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THE ROLE OF LANGUAGE IN EMOTION REGULATION

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Abstract

The relation between 48 month-olds' language development and emotion regulation was examined during a task that challenged their self-regulation. It was hypothesized that children with better language skills, and who spoke during the challenging task, would show less anger and would persist at the task longer. It was also hypothesized that children who spoke positively during the task, specifically verbalizing optimism or self-instruction, would show less anger and persist at the task longer. The data for this project were taken from a longitudinal study of 120 toddlers who were followed until they were age 48 months. At this later time point, children were administered a standardized language assessment (TOLD-P3; Newcomer & Hammill, 1997) and a task designed to tax child emotion regulation, the Impossible Perfect Circle task (Goldsmith & Rothbart, 1996). Their performance during this task was coded in regard to their nonverbal expressions of anger, task persistence, use of internal state language (Bretherton et al., 1986), and verbalizations of optimism and self-instruction. Contrary to prediction, it was found that children who performed better on standardized language measures spoke *less* during the task, and children who spoke more during the task displayed more anger and persisted less. Also contrary to prediction, children who verbalized optimism or self-instruction displayed more anger and persisted less, particularly in the case of optimism.

Table of Contents

List of Tables

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Chapter 1 Introduction

Everyday children experience frustrations and disappointments. These occur in various ways and in a wide variety of settings. One such setting is in school. For example, a teacher may correct a child who is trying to write letters of the alphabet, repeatedly telling the child to try to do it again correctly. The child may begin to feel frustration if her effort is not correct the first time or two. The ability to persist at trying to complete a difficult task calls on a child's ability to regulate frustration. In scientific terms, the child's ability to master the skill depends on her emotion regulation skill. The processes used to modify and monitor one's emotions are known as emotion regulation (Thompson, 1994). Emotion regulation appears to require certain skills that develop in early childhood, e.g. language (Kopp, 1989), is regarded as important for task persistence (Cicchetti, Ackerman & Izard, 1995), and varies in terms of social context (Saarni, 1999).

The purpose of the present study is to explore the relation between a young child's language abilities and the child's ability to regulate frustration in the context of a challenging task performed in the presence of a relative stranger. To that end, the existing body of literature connecting language skills and emotion regulation will be discussed, including studies focusing on children with specific language impairment, children's use of private speech and internal state language, as well as studies that have directly linked children's language abilities directly to measures of emotion regulation.

A major aspect of emotion regulation is coping with negative emotions, such as anger. In the context of a task that challenges emotion regulation, specifically the task of trying to draw a perfect circle and repeatedly being critiqued, children are expected to be

angry due to frustration. When angry in this context, children may either withdraw from the task or continue to engage in it (Kopp, 1989). In school contexts of this type, in which children are trying to master something that they have not quite done correctly, we want them to manage their anger such that they are able to persist at the task. In that instance, sad withdrawal or angry defiance presents problems, patterns of behavior that lead teachers to refer children for evaluation and mental health services. However, that is not to say that all sadness and anger is maladaptive. Anger, which arises when a goal is interrupted or blocked (Razza, Martin, & Brooks-Gunn, 2012), is believed to assist task persistence due to its underlying approach motivation (Harmon-Jones & Allen, 1998; Lewis, Sullivan, Ramsay, & Alessandri, 1992). Conversely, sadness arises when goals cannot be achieved and relinquishing them may be adaptive. Effective emotion regulation includes knowing when to persist, when to give up, and when to ask for help (Barber, Grawitch, & Munz, 2012).

The aspects of emotion regulation involved in motivating and organizing adaptive behavior allow children to persist at tasks (Cicchetti et al., 1995), when doing so is adaptive (Barber et al., 2012). Thus, emotion regulation supports task persistence, which is defined as the ability to sustain attention to a task, despite internal and external challenges (Andersson & Bergman, 2011). This relation is evident from infancy, as Lewis et al. (1992) found that infants who displayed anger during the extinction of an arm-pull response showed more positive affect, interest, and engagement during subsequent relearning. In longitudinal studies, task persistence and related constructs observed in childhood have been shown to be related to children's later academic achievement, educational attainment, and occupational level (Andersson & Bergman,

2011; Valiente, Lemery-Chalfant, Swanson, & Reiser, 2008). Children who are able to use their emotion regulation abilities to bolster their task persistence have better outcomes later in life.

Another functional aspect of emotion involves sending and receiving information about one's state (Keltner & Kring, 1998). As such, emotions can be considered a means of communication. Therefore, nonverbal emotional expressions and language are both means of communicating. Indeed, it has been postulated that language plays a role in the development of self-regulation of emotion (Kopp, 1989). However, it is not known exactly how children use their expressive language in emotional moments (Cole, Armstrong, & Pemberton, 2010). The relation between emotion regulation has however been examined in atypical populations, as well as in specific types of language, including private speech and Internal State Language.

Atypical Populations

One area of research in the emotion literature is the study of atypical populations. As Cicchetti et al. (1995) noted, "the study of abnormal populations can enhance our understanding of some of the processes involved in normal emotional development" (p. 1). Studying how variation in children's language development relate to variations in their reactions to frustrating situations can reveal language processes that aid emotion regulation. The following vignette is an example of how poorer language skill can be detrimental to emotion regulation and task persistence:

A child with a language delay wants an oatmeal raisin cookie, so he goes up to his mother and says, "I want cookie." His mother goes into the pantry, gets an oatmeal raisin cookie and presents it to the child. The child, unable to articulate exactly what is wrong

with the cookie presented to him, says, "No, I want *cookie*." The mother, unsure as to why the child is protesting, again offers the oatmeal raisin cookie. The child shakes his head and points to the cabinet, confusing his mom and causing her to ask, "You don't want the cookie?" The child nods and says, "I want *cookie.*" Thoroughly confused, his mother says, "I don't know what you want," which causes the child to scream and throw himself on the floor. In this situation, the child's inability to express his precise desire due to his limited vocabulary causes him and his mother to become frustrated and for them both to give up on understanding what the child wants.

In this example, the child's limited expressive vocabulary results in his inability to specify his wants and needs. Initially, the child's anger and frustration motivate him to persist at communicating, demonstrated by his attempt at correcting his mother. However, when his mother still is unable to understand him, the child's effort to get what he wants devolves into a tantrum. Given this vignette, it is not surprising that children with poorer language skills are often found to have lower rates of task persistence when compared to their typically developing peers. This relation has been documented in populations with speech sound (phonological) disorders (Hauner, Shriberg, Kwiatkowski, & Allen, 2005), prenatal cocaine exposure (Bandstra et al., 2001), attention deficit hyperactivity disorder (ADHD; Hoza et al., 2001), and mental retardation (Kozub, Porretta, & Hodge, 2000). It has also been shown that task persistence in children with Down syndrome is related to their later academic achievement (Gilmore & Cuskelly, 2009), which suggests that task persistence plays as important a role in the development of children with special needs as it does among typically developing children.

The population that may best illustrate the links between language skills and

emotion regulation, one that has been often studied, is children with Specific Language Impairment (SLI). SLI is defined by language development that is deficient in some area (Baker & Cantwell, 1991), and children with SLI have been shown to deviate in their emotion regulation behaviors compared to typically developing children of the same age. Children with SLI have been shown to have lower scores on measures of emotion regulation such as the Emotion Regulation Checklist (ERC) and were rated by teachers as displaying more problem behaviors (Fujiki et al., 2002; Fujiki, Spackman, Brinton, & Hall, 2004; Qi & Kaiser, 2004). In addition, standardized measures of language have been found to be correlated with specific social behaviors such as reticence, externalizing and internalizing behaviors, and passive-solitary behavior in this population (Fujiki et al., 2004; Hart et al., 2004; Qi & Kaiser, 2004). However, these findings cannot be generalized to the entire population, as the emotion regulation abilities of children with SLI differ from those of typically developing children due to their difficulties in pragmatic uses of language and other social skills (Baker & Cantwell, 1991). Difficulties with language ability may explain why children with SLI are commonly rated as having more problem behaviors (Qi & Kaiser, 2004). In sum, children with special needs show difficulties with task persistence, which may indicate that task persistence is influenced by the cognitive and/or emotional deficits encountered by children with these disorders. Similarly, children with SLI have difficulties with both language and emotion regulation, which also indicates a relation between the development of these two domains.

