years required direct assessment. A number of the internal state word items created for the picture description task, such as the item to elicit the target response "remember," required a narrative of several sentences, along with the picture stimulus, to represent the target internal state response. (e,g, This is Jamal. He made a picture for his mother. He wanted to bring it home, but he left it at school. His mother said "Did you remember to bring your picture home?" Jamal said "No, I (forgot).") Such items require a level of auditory comprehension, so that such items require language skills that may differ from the child's knowledge and use of internal state words. Likewise, a story retell task to elicit internal state words in context may require narrative as well as comprehension skills. The absence of such narrative skills, however, may not preclude the ability to use internal state words in functional contexts. A methodology that includes the collection of significant spontaneous speech samples across a variety of functional contexts may provide a means of assessing knowledge and use of internal state words that is not dependent upon these additional language skills. Analysis of direct observation of classroom behavior was limited to proportion of noncompliance to teacher directives. This aspect of behavior would appear to require a language comprehension component. The establishment of inter-rater reliability for more behavior problem classifications would provide access to more information on classroom behavior from the video-recorded direct observations.

Implications

Dynamic systems theory of human development is consistent with a relationship between language and social-emotional development in young children. The current

study would appear to clearly support and extend findings of other studies (e.g., Caulfield et al., 1989; Fagan & Iglesias, 2000; Horwitz et al., 2003) that expressive communication skills are inversely related to behavior problems for young children at social risk. Expressive communication standard scores on the PLS-5 consistently emerged as negatively predictive of teacher ratings of classroom behavior problems as well as noncompliance to directives during structured activities. While current efforts to increase academic performance of young at-risk children have appropriately focused upon the link between language skills and literacy, it also appears that strong expressive language skills are negatively related to classroom behavior problems. In this sample of 59 young children growing up in poverty, only 1 child with a PLS-5 EC standard score of 100 or more had a teacher rating of behavior problems that signified borderline or clinical significance. At the same time, no variables controlled for in the study, including nonverbal intelligence, site attended (possibly representing various degrees of social risk factors), gender, age, or overall expressive communication skills differentiated between children with expressive language scores below the mean with and without significant behavior problems as rated by their teachers. It may be that receptive language skills, which were not directly assessed in this study, is a differentiating factor. In a recently-published study, (Aro, Eklunk Nurmi, & Poikkeus, 2012) 5-year-old-children with poor behavioral regulation skills (parent ratings) demonstrated lower scores on receptive language tasks.

Study results appear to indicate that development of internal state word vocabulary occurs in a direct and linear relationship to other expressive vocabulary. This

relationship appears to exist once a foundation of expressive vocabulary has been established. This finding would appear to indicate that supporting the development of internal state words should occur within the context of facilitation of expressive language skills in general.

With overall expressive language controlled for, internal state word knowledge and use did not appear to provide additional prediction of behavior problems as rated by teachers or as measured by noncompliance to directives. It may be that caregiver input and/or internal state word vocabulary items acquired at an earlier age than participants of the current study provides the foundation for self-regulatory components of executive function (Carlson et al., 2004), and that such self-regulation mediates the relationship between internal state words and behavior in 3-to-5-year-old children. Further longitudinal studies that measure internal state word input as well as knowledge and use at 2 years of age and then continue to monitor performance on self-regulatory tasks and behavior as children progress through the preschool years would provide more information as to a possible longitudinal relationship between internal state words and behavior.

Across associative and predictive analysis, this study consistently found that expressive language skills are inversely related to classroom behavior problems for young children at social risk. This finding suggests that in addition to providing services to language delayed/disordered children, the contributions of speech and language pathologists may benefit a wider circle of young at-risk children. Contributions may

include teacher training in language facilitation, consultation on curriculum development and selection, and conducting language activities in preschool classrooms.

