TODDLERS USE OF SYMBOLIC GESTURES IN THE SERVICE OF EMOTION REGULATION

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ABSTRACT

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Although research on young children's emotion regulation has increased in the recent years, there is still little known about how toddlers use both gestures and emerging language for self-regulation. Previous research has shown that as oral language abilities develop children are able to use more proactive regulation strategies, and it has been shown that children can use symbolic gestures to communicate at a younger age than they can use oral language for communication. Therefore it is important to examine children's oral language as well as their use of gestures because it is possible that children may be able to use symbolic gestures to employ proactive regulation strategies at an earlier age. The current study aims to describe toddlers' use of symbols – in the forms of both symbolic gestures and words – to employ complex and diverse regulation strategies. Seventeen toddlers between 11 and 28 months old were observed in a childcare setting where symbolic gestures (aka "infant signs") were used as part of the daily routine. Ninety observations took place during typical routines which could be emotionally evoking and thus could require children to employ coping strategies. Results showed that toddlers use gestures more frequently than words when they were distressed. Further, younger toddlers used significantly more unique regulation strategies when communicating through gestures than they did when communicating through words. Findings suggest that symbolic gestures may provide children with opportunities to employ more regulation strategies than language alone which may ultimately enhance children's abilities to self-regulate.

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INTRODUCTION

Emotion regulation develops throughout early childhood, and supports later successful cognitive performance (Sarason, Sarason, & Pierce, 1990) as well as positive social functioning (English, John, Srivastava, & Gross, 2012); in fact, impaired functioning of emotion regulation can become associated with later psychopathology (Cole & Deater-Deckard, 2009). Given the importance of this domain of development and its relationships to future academic and social skills (Lin, Lawrence, & Gorrell, 2003; McClellend et al., 2007), it is important to understand the development of emotion regulation strategies, as well as to identify ways to support the development of these skills from an early age. Although aspects of regulation begin at birth, the diversity and complexity of regulation strategies develop throughout early childhood as children take on more and more active roles in monitoring, modifying, and guiding their own behavior (Sameroff, 2010). The literature is rich with examples of reactive regulation strategies used by infants (Gianino & Tronick, 1988), as well as broad behavioral strategies used by toddlers for self-regulatory purposes (Mangelsdorf, Shapiro, & Marzolf, 1995). Further, there is a breadth of research on self-regulation in preschool-aged children that indicates that as children develop more advanced oral language skills they are able integrate more advanced regulatory strategies (Stansbury & Sigman, 2000); this is in line with Vygotsky's idea that symbols, most commonly words, are the mental tools that are used by individuals in the process of self-regulation. Though Vygotsky focused on children over three years, toddlerhood is a critical time to examine the role of language in the development of self-regulation as it is during toddlerhood that differences between children's language skills become meaningful and predictive of the future; for example, the language and self- regulatory skills children exhibit in toddlerhood predict later language and

self- regulation skills (McClellend et al, 2007). Further, the toddler years are a period of transition where children are still using many rudimentary regulation strategies because they do not have the language abilities to use more advanced strategies; yet more proactive strategies are emerging as children rapidly develop their language skills and apply these new skills to social-emotional challenges. In addition to words, there are other forms of symbols – specifically gestures – that can serve as mental tools and that may contribute to children's self-regulatory abilities. Importantly, children can use gestures, including symbolic gestures, prior to their use of words (Goodwyn & Acredolo, 2000), thus, these gestures may enable toddlers to use a variety of self-regulation strategies that would otherwise have to wait for words. The current study describes toddlers' use of both symbolic gestures and words as tools for emotion regulation.

CHAPTER 1

LITERATURE REVIEW

Emotion Regulation

Simply defined, emotions are our responses to emotionally evocative events. The ability to regulate our emotions is an important part of the development of self regulation. Emotion regulation is an individual's ability to regulate his/her internal emotional responses to a stimulus, as well as to control his or her own behavior in response to emotions or emotionally evocative events in a socially adaptive way that allows the individual to meet his or her goals (Bronson, 2000). As a construct, emotion regulation reflects the interrelationship of emotions, cognition, and behaviors (Bell & Wolfe, 2004).

Although there are some inconsistencies in the literature in the use of the terms and definitions of emotion regulation and self-regulation, the majority of research uses both terms to characterize the processes involved in coping with heightened levels of negative emotions involved in distress (Kopp, 1989). In addition, self-regulation is used to refer to a broader category of behavior involving a child's adoption of socially appropriate standards of behavior (Kopp, 1982). Therefore, emotion regulation can be seen as a component of self-regulation as it is necessary to regulate emotions in order to behave appropriately. This paper will use the term emotion regulation, with the understanding that the focus of the current study is on children's strategies to cope with events that could be, but are not necessarily, distressing.