Types of Language Involved in Emotion Regulation

Although a full explanation of why and how language contributes to emotion regulation has not been documented, there are multiple lines of research that have

focused on children's speech when presented with a challenging task. Several studies have examined Vygotsky's (1962) theory that children's private speech, itself a step in the internalization of language, assists with behavior regulation. In typically developing children, it has been shown that the amount of private speech increases as tasks become more challenging, which helps children overcome obstacles in order to accomplish a given task (Berk, 1986; Frauenglass & Diaz, 1985). Private speech has also been studied in special-needs populations. Berk and Potts (1991) found that boys with Attention-Deficit Hyperactivity Disorder (ADHD) used more self-guiding private speech than their typically developing peers while doing a math assignment, and Winsler, Diaz, McCarthy, Atencio, and Chabay (1999) found that preschoolers identified by their teachers as having behavioral problems also used more self-guiding speech while working on an individual, problem-solving task compared to a control group. Furthermore, children that used less audible, more internalized private speech during problem-solving tasks were rated by parents and teachers as having fewer externalizing behaviors (Winsler, De León, Wallace, Carlton & Willson-Quayle, 2003). These findings indicate that children with behavioral problems rely more on overt private speech, perhaps because they find the tasks to be more challenging than do children without behavior problems (Winsler et al., 2003). While these findings may help predict the performance of preschoolers on challenging tasks, these studies used attentional challenges to assess behavioral regulation, rather than tasks that are specifically designed to challenge children's emotional regulation. In addition, private speech, by definition, occurs when the child is alone, so these tasks cannot predict how children use their language when they are interacting with an adult.

Another aspect of children's language that has been observed during emotion regulation tasks is Internal State Language (ISL), i.e. terms that reference emotions, perceptions, desires and cognition, all of which are not directly observable (Bretherton, Fritz, Zahn-Waxler, & Ridgeway, 1986). It is believed that parental use of ISL helps children acquire a vocabulary that builds emotion knowledge and this knowledge assists children in effectively regulating emotions (Cole et al., 2010). It has been shown that children's verbal abilities are related to their emotion knowledge (Trentacosta & Izard, 2007) and predict their later emotion knowledge (Trentacosta, Izard, Mostow, & Fine, 2006). One would expect that children with greater language abilities would use more of these ISL terms, which would help explain the relation between their language ability and emotion knowledge. Armstrong (2011) analyzed children's use of ISL terms at several age-points and found that children's use of ISL terms increased significantly from 24 months to 36 months, and their use of ISL terms at 36 months predicted their generation of appropriate emotion regulation strategies and negatively predicted their anger expression at 48 months, highlighting the potential value of ISL for emotion regulation. However, ISL studies have only focused on spontaneous speech between children and their mothers, so it is largely unknown how context affects children's use of ISL.

While studies analyzing private speech and ISL have examined aspects of children's language, there is still a dearth of knowledge regarding which domains of language (e.g. syntax, semantics, pragmatics) influence children's emotion regulation abilities. For example, Stansbury and Zimmermann (1999) found that children with better language skills used significantly more distraction as a regulation strategy during challenging tasks than children with low language. In tasks in which a child must tolerate

having a goal blocked, e.g. waiting for something desirable, having a toy removed, distraction, or the ability to shift attention away from the desired object, is regarded as an effective regulatory strategy. In this study, the approach was to divide the sample into children who were higher or lower on their overall language scores; it did not investigate specific language skills. Vallotton and Ayoub (2011), using a longitudinal data set to examine young children's spontaneous talkativeness and vocabulary size, made several key findings. Both measures were positively related to concurrent self-regulation, as indexed by observer ratings of infant behavior during administration of the Bayley Scales of Mental Development. Vocabulary size at 24 months was correlated with the rate of growth in self-regulation from 24 months to 36 months (Vallotton & Ayoub, 2011). It should be noted however that this study did not use an emotion regulation task but rather examined ratings of children's regulation during psychological testing. This study also did not examine how children used their language during the task. Thus this interesting study demonstrated longitudinal relations between language and self-regulation, generally defined. It did not address the specific ways in which language may help children regulate behavior. In addition to vocabulary size, other aspects of language development, e.g. early sentence formation and understanding of grammar, may also be important aspects of language development that contribute to emotion regulation.

An issue in the measurement of the aforementioned studies is that none analyzed what children did during tasks that taxed their self-regulation—e.g., the emotions they expressed, how they interacted with the task, whether they spoke, and if they spoke what they said—and how these behaviors converge or diverge in terms of emotion regulation. Rather, all of the major studies in this area have focused on standardized measures of

language and behavior. In regard to language, several of these studies employed tests such as the Peabody Picture Vocabulary Test-Third Edition (PPVT-III; e.g. Qi & Kaiser, 2004; Trentacosta et al., 2006), the Reynell Developmental Language Scales (e.g. Stansbury & Zimmermann, 1999), the Comprehensive Assessment of Spoken Language (CASL; e.g. Fujiki et al., 2004), and the Clinical Evaluation of Language Fundamentals-Revised (CELF-R; e.g. Hart et al., 2004). Furthermore, many of these studies used teacher ratings of behavior, such as the Teacher Behavior Rating Scale (TBRS; e.g. Hart et al., 2004) and/or the Emotion Regulation Checklist (ERC; e.g. Fujiki et al., 2004), as their measure of emotion regulation, which does not demonstrate how their language assists them in their emotion regulation skills. Thus, there is evidence of links between language and emotion regulation, but few studies have been designed to explain how children use language to facilitate their emotion regulation efforts.

Role of Social Context in Emotion Regulation

When considering emotion regulation, it is important to consider the social context (Cole, Martin, & Dennis, 2004). Children need to use their emotional knowledge and expressions to properly navigate interpersonal interactions, which taxes their emotion regulation skills beyond merely managing their emotions (Saarni, 1999). When children are in an emotionally challenging task with their parents, their parents provide external support for emotion regulation (Kopp, 1989). This support allows children to develop patterns of emotional responses depending on the situation, eventually leading to generalized behaviors children use to regulate their emotions in the absence of their parents (Saarni, 1999).

However, children who are securely attached to their parents may feel able to express themselves freely. A different social context is one that involves interacting with friendly but less familiar adults than one's parents. An example of emotion regulation in this context comes from a study of preschool age children who were given a disappointing gift from an experimenter [relative stranger]. These children spontaneously attempted to mask their disappointment by smiling (Cole, 1986). Such findings show that that young children have some initial ability to regulate emotion, at least emotion expression, in a situation that is unfamiliar and is associated with emotion display rules that involve politeness.

In most of the studies that attempted to elicit and observe emotion regulation in children focused on anger expression. Anger regulation is thought to be crucial for school readiness and social skills. Evidence has shown that 3- and 4-year-olds display more positive than negative emotion when receiving a disappointing gift when a research assistant is present than when they are alone (Cole, 1986; Cole, Zahn-Waxler, & Smith, 1994), but preschool age children with behavior problems showed more anger than positive emotions (Cole et al., 1994). These findings suggest that typically developing preschool age children are beginning to try to self-regulate emotions in social context but that children with behavior problems are less able to do so. More recently, using a different task in which a research assistant continuously criticizes the ability of a child to draw "a perfect circle," 48 month-olds were found to convey more happiness than anger, again suggesting that young children attempt to modulate or hide their anger (Klein, 2010). However, none of these studies examined children's speech during these tasks, an approach that might shed light on how language may aid emotion regulation.