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Appendix A. Internal State Word Picture Description Task Items

1. What is the boy doing? (seeing/watching/looking).

2. What is this boy doing? (hearing/listening).

3. My teacher said "How does the cereal (taste)"?

4. What is the girl doing? (smelling).

5. Hairy and warm: that is how the horse's nose (feels).

6. The children in the snow may feel (cold/freezing).

7. The man is sweating because he is (hot/warm).

8. Why does the girl have a bandaid? (hurt).

9. These children want more food. They are still (hungry/starving).

10. Why are these children drinking water? (thirsty).

11. Why is this boy yawning? (sleepy/tired).

12. What is this girl doing? (sleeping/asleep).

13. These children are not asleep. They are (awake/waked up).

14. This girl does not feel well. She might be (sick).

15. Why are these boys smiling? (happy/having fun/having a good time).

16. Look! The girl caught a fish. She feels (proud).

17. Mother says "How do you (feel)?"

18. Mom gives the sick baby medicine. Pretty soon the baby will (be/feel alright/better/good/OK).

19. She is the boy's friend. She is someone who he (likes).

20. The children kiss their mother. She is someone who they (love).

21. The boy did not know he was getting a bike; when his parents gave it to him, he was (surprised).

22. How do you think this girl feels? (sad).

23. How do you think this girl feels? (angry/mad).

24. The boy is hiding because he feels (scared).

25. Being all alone in the dark can feel (scary).

26. This baby is (dirty/messy/yucky).

27. This girl is sick. She feels (bad).

28. What is the girl doing? (hug/hugging).

29. What is the boy doing? (kissing/kiss).

30. Ha, ha, ha is the sound we make when we (laugh).

31. What is the girl doing? (smile/smiling).

32. What is this girl doing (cry/crying).

33. These children are very hungry. Food is what they (want/need).

34. This girl says "I don't want to go to bed." But her mother says "You (have to).

35. Learning how to ride a bike is (hard).

36. My teacher is nice. That is what I (think).

37. This is Jamal. He made a picture for his mother. He wanted to bring it home, but he left it at school. His mother said "Did you remember to bring your picture home?" Jamal said "No, I (forgot)."

38. This is Anne at school. Anne asked her teacher "Are we going outside today?"

Her teacher was not sure if they would go outside or not, so she said (maybe/perhaps/we'll see).

39. The girl said "Tengo hambre." That is Spanish. Her friend does not speak Spanish, so she did not (understand/know).

40. Jamal forgot to bring his picture home from school yesterday. Today he will try to (remember).

41. She is not really a doctor, but it is fun to (pretend/play doctor).

42. This boy woke up because he had a bad (dream).

43. You do not know which hand the candy is in, so you will have to (guess).

44. The boy said "Que' es esto?" I do not understand Spanish, so I did not know what that (means).

45. Why is this girl having a time out? (bad/naughty).

46. Dad says "Don't be bad. I want you to be (good/nice)."

47. This child wants a cookie. Mother says "Yes, you (may/let/can)."

Appendix B. Matched Internal and Non-internal State Words

Perception		Imageability	Frequency
hear	Verb	425	2.7
call	Verb	424	2.84
smell	Verb	477	1.68
sweep	Verb	513	1.71
Physiology			
sleep	Verb	530	2.11
feed	Verb		2.12
Volition/Ability			
want	Verb	361	3.05
find	Verb	370	3.04
Cognition			
dream	Noun	485	1.89
shape	Noun	471	1.9
mean	Verb	419	2.87
give	Verb	383	3.11
Moral Judgement			
good	Adjective	374	3.16
new	Adjective	418	3.03
can	Verb	369	3.6
go	Verb	364	3.46

Note. Internal state words are bolded.

Appendix C. Non-Internal State Word Picture Task Items

1. This mom wants her children to come in the house. What is she doing? (calling).

2. What is this girl doing with the broom? (sweeping).

3. These blocks are different colors and different (shapes).

4. Tell me about these cars. This one (point) is old and this one (point) is (new).

5. A girl caught a butterfly, but she did not keep it. What is she doing in this picture? (go).

6. What is the girl doing? (giving).

7. This boy (point) is going to hide. Then what will this girl do? (find).

8. What is this mom doing? (feeding).

Appendix D. Script to accompany Picnic (McCully, 2003) for Story Retell Task.