Emotion Regulation in Infancy

The development of emotion regulation begins in early infancy, during which natural physiological mechanisms protect a young child from too much stimulation or arousal. Beginning early in infancy, a child may turn his or her head to avoid noxious stimuli (Fox, 1994;

Kopp, 1982), as well as employ other rudimentary regulation strategies such as: self- soothing, which may include nonnutritive sucking, rocking, and rhythmic stroking (Calkins & Hill, 2006; Jahromi, Putnam, & Stifter, 2004; Stifter & Braungart 1995), self-distraction (Braungart-Rieker, Garwood, Powers, & Notaro, 1998; Buss & Goldsmith, 1998), and social referencing (Diener & Mangelsdorf, 1999; Mangelsdorf, Shapiro, & Marzolf, 1995). Kopp (1982) describes the development of self-regulation as starting in early infancy with reactive reflexes - such as sucking or avoidance of a stimulus by turning one's head- and continues to develop into more behaviorally directed strategies such as distraction with a toy during later infancy. One study showed developmental differences in the way infants cope with the stress of interacting with a stranger; 6 month olds were more likely than 12 month olds to use gaze aversion and fussing as their primary emotion regulation strategies, and were less likely than the older infants to use self-distraction (Mangelsdorf, Shapiro, & Marzolf, 1995). Further, motor and perceptual withdrawal decrease with age, which indicates that reactive disengagement is more typical of very young infants (Gianino & Tronick, 1988). Additionally, Gianino and Tronick found that attending to objects as a coping strategy increased from 3 months to 6 months and from 6 months to 9 months of age (1988), further indicating that more advanced behavioral and proactive strategies develop with age.

Despite the regulatory capabilities of infants, they still depend on their caregivers to provide many coping strategies, especially during very distressing situations. One study found that 12 month old children were more able to overcome stress and regulate their behavior when their caregivers were available to support them than when their caregivers were asked to complete another task (Bridges, Grolnick,& Connell, 1997), suggesting that during the first year of life children are dependent on their caregivers' involvement in the process of regulation.

Furthermore, research shows that the more distressed the infant becomes the more he or she depends on the caregiver to provide regulation strategies (Grolnick, Bridges, & Connell, 1996). Schaffer describes the development of self-regulation as a gradual shift from a dyadic regulation to self-regulation (1996). That is, a child cannot develop sufficient self-regulatory capacities on his/her own, but must learn from the models provided by their caregivers through interaction during emotional events. Similarly, Sameroff (2010) explains the internalization of self-regulation strategies as a transmission of primary responsibility of regulation from the caregiver to the child in his Transactional Model of Development. As an infant, the role of the child in his or her own regulation is small; he depends on his environment to help him regulate. However, as children approach toddlerhood they are gradually able to take more responsibility for their own self-regulation (2010).

Emotion Regulation in Toddlerhood

Beginning in toddlerhood**,** children become capable of intentional, goal-directed behavior (Kopp, 1982), which provides them with the ability to control their actions and reactions to a situation in order to accomplish a particular objective. As children approach toddlerhood they begin developing more complex skill sets that play a critical role in the development of self-regulation, including the awareness of social expectations of behavioral control (Kopp, 1989), effortful control (Posner & Rothbart, 1980), and representational or symbolic capacities (Vygotsky, 1978). These emerging capacities make it possible for the child to use several different kinds of proactive strategies for regulating their emotions (e.g., behavioral, symbolic, attentional), though the child may still be limited by his or her language abilities (Kopp, 1982).

As toddlers come to understand the causes of emotional distress, they may use intentional strategies aimed at changing or eliminating the cause of distress as opposed to reactive strategies

such a self-soothing. A study by Grolnick et al., found that active engagement with toys, a form of distraction, was the most frequently used behavioral strategy by 2-year-olds (1996), whereas physical self-soothing (i.e., sucking, rocking and stroking) – a strategy common in infancy – was used minimally by 2-year-olds. Mangelsdorf et al. (1995) reported an increase in self-directing as well as behaviors intended to direct the attention or actions of others (i.e., vocalizations with a strong commanding tone or pointing) during toddlerhood, and also found that both 12 and 18 month olds engaged in more avoidance behavior, such as looking away from a stimulus and self-distraction than 6-month-olds.

It is typically between 12 and 18 months of age when oral language is emerging. According to Vygotsky, language is the key psychological tool needed for "adult-like" self-regulation, which can be conceptualized as more complex and advanced means of self-regulation. Many mature self-regulation strategies require language to manipulate and express feelings, needs, and concerns, as well as a method of getting needs met directly through explicit communication such as requests (Cole, Zahn-Waxler & Smith, 2010). One study looking at emotion regulation in toddlers found that 18-month-olds engaged in greater other-directing and information-seeking than did 12-month-olds. The specific strategies employed included seeking information from their caregivers about the stimuli and verbally directing the caregiver, indicating the important role language plays in developing more mature regulation strategies, even relatively early in toddlerhood (Parritz, 1996).