Conclusion

Although there is considerable evidence that suggests links between language development and emotional development, specifically the development of self-regulation of emotion, it is still not known how children use language in emotionally challenging situations and whether their spontaneous language in such situations is related to (a) their language skills and (b) their task behavior and nonverbal emotion expressions. The aim of the present study is to examine which measures of language predict children's spontaneous speech in an emotionally challenging task with a friendly but unfamiliar person as well as their anger expressions and task persistence. It is hypothesized that (a) children who score higher on standardized, spontaneous, and functional language measures and (b) children who verbalize optimism and verbal self-instruction will persist at drawing circles and show less anger with a relative stranger, though it is not known which measures of children's language will best predict their emotion regulation abilities in this context.

Chapter 2 Methods

Participants

For the present study, data was taken from a longitudinal study of 120 children who were followed from age 18 months to age 48 months. A primary focus of the study was to examine the relation between early language development and the development of self-initiated attempts at emotion regulation (Armstrong, 2011; Roben, Cole, & Armstrong, 2012). The larger study did not examine children's spontaneous speech as a link between language ability and emotion regulation ability. Therefore the present study focused on how children behaved—their spontaneous speech, their emotional expressions, and their regulatory efforts—during a standardized frustrating task (Impossible Perfect Circle; Goldsmith & Rothbart, 1996) and how their behavior related to indices of their developing language ability at age 48 months.

Procedure

From the larger study 114 participants (62 boys, 52 girls) completed the Impossible Perfect Circle Task (Goldsmith & Rothbart, 1996) at age 48 months. This standardized task is designed to elicit anger. A research assistant asks the child to draw the perfect green circle and then constantly criticizes the child's efforts. After the child draws the first circle, the assistant offers the first criticism (e.g. the circle is too small, too flat, not quite right, etc) and asks the child to draw another circle. If the child asked to turn the paper over to the other side, the child is told to continue to use that the original side of the paper. After three and a half minutes (210s), the assistant tells the child, "I have to go do something. You try to draw the perfect green circle while I'm gone and I'll

be right back." The child is then left alone for one minute. This task was video-recorded for later use by transcribing and coding teams. For the purpose of this study, only the first part of the task, where the child was with the experimenter, was used.

In addition, all participants participated in an unstructured, wordless book reading task with their mothers. Mother and child spent five minutes with several wordless picture books by Mercer Mayer. The reading task was video recorded and transcribed by trained research assistants using the CHILDES system (Child Language Data Exchange System; MacWhinney 2000). The CHILDES system has two components: Codes for the Human Analysis of Transcripts (CHAT), a transcription and coding format, and Computerized Language Analysis (CLAN), a program which analyses language samples coded in the CHAT format (MacWhinney 2000).

Measures

Standardized Language Measures. At each time-point within the study, each child's language abilities were assessed using an age-appropriate standardized measure. At 48 months, the Test of Language Development-Primary Third Edition (TOLD-P3; Newcomer & Hammill, 1997) Sentence Imitation and Grammatical Understanding subtests were administered. The Sentence Imitation subtest requires children to repeat sentences verbatim while the Grammatical Understanding measures children's receptive syntax by having them select a picture that most accurately depicts a given sentence (Newcomer & Hammill, 1997).

Spontaneous Speech during the Reading Task. Using CLAN, the Mean Length of Utterance (MLU; Brown, 1973) and Type Token Ratio (TTR; Johnson, 1944) were calculated for each child during the reading task as a measure of non-challenging

spontaneous speech. MLU is a measure of linguistic complexity in early childhood and is calculated as the average number of morphemes, including free morphemes, or root words, and bound morphemes, which either serve a grammatical purpose (e.g. "—s" or "—ed") or change the word's meaning or part of speech (e.g. "un—" or "—ly"), in a speech sample (Brown, 1973). However, MLU is a weaker indicator of linguistic ability at this age, as Brown's (1973) final stage of linguistic complexity, Stage 5, typically occurs between 41 and 46 months and is characterized by an MLU in the range of 3.5-4.0 and the emergence of new forms of complex sentences. Beyond that stage, increased complexity typically results in more concise sentences and decreases in MLU. However, because these children were recruited from economically strained households, and because lower income is related to slower language development (Dollaghan et al., 1999; Feldman et al., 2000; Rescorla, 1989), MLU was examined. Indeed, the sample's MLU falls within Brown's (1973) Stage 5 (M = 2.88, SD = 1.02, mdn = 2.70), suggesting at least some of the children may have had slower language development and that the measure is indeed appropriate for analysis.

An additional language ability index taken from the spontaneous speech sample was TTR. TTR was first described by Johnson (1944) as the ratio of the number of different words (types) to the total number of words (tokens) used in a spontaneous speech sample. TTR has been used many times in the literature as a measure of childhood language development (e.g. Templin, 1957). To increase the validity of this measure, in acknowledgement of criticism of this measure (e.g. Hess, Haug, & Landry 1989; Hess, Sefton & Landry, 1986), types and tokens were entered separately in the

analyses. This was also done in an attempt to parallel Vallotton and Ayoub's (2011) finding that vocabulary size (tokens) is correlated with self-regulation.

Task Behavior during the Perfect Circles Task. Three coding teams composed of undergraduate research assistants and graduate students who supervised coding classified different task behaviors: children's spontaneous speech, task behavior, and nonverbal emotion expressions. Each coder was trained to at least 80% accuracy as determined by comparing the coder's work to a master coder's work. Coders worked with video records of the task.

Spontaneous speech. This team was trained to transcribe verbatim children's utterances during the Perfect Circles task using the CHILDES formatting guide on a second by second basis. After the task was transcribed, a different member of the team coded the child's spontaneous speech using the following categories: type of verbalization (e.g. communicative sounds, unintelligible utterances, intelligible utterances), direction of verbalization (e.g. to self, initiated to other, in response to other), focus of the speech (task-related or not), use of ISL, and type of verbalization, stating frustration, helplessness, optimism or self-instruction.

Anger expressions. This coding team assessed the children's facial and vocal cues for four emotions on a second by second basis. Arguably, emotion regulation in the Perfect Circles task involves modulating anger. To capture this, two variables related to anger expression were used from this coding system. The first was the total number of seconds of anger, which measures the amount of time that the child expressed anger. The second was latency to anger, which is the amount of time it took for a child to display the first anger expression.

Regulatory efforts. Lastly, a coding team was trained to classify children's behavior during the Perfect Circles task. This included behaviors that are purported to be regulatory. For the purposes of the present study, two of the more common behaviors—persisting at trying to draw a perfect circle (persistence) and interacting with the assistant about the problematic situation (bids)—were used in analyses. Persistence was defined by children's engaging in drawing circles. As their behavior was classified on a second-by-second basis, it was possible to generate two time related variables: the total number of seconds the child persisted (total time persisting) and the number of seconds between the first criticism and the child's return to trying to draw circles (latency to persisting again).

Bids, or interacting with the assistant, could be verbal or non-verbal (e.g. the child could gesture to or touch the assistant). The behavior was confined to interactions that focused on the problem of drawing a perfect circle, e.g., asking if a circle was correct or better. These behaviors are generally regarded as support seeking in the emotion regulation literature. Again, two time related variables were generated: the total number of seconds during which the child bid to the RA (total time bidding) and the number of seconds until the child's first bid (latency to first bid).