Target internal state words are bolded. The script includes all internal state words as identified by Bretherton and Beeghly (1982) with the exception of the following: sick, funny, angry/mad, understand, mean, nice.

This is the mouse family. They are having a **good** time. Everyone **has to** help, because they are getting ready to go on a picnic. It is a sunny day. It **feels warm** outside. Bitty Mouse said "I **need** to bring Buster" (point). Buster was not a **real** mouse. He was Bitty's very special toy mouse. The mouse family gets in their truck. "**Watch** for bumps in the road!" said Father Mouse. Bitty is **sleepy**. He **forgets** what his father has said about the bumps in the road. He falls **asleep** and **dreams** about the picnic. The truck goes over a big bump. Oh, No! Bitty Mouse falls off the back of the truck. That **wakes** him up! No one **sees** Bitty fall off the truck. The mouse family does not **know** that he is in the road. The mouse family **thinks** that Bitty is still in the truck. The mouse children **want** to have their picnic at this spot. "We are going to have **fun**" they say. "I **like** this spot" says Mother Mouse. This little mouse (point) runs to the water. "Let's **pretend** that we are fish swimming in the ocean, he says. "Mother Mouse, **can** we go in the water?" "Yes," says Mother Mouse. This mouse is **thirsty**, (point) so he carries the juice to the picnic spot. "Come down from the tree" says Mother Mouse (point). "Please don't be **naughty**. Be **good**, so that you will all be safe." But poor Bitty Mouse is **crying**. He is very **sad**. And Bitty **feels scared**. The little mice say "Brrr, this water makes us feel **cold**. " "The picnic is ready" calls Mother Mouse. "Who is **hungry**?" "We are!" say all the little mice. Yum! This watermelon **tastes** good! (point). One, two, three, four, five, six, seven, eight

(point). Mother and Father and Grandpa and Grandma Mouse are **surprised** to count only eight little mice. There are **supposed to** be nine. Where is Bitty? We **must** find him! Meanwhile, Bitty is doing a little **better**. "I am **alright**," he says to Buster. I am **OK**. I am not **hurt**. Bitty tries to keep busy. He picks some flowers to **smell**. The mouse family searches and searches for Bitty. They search in the grass. They **look** behind the rocks. They call "Bitty!" The mouse family **feels** very **bad** because they cannot find Bitty. It is so **scary**! Then Father Mouse **remembers** the bumpy road. "**Maybe** Bitty fell off the truck," he says. They decide to search for Bitty on the road. Meanwhile, Bitty waits and waits. Bitty's family searches every inch of the road. "Bitty! Bitty!" they call. Bitty **listens**. "I **hear** something" he said. "What is that sound?" "Here I am" said Bitty. "There he is!" said the little mice. They are so **happy** to find Bitty. They **smile** and they **laugh**. The mouse family is so **happy** to see him. Mother and Father Mouse **kiss** Bitty. "We **love** you, Bitty" said the little mice. "We are all together now." "You were very brave, Bitty," said Grandpa Mouse (point). "We are very **proud** of you." But where is Buster? Bitty tries to **guess** where he has left Buster**. Maybe** he left Buster in the grass. Yes! Bitty gives Buster a big **hug**. And then he brushes Buster off, because he was a little **dirty** from being lost in the grass. "**May** we have our picnic now?" Bitty said. The mouse family had a **hard** day because Bitty got lost. But now it is picnic time at last.

Appendix E. Behavior Codes

Behavior Code Definitions

1. Codes for Inappropriate Behavior

a) Vocally/Verbally Inappropriate: Includes whining, crying, screaming, yelling, swearing, verbal aggression (eg., shut up, I'm going to hit you), name-calling.

b) Out of area: Child leaves area to which she or he is assigned without permission.

c) Take: Child takes object from another child, teacher, or area without permission.

d) Property Aggression: Child throws, rips, or in other ways demonstrates aggressive use of an object.

e) Person Aggression: Child exhibits aggressive behavior toward another child or adult. Examples include fighting, kicking, slapping, hitting.

2. Function of inappropriate behavior:

a) Escape: Child appears to be exhibiting behavior in order to avoid activity, teacher, or area.

b) Attention: Child appears to be exhibiting behavior in order to gain attention from children and/or adults.

c) Tangible: Child appears to be exhibiting behavior in order to obtain tangible reward.

3. Directives

a) Compliant: Child obeys or attempts to obey within 5 seconds a teacher directive to the individual child or to a group of children that includes the child. If a directive is given during the last half of a 10 second coding interval, the coder will continue to watch for child compliance to that command for 5 seconds and will score the outcome in the interval in which the command is given.

b) Noncompliant: The child makes no attempt to obey a teacher directive during 5 seconds following the directive.

c) Task: Use only for structured activities.

d) Other behaviors incompatible with task: The child exhibits a behavior or behaviors that are incompatible with the target task.

e) Examples: The child examines takes objects from his pocket and examines them while the teacher is reading a story. The child turns back on teacher while she is directing the child or children's attention to the calendar.

Coding instructions:

Provide a function for each inappropriate behavior coded. Each code is to be used no more than one time during each ten-second segment. For example, if a child throws four toys during the same time segment, property aggression is checked one time for that time segment. Multiple codes may be checked during the same time segment, but not for

the same behavior. A given behavior is to be coded one time and given one code. All inappropriate behavior codes are specific behaviors that are incompatible with attending to the task. They should be used, not incompatible behavior, when they are applicable. Incompatible behavior should be used for other, non-designated observed behaviors that are incompatible with the task. Compliance/Non-compliance should only be used to code the child's behavior following a teacher directive.

Appendix F. Responses on internal state word picture description task by category.

Perception

cold/freezing			feel		
	Accepted	79%		**Accepted**	5%
	better	2		feel	3
	cold	22		**Total**	3
	good	1			
	great	1		**Not Accepted**	
	happy	9		be	2
	hot	1		big	1
	no good	1		drinks	1
	sorry	1		girls	1
	special	1		go	2
	warm	1		grow	1
	wet	1		hee haw	1
	sick	1		look like	2
	unspecified	3		moo	1
	Total	45		neigh	2
				no	1
	Not Accepted			nose	4
	jacket	1		people	2
	nothing	1		pet	1
	play	1		ride horse	1
	snow	3		smells	6
	snowman	1		sniff	1
	walk	1		something	1
	unintelligible	2		take	1
	no response	2		touch	3
	Total	12		warm	3
				wide	1
				yes	4
				no response	11
				Total	54

Appendix F. Responses on internal state word picture description task by category, cont'd.

Perception, continued

hear/listen			hot/warm		
	Accepted	47%		**Accepted**	56%
	hear	12		hot	15
	listen	12		hurt	3
	unspecified	3		not feel good	1
	Total	27		owie	3
				sick	4
	Not Accepted			tired	2
	call	1		wants drink	1
	dance	1		warm	1
	ear plugs	1		unspecified	2
	ears	2		**Total**	32
	hand	1			
	headphones	2		**Not Accepted**	
	microphone	2		blood	1
	music	4		bump	2
	put on	1		can't breathe	1
	sing	3		cold	4
	song	3		dying	1
	sun	1		good	1
	no response	8		jacket	1
	Total	30		job	1
				run	3
				sleepy	1
				went outside	1
				wet	1
				working	1
				unintellible	1
				no response	5
				Total	25

Appendix F. Responses on internal state word picture description task by category, cont'd.