Chapter 3 Results

Missing Data

Of the 120 participants with enough data points for the longitudinal study, six participants did not complete the Impossible Perfect Circles task. Three of these six were children whose families were unable to attend the visit and three were children who could not separate from their mothers due to child distress.

Standardized and Non-challenging Spontaneous Language Measures

The means, standard deviation and range of the standardized and non-challenging spontaneous language measures are presented in Table 1. On the TOLD-P:3 Grammatical Understanding subtest, the group mean standardized score ($M = 9.63$) corresponds to a percentile rank between 37th and 50th. Similarly, the mean standardized score for the Sentence Imitation subtest ($M = 9.05$) corresponds to about the 37th percentile. So, based on the standardization sample for the TOLD-P:3, on average

Table 1

Mean, standard deviation and range of Language Measures

Measure	*M*	*SD*	Min	Max	Range
TOLD-P:3 Grammatical Understanding	9.63	2.465	4	15	11
TOLD-P:3 Sentence Imitation	9.05	3.064	5	16	11
MLU	2.881	1.023	0	7.607	7.607
Word Types	57.62	28.654	0	162	162
Word Tokens	116.49	79.442	0	484	484
TTR	.558	0.131	.315*	1.000	.685

Note. Three participants did not complete the Sentence Imitation subtest. One participant is missing the spontaneous speech data (MLU, Word Types, etc) due to a technological error.
*One participant has an undefined TTR

the children in the present sample demonstrated low expressive and receptive syntactic skills. Further analysis indicated that the group may have had a larger number of children who were below average in the language skills tapped by the TOLD-P:3. On the Grammatical Understanding subtest, 11.4% of the children scored at or below the 9th percentile while less than 1% (0.9%) scored at or above the 91st percentile. In a normal distributed sample, one would expect only 9% versus 11.4% of the children to score at the 9th percentile. On the Sentence Imitation subset, an even larger percentage of children (> 9%) scored below the 9th percentile; specifically, 27.9% scored at or below the 9th percentile. In addition, 5.4% scored at or above the 91st percentile. In sum, although most children in this rural/semi-rural economically strained sample performed at or near the mean relative to the TOLD-P:3 standardization sample, a number of participants performed more poorly than would be expected in the general population of children this age.

As previously mentioned, the sample's low MLU (M = 2.88, SD = 1.02, mdn = 2.70) suggests some of the children may have had slower language development. In fact, only 9.7% of the participants demonstrated an MLU above 4.000. Although the sample also demonstrated a low expressive vocabulary (M = 57.62), this was likely due to deriving the variable from a Reading Task. As the task was unstructured, there was a lot of variation in how much the parent made the child narrate the wordless books.

Correlations among the child language ability measures are reported in Table 2. The two TOLD-P:3 subtests were correlated, as were the TOLD-P:3 Sentence Imitation subtest and MLU. Grammatical understanding may not have been related to MLU because it requires less expressive language to succeed. MLU was strongly related to the

number of word types, but both MLU and word type were inversely related to TTR. In sum, in the reading task, children who used more words and longer utterances in the reading task also were better able to repeat sentences in the proper word order on a standardized test. However, perhaps due to the nature of a reading task, children who had greater lexical diversity (TTR) did not demonstrate larger vocabularies and longer utterances. If a book naturally constrains the utterances children use, because the same words may come up frequently, using diverse words and word forms (e.g., frog and froggie, boy and child, jumps and jumped) better assesses child language ability than lexical diversity.

Hypothesis 1: Children with better language abilities, i.e. who score higher on standardized, spontaneous, and/or functional language measures, will persist longer at the challenge of trying to achieve a perfect circle and with less anger.

Table 2

Correlations for Key Variables

Measure	1	2	3	4	5
Intercorrelations of Language Measures					
1. TOLD-P:3 Grammatical Understanding	—	.31**	.17	.08	.13
2. TOLD-P:3 Sentence Imitation		—	.21*	.03	.12
3. MLU			—	.69**	-.39**
4. Word Types				—	-.61**
5. TTR					—
Correlations to Subjective Behavior Measures					
6. Total Seconds of Anger	-.01	.05	.19*	.18*	-.21*
7. Latency to first Anger	.11	-.03	.06	.06	-.02
8. Total Seconds of Bids	-.23**	-.18*	-.01	.10	-.19*
9. Latency to first Bid	.07	.17*	.05	-.02	.12
10. Total Seconds of Task Persistence	-.05	.02	-.25**	-.23**	.18*
11. Latency to Persisting Again	.05	.02	.21*	.16*	-.04
12. Number of Intelligible Utterances	-.16*	-.22*	-.06	.13	-.11

**p<0.01, *p<0.05 (1-tailed)

First, the results indicated that standardized language subtests were not significantly correlated with the total seconds of anger, latency to first anger, total seconds of task persistence and the latency to persisting again. However, both TOLD:P-3 subtests were correlated with children's bids to the RA about the problem of drawing a perfect circle, an index of support-seeking. As seen in Table 2, the better the child's Grammatical Understanding and Sentence Imitation, the shorter the child's bids and the fewer unintelligible utterances. In addition, the better the child's Sentence Imitation, the longer the latency to the first bid . Additionally, the children who performed better on both of the subtests spoke less during the task. So although there was no relation between standardized measures and anger or task persistence, they was a relation between these measures and support-seeking and the amount of speech during the task, as children who performed higher on these measures demonstrated fewer support-seeking behaviors and spoke less throughout the task.

Interestingly, MLU related differently than the grammar subtests to children's nonverbal emotion and task behavior in the Perfect Circles task. Unlike the standardized subtest scores, this index of the ability to combine words spontaneously into sentences was related to anger and task persistence. Specifically, the larger a child's MLU, the longer the child's anger expressions were, the shorter the child's attempts to persist at the task, and the longer the child's latency to return to task after being criticized. Similarly, the more word types a child used in the reading task, the longer the child's expressions of anger, the shorter the child's bouts of persistence, and the longer the child's return to task persistence after being criticized (see Table 2). Thus, contrary to the hypothesis, children with higher language abilities, as indexed by spontaneous use of more complex

utterances and of more vocabulary words, appeared angrier and less persistent.

In contrast, TTR, which was inversely related to MLU and word type, was also related to child task behavior differently than those indices. Children with higher measures of lexical diversity showed less anger, used fewer bids , and persisted at the task longer (see Table 2). While this does appear to support the hypothesis, higher TTR has been established as being associated with lower MLU and Word Types, so it is consistent with the previously established findings.

The correlations between subjective behavior measures during the task are presented in Table 3. 88.6% of the children had at least one intelligible utterance (*M*=12.40, *SD*=10.386; see Table 4). The more intelligible speech the child uttered, the more anger they expressed, the more quickly they expressed anger, and the less time they persisted at the task. Thus, number of intelligible utterances during the task predicted child task behavior similarly to MLU and word type from another task. In addition, the more intelligible speech the child uttered, the more bids they used and the more quickly they bid .