Perception, continued					
hurt/owie/ booboo	**Accepted**	77%	taste	**Accepted**	26%
	booboo	5		don't like	1
	hurt	8		feel	1
	owie	27		like	1
	unspecified target	4		taste	15
	Total	44		**Total**	18
	Not Accepted			**Not Accepted**	
	bandaid	1		cereal	2
	bleed	7		close mouth	1
	elbow	1		crunchy	1
	fell	2		do	1
	play	1		eat	20
	no response	1		good	5
	Total	13		him	1
				look like	1
smell	**Accepted**	68%		milk	1
	smell	38		pour	1
	sniff	1		no response	5
	Total	39		**Total**	57
	Not Accepted				
	blow	3			
	butterfly	1			
	flowers	4			
	look	6			
	sing	1			
	no response	3			
	Total	18			

Appendix F. Responses on internal state word picture description task by category, cont'd.

Physiology

asleep/sleep	**Accepted**	72%	hungry/ starving	**Accepted**	91%
	asleep	3		angry	1
	nap	2		cry	1
	sleep	30		hungry	41
	want go home	1		mad	1
	unspecified	5		sad	3
	Total	41		unspecified	5
				Total	52
	Not Accepted				
	drive	1		**Not Accepted**	
	go night night	1		chicken	1
	hold bear	1		food	1
	mouth	6		get some	1
	play	1		that one	1
	sit	1		no response	1
	that	1		**Total**	5
	yawn	2			
	no response	2	sick	**Accepted**	88%
	Total	16		cold	1
				hot	1
awake/wake up	**Accepted**	88%		hurt	4
	awake	20		sad	3
	wake up	18		sick	37
	woke	8		sleeping	2
	unspecified	4		sleepy	1
	Total	50		warm	1
				Total	50
	Not Accepted				
	get up	1		**Not Accepted**	
	in room	1		eat	1
	sleep	4		feel	2
	up	1		happy	2
	Total	7		medicine	1
				tongue/mouth	1
				Total	7

Appendix F. Responses on internal state word picture description task by category, cont'd.

Physiology, continued

thirsty			sleepy/tired		
	Accepted	63%		**Accepted**	63%
	hot	9		sleep	3
	thirsty	24		sleepy	12
	want	3		tired	15
	Total	36		want sleep	1
				unspecified	5
	Not Accepted			**Total**	36
	been in water	1			
	cold	1		**Not Accepted**	
	drink	5		cereal	1
	hungry	1		chocolate	1
	outside	1		close eyes	1
	sick	2		cold	1
	sweating	3		cough	1
	swim	4		eat	3
	no response	3		mouth	1
		21		nothing	1
	want eat	1		owie on teeth	1
	warm	1		shy	1
	unspecified	2		snows	1
	Total			yawn	1
				unintelligible	1
				no response	6
				Total	21

Appendix F. Responses on internal state word picture description task by category, cont'd.

Emotion/Affect

alright/better/good			angry/mad		
	Accepted	44%		**Accepted**	98%
	better	9		angry	15
	cry	1		mad	32
	good	6		naughty	1
	happy	1		no feel good	1
	hug	1		sad	3
	hurts	1		unspecified	4
	OK	1		**Total**	56
	sleep	1			
	want eat	1		**Not Accepted**	
	warm	1		nottish scottish	1
	unspecified	2		**Total**	1
	Total	25			
			bad	**Accepted**	56%
	Not Accepted			annoyed	1
	baby	1		hot	2
	born	1		mad	6
	choke	1		not better	1
	dead	1		not good	4
	eat	2		sad	14
	feed	1		sleep	1
	get it	1		sorry	1
	go home	1		tired	2
	grow up	2		**Total**	32
	healthy	1			
	medicine	1		**Not Accepted**	
	mouth	1		fever	1
	not sick	5		good	1
	sick	13		medicine	2
	Total	32		sick	20
				no response	1
				Total	25

Appendix F. Responses on internal state word picture description task by category, cont'd.

Emotion/Affect, continued

cry	**Accepted**	91%	feel	**Accepted**	82%
	cry	34		don't feel good	1
	hurt	1		feel	40
	mad	1		hungry	1
	sad	14		not good	1
	sick	2		sad	2
	Total	52		sick	2
				Total	47
	Not Accepted				
	do hair	1		**Not Accepted**	
	sit	1		look	3
	tears	1		medicine	1
	no response	2		mouth	1
	Total	5		r-r-r	1
				temperature	1
dirty/messy/ yucky	**Accepted**	67%		no response	3
	dirty	6		**Total**	10
	icky	1			
	messy	24	happy/ have good time/have fun	**Accepted**	39%
	nasty	1		funny	1
	sad	1		happy	15
	unspecified	5		have good time	1
	Total	38		hug	2
				like	1
	Not Accepted			not sick	1
	cleaning	1		unspecified	1
	cool	1		**Total**	22
	crazy	1			
	crumbs	2			
	eat	3			
	four	1			
	play with fingers	1			
	spill	4			
	unintelligible	2			
	no response	3			
	Total	19			

Appendix F. Responses on internal state word picture description task by category, cont'd.

Emotion/Affect, continued

happy/ have good time/have fun *cont'd*	**Not Accepted**		kiss	**Accepted**	95%
	balls	14		kiss	52
	boat	1		smell	1
	friends	2		talk	1
	hold soccer	1		**Total**	54
	in house	1			
	kids	2		**Not Accepted**	
	play	9		tell secret	1
	take/get picture	2		no response	2
	sleep	1		**Total**	3
	want apple	1			
	no response	1	laugh	**Accepted**	63%
	Total	35		funny	3
				good	2
hug	**Accepted**	88%		happy	.
	happy	1		laugh	23
	hug	46		smell	1
	kiss	2		smile	1
	loving	1		**Total**	36
	Total	50			
				Not Accepted	
	Not Accepted			bird	1
	I don't like this	1		butterfly	1
	move it	1		eat	2
	tell secret	1		flowers	9
	tell story	2		go outside	1
	no response	2		haha	1
	Total	7		sound	1
				sum	1
				unintelligible	1
				no response	3
				Total	21

Appendix F. Responses on internal state word picture description task by category, cont'd.

Emotion/Affect, continued

like	**Accepted**	68%	love *cont'd*	**Not Accepted**	
	funny	1		are	1
	happy	1		baby	1
	hug	17		cool	1
	know	1		else	1
	like	5		feel	1
	love	13		friends	1
	smile	1		is	1
	Total	39		kiss	13
				live by	1
	Not Accepted			mother	3
	be	1		play with	1
	better	1		no response	4
	boy	1		**Total**	29
	cool	1			
	feel	2	proud	**Accepted**	68%
	friend/friendly	6		better	2
	live	1		excited	1
	named boy	1		funny	1
	no response	4		good	2
	Total	18		happy	30
				hungry	1
love	**Accepted**	49%		proud	1
	happy	1		scared	1
	hug	3		**Total**	39
	know	1			
	like	3		**Not Accepted**	
	love	18		fish	5
	proud	1		go	1
	want	1		got him	1
	Total	28		mad	2
				sad	2
				sister	1
				sit	1
				water	1
				no response	4
				Total	18

Appendix F. Responses on internal state word picture description task by category, cont'd.

Emotion/Affect, continued

sad	**Accepted**	96%	scared *cont'd*	**Not Accepted**	
	better	1		find	1
	cry	19		hiding	6
	mad	3		monster	2
	sad	31		whooping	1
	sick	1		no response	1
	Total	55		**Total**	11
	Not Accepted		scary	**Accepted**	79%
	mom	1		cry	1
	unintelligible	1		good	3
	Total	2		happy	6
				mad	4
scared	**Accepted**	81%		not happy	2
	annoyed	1		proud	1
	doesn't want eat	1		sad	9
	excited	1		scared	10
	funny	3		scary	9
	good	2		**Total**	45
	happy	4			
	mad	5		**Not Accepted**	
	mean	1		dark	4
	nervous	1		fire	2
	not happy	1		get light on	1
	sad	7		nighttime	1
	scared	15		old	1
	scary	2		watch TV	1
	shy	1		no response	2
	surprised	1		**Total**	12
	Total	46			

Appendix F. Responses on internal state word picture description task by category, cont'd.