Table 3

Intercorrelations of Subjective Behavior Measures

Measure	1	2	3	4	5	6	7
1. Total Seconds of Anger	—	-.50**	.15	-.08	.00	-.06	.16
2. Latency to first Anger		—	-.20	.06	-.03	-.02	-.32*
3. Total Seconds of Bids			—	-.56**	.17	-.27**	.62**
4. Latency to first Bid				—	-.29**	.70**	-.20*
5. Total Seconds of Task Persistence					—	-.62**	-.24**
6. Latency to Persisting Again						—	.09
7. Number of Intelligible Utterances							—

**p<0.01, *p<0.05

Frequency of Spontaneous Speech Variables

Internal State Language. The next set of reported findings focuses on the different types of verbalizations children uttered *during* the Perfect Circle Task. The first type of verbalization examined is internal state terms. Of the 114 children observed during this task, 51.8% used a total of 186 ISL terms (see Table 4). The form of internal state language that is of main interest in emotion regulation research is the labeling of felt emotions, i.e. emotion terms. However, only two children used a total of two emotion words. The lack of emotion terminology indicates that the children were not using ISL to regulate their emotions. Of the remaining terms, 31.7% of children used a total of 69 desire terms (e.g. want, need), 19.3% of children used 48 cognition terms (e.g. think, know), and 28.9% of children used 67 perception terms (e.g. see, look). It is important to note that many of children used the perception terms to draw the experimenter's attention to their drawing (e.g. "Look, that is the perfect green circle."), rather than trying to share perceptions about the world (Bretherton et al., 1986). In addition, many used the desire

Table 4

Frequency, mean, and standard deviation of Spontaneous Speech Variables

Type of Utterance	Percent of Children	*M* Utterances	*(SD)*
Intelligible Utterances	88.6%	12.40	(10.39)
ISL	51.8%	1.63	(2.539)
Desire	28.1%	0.61	(1.301)
Perception	28.9%	0.59	(1.240)
Cognition	19.3%	0.42	(1.296)
Emotion	1.8%	0.02	(0.132)
Verbalization Types	86.8%	7.49	(6.664)
Frustration	41.2%	1.10	(1.881)
Hopelessness	69.3%	2.52	(3.714)
Optimism	54.4%	2.14	(3.745)
Self-Instruction	38.6%	0.63	(1.099)

and emotion terms to express displeasure with the situation (e.g. “I don’t want to,” “I don’t think I can,” “I don’t know how to.”), which suggests that these utterances are better captured by children’s verbalizations reflecting their views of the task and their ability rather than their use of ISL.

Verbalizations about Situation. Four types of verbalizations were analyzed: verbalizations indicating the task was undesirable, i.e. frustration (e.g. “No,” “I don’t want to.”), verbalizations indicating the task could not be done or the child could not do it, i.e. hopelessness (e.g. “I can’t do it.”), verbalizations that the child could or had done the task correctly, i.e. optimism (e.g. “I can do it,” “This is the perfect green circle.”), and verbal self-instruction, which also implied the child could do the task (e.g. “Maybe if I do this.”). Most children (86.8%) used at least one type of verblization, with 41.2% of children verbalizing frustration, 69.3% verbalizing hopelessness, 54.4% verbalizing optimism, and 38.6% using self-instruction.

Hypothesis 2

It was hypothesized that children's verbalizations of optimism, conveying they felt able to do the task or guiding themselves verbally, would persist at trying to draw a perfect circle and do so less angrily. To test this hypothesis, children were separated into groups based upon whether they did or did not verbalize optimism or self-instruction; independent *t*-tests were used to compare the behaviors of children who did and did not make these verbalizations.

Frustration. There were 47 children who verbalized frustration and 67 who did not. These children did not differ in terms of TOLD-P:3 scores, MLU, and TTR; there was a trend toward a difference in the number of word types (see Table 5). Children who

verbalized frustration in the perfect circle task used marginally more word types in the reading task, $t(111) = 1.712$, $p = 0.090$. That is, children who verbalized in ways that indicated the task was undesirable had marginally larger vocabulary size.

However, verbalizing frustration was not associated with children's anger duration, latency to anger, latency to first bid, duration of task persistence, or latency to first problem solving attempt. Children who verbalized frustration only differed from those who did not in that they had longer bids to the assistant than children who did not verbalize frustration, $t(112) = 2.784$, $p = 0.006$.

Hopelessness. Similar results were revealed by mean comparisons of children who did and did not verbalize that the task was hopeless or that they could not do it (see Table 6). There were 79 children who verbalized hopelessness and 35 who did not. As with verbalizing frustration, children who verbalized hopelessness did not differ in terms of their TOLD-P:3 scores, MLU, number of word types, or TTR. There were also no

Table 5

Independent T-Tests for Children who Did and Did Not Verbalize Frustration

	Verbalized Frustration		Did Not Verbalize Frustration			
Measure	*M*	*(SD)*	*M*	*(SD)*	*t*	*df*
TOLD-P:3 GU	9.34	(2.513)	9.84	(2.428)	-1.057	112
TOLD-P:3 SI	8.84	(3.045)	9.18	(3.093)	-0.568	109
MLU	2.84	(0.898)	2.91	(1.110)	-0.330	111
Word Types	63.04	(24.80)	53.76	(30.71)	1.712†	111
TTR	0.555	(0.109)	0.560	(0.146)	-0.205	110
Total Seconds of Anger	13.26	(13.02)	10.76	(10.43)	1.133	112
Latency to first Anger	51.59	(46.19)	64.82	(59.26)	-1.222	99
Total Seconds of Bids	18.51	(12.87)	12.21	(11.17)	2.784**	112
Latency to first Bid	44.40	(64.02)	48.00	(69.51)	-0.281	112
Total Second of Task Persistence	61.23	(24.55)	64.90	(25.23)	-0.771	112
Latency to Persisting Again	13.28	(42.18)	16.57	(49.31)	-0.372	112

†p<0.1, *p<0.05, **p<0.01

significant differences for duration of anger, latency to first anger, latency to first bid , duration of task persistence, and latency to first problem solving attempt. However, verbalizations of hopelessness were associated with bids to the assistant. Specifically, children who verbalized hopelessness spent more time bidding to the assistant about the problem of drawing a perfect circle than children who did not, $t(112) = 2.391$, $p = 0.018$.

Optimism. There were 62 children who verbalized optimism and 52 who did not. These children did not differ in terms of TOLD-P:3 scores, MLU, or word types; there was only a trend toward a difference in TTR (see Table 7). Children who verbalized optimism demonstrated marginally lower lexical diversity, $t(110) = -1.877$, $p = 0.063$.

There were no significant differences in latency to first bid and latency to continuing trying to draw. There was a significant difference in the amount of anger shown, with children who verbalized optimism showing significantly more anger, $t(112)=1.991$, $p=0.049$. There was also a significant difference in the latency to the first

Table 6

Independent T-Tests for Children who Did and Did Not Verbalize Hopelessness

	Verbalized Hopelessness		Did Not Verbalize Hopelessness			
Measure	*M*	*(SD)*	*M*	*(SD)*	*t*	*df*
TOLD-P:3 GU	9.41	(2.499)	10.41	(2.341)	-1.482	112
TOLD-P:3 SI	9.12	(2.921)	8.89	(3.394)	0.370	109
MLU	2.91	(0.909)	2.81	(1.263)	0.484	111
Word Types	59.84	(27.33)	52.47	(31.33)	1.256	111
TTR	0.554	(0.128)	0.569	(0.140)	-0.560	110
Total Seconds of Anger	12.94	(11.93)	9.20	(10.44)	1.600	112
Latency to first Anger	53.20	(52.60)	71.69	(55.98)	-1.610	99
Total Seconds of Bids	16.59	(12.31)	10.77	(11.24)	2.391*	112
Latency to first Bid	41.44	(62.51)	57.97	(76.00)	-1.217	112
Total Second of Task Persistence	63.20	(24.06)	63.80	(27.09)	-0.118	112
Latency to Persisting Again	12.42	(39.80)	21.51	(58.69)	-0.966	112

†p<0.1, *p<0.05, **p<0.01

bout of anger, as children who verbalized optimism were significantly quicker to anger, $t(74.6) = -2.076$, $p = 0.041$. There was also a significant difference in the mean duration of bids, as children who verbalized optimism made more bids to the RA than children who did not, $t(110.4) = 5.051$, $p < 0.001$. Finally, there was also a marginal difference in the duration of task persistence, with children verbalized optimism persisting for marginally less time than those who did not, $t(112) = -1.933$, $p = 0.056$.