Emotion/Affect, continued

smile	**Accepted**	56%	surprised *cont'd*	**Not Accepted**	
	funny	1		ask his mom	1
	happy	7		big	1
	laugh	12		blood	1
	smell	2		boy	1
	smile	10		fast	1
	Total	32		fat	1
				fell	1
	Not Accepted			got bike	1
	cat	1		lost	1
	duck	1		mine	1
	eat	4		on scooter	1
	flower	3		ride	1
	get bird	1		right	1
	ha ha	1		silly	1
	ladybug	1		squish cheek	1
	nothing	2		stopped	1
	play	3		toy	1
	something	1		why	1
	touch	1		yawn	1
	unintelligible	1		unintelligible	2
	no response	5		no response	3
	Total	25		**Total**	24
surprised	**Accepted**	58%			
	afraid	1			
	good	1			
	happy	9			
	mad	3			
	nervous	1			
	proud	1			
	sad (girl's bike)	1			
	scared	1			
	sick	1			
	surprised	11			
	want	2			
	worried	1			
	Total	33			

Appendix F. Responses on internal state word picture description task by category, cont'd.

Volition/Ability					
hard	**Accepted**	26%	want/need	**Accepted**	32%
	cool	1		angry	1
	fun	4		cry	1
	good	3		like	2
	happy	3		mad	1
	hard	4		need	2
	Total	15		sad	1
				want	10
	Not Accepted			**Total**	18
	baseball	1			
	big	1		**Not Accepted**	
	big boy	1		cold	1
	bike	2		do	1
	dad	2		eat	27
	fast	1		feel	1
	feel	1		food	2
	go to park	1		hungry	1
	help	1		some	1
	learn	4		wait	1
	mine	1		NR	4
	not fall	1		**Total**	39
	not little	1			
	person	1			
	practice	1			
	push	2			
	ride	5			
	sidewalk	1			
	teach	1			
	training wheels	1			
	try	2			
	no response	10			
	Total	42			

Appendix F. Responses on internal state word picture description task by category, cont'd.

Cognition

dream/nightmare			guess		
	Accepted	40%		**Accepted**	18%
	dream	18		be good	1
	feeling	1		guess	1
	unspecified	4		look	5
	Total	23		see	1
				think	2
	Not Accepted			**Total**	10
	bad	1			
	bath	1		**Not Accepted**	
	bed	2		do	2
	car	1		eat	1
	cough	1		find	7
	day	13		get	2
	good	1		give	1
	heart	1		hide	1
	mouth	1		open	1
	new house	1		paper	1
	night	2		pick	3
	noise	1		remember	1
	present	1		say	1
	temperature	1		that hand	5
	time	1		wait	1
	tummy	1		no response	20
	yeah	1		**Total**	47
	no response	3			
	Total	34			

Appendix F. Responses on internal state word picture description task by category, cont'd.

Cognition, continued

know/understand			maybe/ perhaps/ we'll see		
	Accepted	21%		**Accepted**	14%
	feel good	1		don't know	3
	hear	1		maybe	3
	know	4		probably	1
	like to	1		think	1
	mad	1		**Total**	8
	understand	1			
	want to	3		**Not Accepted**	
	Total	12		come on	1
				don't	1
	Not Accepted			give	1
	be friend	1		go motor room	1
	be quiet	1		got house	1
	care	2		happy	1
	do it	2		hungry	1
	eat	6		I said	1
	go	3		no	25
	help	1		oh man	1
	hit	1		outside	2
	hungry	1		teacher say	1
	love	1		yes	11
	play	2		no response	1
	say	1		**Total**	49
	say sorry	1			
	speak	3			
	speak English	1			
	talk	5			
	speak Spanish	5			
	think	1			
	no response	7			
	Total	45			

Appendix F. Responses on internal state word picture description task by category, cont'd.

Cognition, continued

forget	**Accepted**	21%	means *cont'd*	**Not Accepted**	
	can't	1		called	1
	forget	7		color	2
	smile	1		cousin	1
	think	1		do	6
	want	2		is/was	14
	Total	12		know	1
				listen	1
	Not Accepted			not Eng	1
	do	1		say	1
	don't/didn't	24		no response	8
	I	1		**Total**	36
	kept	2			
	leave/left	5	pretend	**Accepted**	60%
	no	2		play	28
	remember	1		pretend	6
	share	1		**Total**	34
	want	1			
	yes	1		**Not Accepted**	
	no response	6		be	4
	Total	45		check	2
				colors	1
means	**Accepted**	37%		do	3
	hungry or not	1		doctor	3
	means	20		girl	1
	Total	21		house	1
				in mouth	1
				look	1
				make dr	1
				scream	1
				talk	1
				no response	3
				Total	23

Appendix F. Responses on internal state word picture description task by category, cont'd.

Cognition, continued

remember	**Accepted**	4%	think	**Accepted**	42%
	be happy	1		feel	6
	remember	1		hug	1
	Total	2		kiss	1
				know	1
	Not Accepted			like	8
	again	4		love	3
	bring	16		play	1
	color	1		see	1
	do/did	7		think	1
	fail	1		want	1
	forget	1		**Total**	24
	get	5			
	go	1		**Not Accepted**	
	hit	1		color	2
	home	2		could	1
	leave/left it	3		do	14
	make	1		go	1
	mom	2		have	1
	pundles	1		hit	1
	tomorrow	1		nice	2
	try again	2		nothing	1
	two of them	1		say	2
	when get home	2		school	1
	no response	3		teacher	1
	Total	55		want to paint	1
				unintelligible	1
				no response	4
				Total	33

Appendix F. Responses on internal state word picture description task by category, cont'd.

Moral Judgment/Obligation

bad/naughty	**Accepted**	70%	can/let/may *cont'd*	**Not Accepted**	
	act up	1		be	1
	angry	2		cookies	2
	bad	16		do	4
	didn't listen	1		get	1
	inappropriate	1		have one	1
	mad	10		pop	1
	mean	4		want	2
	naughty	2		yes	4
	not funny	1		no response	3
	unspecified	2		**Total**	19
	Total	40			
	Not Accepted		good/nice	**Accepted**	82%
	can't	1		good	26
	can't say sorry	1		happy	10
	fight	1		kiss	1
	hit	1		nice	8
	mom	2		unspecified	2
	throw	1		**Total**	47
	time out	4			
	won't lay down	1		**Not Accepted**	
	no response	5		angry	1
	Total	17		be	1
				in trouble	1
can/let/may	**Accepted**	67%		mad	1
	can	20		nothing	1
	could	3		pop	1
	heard	1		you	1
	let	1		no response	3
	may	9		**Total**	10
	unspecified target	4			
	Total	38			

Appendix F. Responses on internal state word picture description task by category, cont'd.

Moral Judgment/Obligation, continued		
have to/must/ supposed to	**Accepted**	68%
	could	1
	go to sleep	1
	got to	5
	have to	23
	must	1
	need to	5
	unspecified	3
	Total	39
	Not Accepted	
	do	5
	go	1
	go outside	1
	go to bed	6
	go upstairs	1
	mother	1
	stairs	1
	want	1
	no response	1
	Total	18

Appendix G . Frequencies of Internal State Words Used During Story Retell

afraid	1	lonely	1
bad	1	look	55
better	4	love	9
bored	1	mad	3
can/could	59	may	1
cold	3	maybe	8
cry	75	owie	1
dirty	5	probably	1
dream	1	real	3
fine	1	remember	8
forget	6	sad	14
freeze	1	scare	24
fun	2	scary	5
good	1	see/saw	27
guess	1	sleep	11
hafta/gotta	14	sleepy	1
happy	5	smell/sniff	21
hard	1	smile	3
hear	19	supposed to	8
hug	17	surprise	1
hungry	8	taste	1
hurt	5	think	9
kiss	26	thirsty	7
know	37	wake	1
let	1	want/wanna	72
like	14	Total	606
listen	2		