Verbal Self-Instruction. There were 44 children who verbalized self-instruction and 70 who did not. These children did not differ in terms of TOLD-P:3 scores, MLU, word types and TTR (see Table 8). There were also no significant differences in duration of anger, latency to first anger, latency to first bid, and latency to resuming drawing. There was, however, a significant difference in the total seconds of bids, with those who verbalized self-instruction bidding for longer than children who did not verbalize self-instruction, $t(112) = 4.316$, $p < 0.001$. Finally, there was a marginal difference in the

Table 7
Independent T-Tests for Children who Did and Did Not Verbalize Optimism

	Verbalized Optimism		Did Not Verbalize Optimism			
Measure	*M*	*(SD)*	*M*	*(SD)*	*t*	*df*
TOLD-P:3 GU	9.39	(2.425)	9.92	(2.504)	-1.158	112
TOLD-P:3 SI	8.88	(2.989)	9.23	(3.166)	-0.598	109
MLU	2.92	(0.869)	2.83	(1.192)	0.469	111
Word Types	59.94	(25.99)	54.80	(31.63)	0.947	111
TTR	0.537	(0.114)	0.584	(0.147)	-1.877†	110
Total Seconds of Anger	13.74	(12.24)	9.46	(10.38)	1.991*	112
Latency to first Anger	49.00	(44.63)	72.09	(62.50)	-2.076†	74.6
Total Seconds of Bids	19.52	(12.51)	9.19	(9.278)	5.051*	110.4
Latency to first Bid	39.32	(61.11)	55.10	(73.15)	-1.255	112
Total Second of Task Persistence	59.31	(26.27)	68.25	(22.46)	-1.933†	112
Latency to Persisting Again	17.79	(51.11)	12.13	(40.19)	0.647	112

†p<0.1, *p<0.05, **p<0.01

duration of task persistence; children who verbalized self-instruction persisted less than those who did not verbalize self-instruction, $t(112) = -1.746$, $p = 0.084$.

Table 8

Independent T-Tests for Children who Did and Did Not use Verbal Self-Instruction (VSI)

	Used VSI		Did Not Use VSI			
Measure	*M*	*(SD)*	*M*	*(SD)*	*t*	*df*
TOLD-P:3 GU	9.43	(2.662)	9.76	(2.343)	-0.684	112
TOLD-P:3 SI	8.88	(3.187)	9.14	(3.006)	-0.439	109
MLU	2.98	(0.947)	2.82	(1.071)	0.846	111
Word Types	62.25	(24.45)	54.67	(30.85)	1.377	111
TTR	0.535	(0.115)	0.573	(0.139)	-1.477	110
Total Seconds of Anger	13.50	(13.11)	10.71	(10.46)	1.254	112
Latency to first Anger	52.67	(55.54)	63.08	(53.25)	-0.941	99
Total Seconds of Bids	20.61	(12.36)	11.16	(10.74)	4.316**	112
Latency to first Bid	36.50	(59.59)	52.81	(71.00)	-1.268	112
Total Second of Task Persistence	58.30	(25.34)	66.59	(24.26)	-1.746†	112
Latency to Persisting Again	19.50	(52.40)	12.51	(42.27)	0.782	112

†p<0.1, *p<0.05, **p<0.01

Chapter 4 Discussion

One purpose of this study was to examine children's use of language during a challenging task to see if children who had better language abilities, as measured on standardized tests and by linguistic indices from natural speech samples in a non-challenging task, would use their language abilities to persist at a difficult task and nto do so with less signs of frustration than children with poorer language abilities. In regard to the standardized language measures, children who performed better on the TOLD-P:3 subtests administered actually spoke less during the task. This finding might be related to the specific domains of language measured by these subtests, as the Grammatical Understanding and Sentence Imitation tasks do not necessarily predict all aspects of expressive language skill. However, it could also be a result of internalization of language, as one would expect that children with more advanced language skills to have more internalized language (Vygotsky, 1962). Alternatively, it could also be related to Stansbury and Zimmermann's (1999) finding that children who performed better on a standardized language assessment used significantly more distraction as a regulatory strategy than children with lower language abilities. However, post-hoc analyses did not reveal any significant correlations.

A second aim was to understand how language skills—both in terms of individual differences in normative language measures and in terms of individual differences in what children said during the challenging task—related to children's ability to persist at the challenging task and to do so without expressing anger. Performance on standardized language measures was not related with children's anger or task persistence, but was related to a specific regulatory strategy—i.e. bidding to an adult about the problem

situation. Children who performed better on the standardized measures were quicker to ask , though they asked less. Interestingly, the children who used more intelligible utterances during the task were not coping well with the task, as evidenced by using more anger and persisting at the task less, and used significantly more bids . As the procedure required the staff to refrain from helping children, and just to critique each circle and then indicate the child should try again, a child who quickly sought support, was not supported, and ceased seeking support may be coping well with the challenging task—if that child is able to continue to try to solve the problem of the perfect circle.

A second approach to understanding links between language and emotion regulation is to examine relations between normative indices of language development in children's spontaneous speech samples. The findings were that children with higher language abilities, as indexed by spontaneous use of more complex utterances and of more vocabulary words during a non-challenging reading task, appeared angrier and less persistent during the task. This finding appears to contradict Vallotton and Ayoub's (2011) finding that children with larger vocabularies had better emotion regulation skills, though their use of the Bayley Scales did not predict what children were doing in challenging moments. In addition, children who spoke more during the task were also much quicker to show anger, showed more anger, and persisted less at the task. This pattern of findings not only failed to confirm the study's hypotheses but yielded an opposite finding. There are two possible interpretations. First, the finding may indicate that children with language skills may use language to express their anger rather than to regulate it and persist at the task. In this case, giving up persisting could be adaptive, as continuing may only yield more negative emotions (Kopp, 1989). An alternative

interpretation may be that children who use their language ability to talk interrupt their efforts to persist. Only temporal analyses of detailed sequences can indicate the order in which these different events occurred, a project that was beyond the scope of the present study.

A third aim of the study was to examine whether specific types of spontaneous speech during the challenging task related to task behavior. In particular, references to internal state, such as labeling emotions felt during the task, and verbalizing about the task situation, such as verbalizing hopefulness (optimism and self-instruction) were examined as potential predictors of task persistence and anger regulation. Unexpectedly, verbalizing optimism and self-instruction were associated with *less* task persistence and, in the case of optimism, more anger. In fact, children who verbalized each of these types of hopefulness expressed more anger and gave up trying to draw the perfect circle sooner than those who did not. This supports the previous finding that children are using their language to cope with their heightened anger. It could also be that children verbalized optimism were asserting themselves with the research assistant (e.g. "This *is* the perfect green circle," "It is round enough,"). Assertiveness may be an appropriate response in this "impossible" situation even though it results in less task persistence.

The results of the present study suggest that language skills and spontaneous speech function differently in four-year-olds than generally conceptualized by theoretical perspectives on the role of language in emotion regulation. The findings therefore raise questions that can be addressed in future research. Future directions could include evaluating the emotion regulation of children with a more distributed range of language abilities, comparing the emotion regulation abilities of children who are and are not

identified as having language difficulties or delays, or comparing the emotion regulation abilities of typically-developing children who are and are not encouraged to speak during an emotionally challenging task.

Future research should also consider some of the limitations of the present study. First, the children were from families economically strained households in rural and semi-rural communities. Socio-economic status and income are known to be related to language development and therefore the generality of these findings may be limited to children from this particular type of background (Dollaghan et al., 1999; Feldman et al., 2000; Rescorla, 1989). The language abilities of the individuals in this population were especially pronounced, as the mean MLU and number of word types were low and a number of participants performed more poorly on the standardized language measures than would be expected in the general population of children this age.

Second, there are many aspects of language and the indices used in the present study may not have fully tapped the skills that best predict the ability to tolerate frustration and persist at a difficult task. Nonetheless, there were several significant findings, albeit contrary to prediction that warrant future research. In particular, it would be important to observe children's spontaneous speech, outside of challenging tasks, in contexts like free play that may be less constraining than a reading task, and to test other domains of language that may better predict expressive language skills, such as a measure of expressive vocabulary.

To further evaluate the findings of this study, it will be necessary to perform temporal analyses of the data. The findings suggested that children were using their language to cope with heightened anger and gave up because of their heightened anger.

Temporal analyses would allow for further analysis of this claim. In addition, it will also be necessary to compare children's abilities in this setting (with a relative stranger) to their abilities by themselves or with their mother to see if language functions differently in different social settings.

References

Andersson, H., & Bergman, L. R. (2011). The role of task persistence in young adolescence for successful educational and occupational attainment in middle adulthood. *Developmental Psychology, 47* (4), 950-960. doi:10.1037/a0023786

Armstrong, L. M. (2011). Emotion language in early childhood: relations with children's emotion regulation strategy understanding and emotional self-regulation. Doctoral dissertation. The Pennsylvania State University, University Park, PA.

Baker, L., & Cantwell, D. P. (1991). Disorders of language, speech, and communication. In M. Lewis (Ed.), *Child and adolescent psychiatry: A comprehensive textbook* (516-521). Baltimore, MD: William & Wilkins.

Bandstra, E. S., Morrow, C. E., Anthony, J. C., Accornero, V. H., & Fried, P. A. (2001). Longitudinal investigation of task persistence and sustained attention in children with prenatal cocaine exposure. *Neurotoxicology and Teratology, 23*, 545–559. doi:10.1016/S0892-0362(01)00181-7

Barber, L. K., Grawitch, M. J., & Munz, D. C. (2012). Disengaging from a task lower self-control or adaptive self-regulation? *Journal of Individual Differences, 33*(2), 76–82. doi:10.1027/1614-0001/a000064

Berk, L. E. (1986). Relationship of elementary school children's private speech to behavioral accompaniment to task, attention, and task performance. *Developmental Psychology, 22*(5), 671-680. doi:10.1037/0012-1649.22.5.671

Berk, L. E., & Potts, M. K. (1991). Development and functional significance of private speech among Attention-Deficit Hyperactivity Disordered and normal boys. *Journal of Abnormal Child Psychology, 19*(3), 357-377. doi:10.1007/BF00911237

Bretherton, I., Fritz, J., Zahn-Waxler, C., & Ridgeway, D. (1986). Learning to talk about emotions: A functionalist perspective. *Child Development, 57,* 529-548. doi:10.2307/1130334

Brown, R. (1973). *A first language: The early stages.* Cambridge, MA: Harvard U Press.

Cicchetti, D., Ackerman, B. P., & Izard, C. E. (1995). Emotions and emotion regulation in developmental psychopathology. *Development and Psychopathology*, *7*(1), 1-10.

Cole, P. M. (1986). Children's spontaneous control of facial expression. *Child Development*, *57*, 1309–1321. doi:10.1111/j.1467-8624.1986.tb00459.x

Cole, P. M., Armstrong, L. M., & Pemberton, C. K. (2010). The role of language in the development of emotion regulation. In S. D. Calkins & M. A. Bell (Eds.), *Child development at the intersection of emotion and cognition.* Washington, DC, US: American Psychological Association.

Cole, P. M., Martin, S. E., & Dennis, T. A. (2004). Emotion regulation as a scientific construct: Methodological challenges and directions for child development research. *Child Development, 75*(2), 317-333. doi:10.1111/j.1467-8624.2004.00673.x

Cole, P. M., Zahn-Waxler, C., & Smith, K. D. (1994). Expressive control during a disappointment: Variations related to preschoolers' behavior problems. *Developmental Psychology*, *30*(6), 835-846. doi:10.1037/0012-1649.30.6.835

Dollaghan, C. A., Campbell, T. F., Paradise, J. L., Feldman, H. M., Janosky, J. E., Pitcairn, D. N., & Kurs-Lasky, M. (1999). Maternal education and measures of early speech and language. *Journal of Speech, Language, and Hearing Research, 42*(6), 1432.

Feldman, H. M., Dollaghan, C. A., Campbell, T. F., Kurs-Lasky, M., Janosky, J. E., & Paradise, J. L. (2000). Measurement properties of the MacArthur communicative development inventories at ages one and two years. *Child Development, 71*(2), 310-322. doi:10.1111/1467-8624.00146

Frauengiass, M. H., & Diaz, R. M. (1985). Self-regulatory functions of children's private speech: A critical analysis of recent challenges to Vygotsky's theory. *Developmental Psychology, 21*, 357-364. doi:10.1037/0012-1649.21.2.357

Fujiki, M., Brinton, B., & Clarke, D. (2002). Emotion regulation in children with Specific Language Impairment. *Language, Speech and Hearing Services in Schools, 33*, 102–111. doi:10.1044/0161-1461(2002/008)

Fujiki, M., Spackman, M. P., Brinton, B., & Hall, A. (2004). The relationship of language and emotion regulation skills to reticence in children with Specific Language Impairment. *Journal of Speech, Language, and Hearing Research, 47*(3), 637-646. doi:10.1044/1092-4388(2004/049)

Gilmore, L., & Cuskelly, M. (2009). A longitudinal study of motivation and competence in children with Down syndrome: early childhood to early adolescence. *Journal of Intellectual Disability Research, 53*(5), 484-492. doi:10.1111/j.1365-2788.2009.01166.x

Goldsmith, H. H., & Rothbart, M. K. (1996). The laboratory temperament assessment battery manual. *University of Wisconsin-Madison: Personality Development Laboratory*.

Harmon-Jones, E., & Allen, J. J. (1998). Anger and frontal brain activity: EEG asymmetry consistent with approach motivation despite negative affective valence. *Journal of Personality and Social Psychology*, *74*(5), 1310-1316. doi:10.1037/0022-3514.74.5.1310

Hart, K. I., Fujiki, M., Brinton, B., & Hart, C. H. (2004). The relationship between social behavior and severity of language impairment. *Journal of Speech, Language, and Hearing Research, 47*(3), 647-662. doi:10.1044/1092-4388(2004/050)

Hauner, K. K. Y., Shriberg, L. D., Kwiatkowski, J., & Allen, C. T. (2005). A subtype of speech delay associated with developmental psychosocial involvement. *Journal of Speech, Language, and Hearing Research, 48*(3), 635-650. doi:10.1044/1092-4388(2005/044)

Hess, C. W., Haug H. T., Landry, R. G. (1989). Reliability of type-token ratios for the oral language of school age children. *Journal of Speech and Hearing Research. 32.* 536-540.

Hess, C. W., Sefrton, K. M., Landry, R. G. (1986). Sample size and type-token ratios for oral language of preschool children. *Journal of Speech and Hearing Research. 29.* 129-134.

Hoza, B., Pelham, W. E., Waschbusch, D. A., Kipp, H., & Owens, J. S. (2001). Academic task persistence of normally achieving ADHD and control boys: Performance, self-evaluations, and attributions. *Journal of Consulting and Clinical Psychology, 69*(2), 271-283. doi:10.I037//0022-006X.69.2.271

Johnson, W. (1944). Studies in language behavior: A program of research. *Psychological Monographs, 56*, 1-15.

Keltner, D., & Kring, A. M. (1998). Emotion, social function, and psychopathology. *Review of General Psychology*, *2*(3), 320. doi:10.1037/1089-2680.2.3.320

Klein, M. R. "Gender differences in young children's expressions of anger and happiness in challenging situations." Honors thesis. The Pennsylvania State University, 2010.

Kopp, C. B. (1989). Regulation of distress and negative emotions: A developmental view. *Developmental Psychology, 25*(3), 343-354. doi:10.1037/0012-1649.25.3.343

Kozub, F. M., Porretta, D. L., & Hodge, S. R. (2000). Motor task persistence of children with and without mental retardation. *Mental Retardation*, *38*(1), 42-49. doi:10.1352/0047-6765(2000)038<0042:MTPOCW>2.0.CO;2

Lewis, M., Sullivan, M. W., Ramsay, D. S., & Alessandri, S. M. (1992). Individual differences in anger and sad expressions during extinction: Antecedents and consequences. *Infant Behavior and Development*, *15*(4), 443-452. doi:10.1016/0163-6383(92)80012-J

MacWhinney, B. (2000). *The CHILDES project: Tools for analyzing talk (3rd ed.)*. Mahwah, N.J.: Erlbaum.

Newcomer, P.L. & Hammill, D.D. (1997). *Test of language development- 3*. Austin, TX: Pro-Ed.

Qi, C. H., & Kaiser, A. P. (2004). Problem behaviors of low-income children with language delays: An observation study. *Journal of Speech, Language, and Hearing Research, 47*(3), 595-609. doi:10.1044/1092-4388(2004/046)

Razza, R. A., Martin, A., & Brooks-Gunn, J. (2011). Anger and children's socioemotional development: Can parenting elicit a positive side to a negative emotion? *Journal of Child and Family Studies*, *21*(5), 845-856. doi:10.1007/s10826-011-9545-1

Rescorla, L. (1989). The language development survey: A screening tool for delayed language in toddlers. *Journal of Speech and Hearing Disorders, 54*(4), 587-99.

Roben, C. K. P., Cole, P. M., & Armstrong, L., M. (2012). Longitudinal relations among language skills, anger expression, and regulatory strategies in early childhood. *Child Development*. doi:10.1111/cdev.12027

Saarni, C. (1999). *The development of emotional competence.* New York: Guilford Press.

Stansbury, K., & Zimmermann, L. K. (1999). Relations among child language skills, maternal socialization of emotion regulation, and child behavior problems. *Child Psychiatry and Human Development, 30*(2), 121-142. doi:10.1023/A:1021954402840

Templin, M. C. (1957). *Certain language skills in children: Their development and interrelationships*. Westport, CT: Greenwood.

Thompson, R. A. (1994). Emotion regulation: A theme in search of definition. *Monographs of the Society for Research in Child Development. 59*(2/3), 25-52. doi:10.2307/1166137

Trentacosta, C. J., & Izard, C. E. (2007). Kindergarten children's emotion competence as a predictor of their academic competence in first grade. *Emotion, 7*(1), 77-88. doi:10.1037/1528-3542.7.1.77

Trentacosta, C. J., Izard, C. E., Mostow, A. J., & Fine, S. E. (2006). Children's emotional competence and attentional competence in early elementary school. *School Psychology Quarterly, 21*, 148–170. doi:10.1521/scpq.2006.21.2.148

Valiente, C., Lemery-Chalfant, K., Swanson, J., & Reiser, M. (2008). Prediction of children's academic competence from their effortful control, relationships, and classroom participation. *Journal of Educational Psychology, 100,* 67–77. doi:10.1037/0022-0663.100.1.67

Vallotton, C., & Ayoub, C. (2011). Use your words: The role of language in the development of toddlers' self-regulation. *Early Childhood Research Quarterly, 26*(2), 169-181. doi:10.1016/j.ecresq.2010.09.002

Vygotsky, L. S. (1962). *Thought and language*. Oxford, England: Wiley.

Winsler, A., Diaz, R. M., McCarthy, E. M., Atencio, D. & Adams Chabay, L. (1999). Mother–child interaction, private speech, and task performance in preschool children with behavior problems. *Journal of Child Psychology and Psychiatry, 40*, 891–904. doi:10.1111/1469-7610.00507

Winsler, A., De León, J. R., Wallace, B.A., Carlton, M. P., & Willson-Quayle, A. (2003). Private speech in preschool children: developmental stability and change, across-task consistency, and relations with classroom behaviour. *Journal of Child Language*, *30*, 583-608. doi:10.1017/S0305000903005671

ACADEMIC VITA

Jacob Feldman

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Education:

The Pennsylvania State University, University Park, PA
Bachelors of Science in Communications Sciences and Disorders, May 2013
Bachelors of Science in Psychology, May 2013
Honors in Psychology, Schreyer Honors College, May 2013

Research Experience:

Development of Toddler Studies (DOTS) Lab, University Park, PA
Undergraduate Research Assistant, Spring 2010 – present
Advisor: Dr. Pamela Cole

- Project investigating the development of emotion regulation.
- Duties
  - Transcribed and coded language during various emotionally challenging tasks
  - Assisted in the development of a coding system for the functional uses of language during developmentally challenging tasks.
- Currently preparing a thesis exploring how children use their language skills to regulate their emotions during a challenging task.

Development of Emotional Competencies in Children with CCN
University Park, PA
Undergraduate Research Assistant, Spring 2012 – present
Advisor: Dr. Krista Wilkinson

- Multi-national collaboration with language researchers, including Dr. Sarah Blackstone.
- Future aims of the lab include piloting a tool for assessing the emotion regulation skills of children with complex communication needs and a publishing a call to action paper.
- Duties
  - Read relevant studies and standardized measures of emotion regulation and provided them to the principal investigators
  - Prepared slides on the relationship between language development and emotion regulation for a presentation at the ISAAC Biennial Conference

Teaching Experience:

The Penn State Department of Communication Sciences & Disorders
University Park, PA
Undergraduate Teaching Assistant, Spring 2012
Advisor: Dr. Krista Wilkinson
Course: CSD 462 (Language Disorders in Children)
Duties: Held twice-weekly office hours, took attendance, and proofread exams.

Work Experience:

Special Equestrians, Warrington, PA
Therapeutic Riding Instructor, April 2009–present

- Contributed over 2,100 service hours lifetime
- Assisted in the development of a program for children with Autism Spectrum Disorders designed to increase social interaction
- Designed and implemented the organization's first annual summer camp in 2009 and have annually overseen the three-week program since.
- Completed the Registered Instructor certification with PATH International in July 2010

State College Area School District, State College, PA
Student Intern, September 2011–December 2011

- Weekly observation of Catherine Connors-Kos, CCC-SLP, in a clinical setting
- Assisted with programming and maintaining AAC technologies and preparing materials for sessions with elementary school students

Presentations:

Feldman, J. I., & Cole, P. M. (In prep). *The role of language in emotion regulation: Evidence from a challenging task*. Poster to be presented at the Pennsylvania State University Undergraduate Exhibition, State College, PA, April, 2013.

Blackstone, S., Wilkinson, K. M., Thistle, J., Rangel, G., Epstein, D., & Feldman, J. I. (2012, July). *Development of emotional competencies in children with complex communication needs: Implications for practice and research.* Presentation offered at ISAAC Biennial Conference, Pittsburgh, PA.

Honors and Awards:

Evan Pugh Scholar Award (Senior)	April 7, 2013
Dean's List	Fall 2009-Fall 2012 (7 Semesters)
Evan Pugh Scholar Award (Junior)	March 18, 2012
Congressional Award Gold Medal	June 25, 2009
President's Volunteer Service Award Gold	Spring 2009