Kopp's (1982) work shows that, between 12 and 18 months of age, children are able to recognize and respond to active guidance from a caregiver, which is an important antecedent to mature self-regulation, that is, the ability to use more complex and advanced means of self-regulation. As children develop receptive language, caregivers rely more and more on language

as a means of soothing, prohibition, and guidance (Kochanska, Coy & Murray, 2001). The child's ability to respond to constraints and guidance on his/her actions that come from others is an important stage in the development of self-regulation, because children must be able to respond to guidance from others before they can respond to such constraints and guidance that come from themselves (Diener & Manglesdorf, 1999).

Previous research on toddler's emotion regulation has focused mainly on a few general categories that group many more specific strategies together. Further, past research has not distinguished between children's verbal and non-verbal regulation attempts. In a study by Braungart and Stifter (1991), all of the toddlers' regulation strategies were coded as one of the following: other-focused, which includes any attempt to engage the parent or another individual, object (toy)-focused, which generally includes any behaviors directed at an object, and self-distraction, which included strategies such as self-soothing, gaze aversion, and motor activity. Additionally, Grolnick, Bridges, and Connell (1996) focused on three strategies that toddlers use to regulate distress: shifting attention from arousing stimuli, comfort or reassurance, and maintaining or increasing focus on the distressing stimulus. Although most regulation attempts made by toddlers can easily be grouped into a few categories, each of these categories may contain important sub-strategies, such as initiating or participating in their own regulation and using self-reflexive strategies, which may be overlooked when all regulation strategies are grouped into broad categories. Further, while these broad strategies may each include the use of language, the specific roles of language in utilizing these emotion regulation strategies has not been described.

Self-regulation in Preschool

During the transition from toddlerhood to the preschool period, much of the research on regulation shifts from an emphasis on *emotion regulation* to a more broad examination of self-regulation, with a focus on executive function skills. As children's repertoires of oral language expand, they are able to use the words that have been provided by caregivers as models or supports in the process of regulating their behavior and emotions (Sameroff, 2010); this is most evident at the preschool age.

Previous research looking at self-regulation strategies in preschool age children has primarily focused on four categories of coping strategies: comforting behaviors, instrumental behaviors, distraction behaviors, and cognitive reappraisals (Grolnick et al., 1996; Stansbury & Sigman, 2000), these strategies include the use of both verbal and non-verbal behaviors and have been modeled by caregivers as acceptable ways of coping with distress. Comforting behaviors have been defined as seeking comfort from a caregiver and self-soothing (Manglesdorf et al., 1995), self-reference or mother reference (Cournoyer & Trudel, 1991), and physical self-comforting (Raver, 1996). Research shows that although some comforting strategies are used by preschool age children, these strategies decrease with age (Mangelsdorf et al., 1995; Stansbury & Sigman, 2000), as children become capable of using more sophisticated regulation strategies. Instrumental strategies serve to eliminate the source that is causing frustration; instrumental strategies can take many forms such as a physical action to overcome the problem, or a verbal objection or request (Stansbury & Sigman, 2000). According to Kopp, instrumental regulation strategies are possible prior to the development of oral language, but increase as children's language skills mature (1982). Distraction is a strategy used to focus attention on something other than the negative situation. This strategy may develop from basic gaze aversion to more voluntary or proactive distraction behaviors, such as active engagement with a substitute toy

(Stansbury & Sigman, 2000). Another advanced strategy is cognitive reappraisal in which children try to rethink or reinterpret a negative situation in a more positively, (McCoy & Masters, 1985; Stansbury & Sigman, 2000) for example, children may rethink the situation by using compromises or bargains, during which a child may use self-directed speech. Cognitive reappraisal is considered to be a more complex strategy because it requires children to use language to discuss justifications and make predictions with others or themselves. Although it was been proposed that cognitive reappraisals would only be seen in older preschool children, Stansbury and Sigman (2000), found that children as young as three were able to use cognitive reappraisals, indicating that by age three children may have the ability to use self-directed speech to implement other self-regulation strategies. .

Vygotsky (1978) focuses on the development of self-regulation during the preschool years when there is a shift in the use of language, from language being used by the child primarily for communication with others, to language also being used by both the child and others to regulate the child's behavior. Vygotsky proposed that a child learns by "co-constructing" and internalizing the tools that are modeled or taught by caregivers. These tools include language and other symbolic aids to communication and thought (Vygotsky 1962, 1978). Evidence of this process of the internalization of language often comes from observing children's self-directed speech. Self-directed speech can be seen as an important link in the internalization process as the child's behavior goes from being regulated by the speech of caregivers, to being regulated by the child's own overt self-directed speech, and finally by the child's private speech (Berk & Winsler, 1995; Diaz & Berk, 1992). Initially, a child uses self talk by talking out loud to themselves. For example a child may say to themselves, "It's ok" or "Try again," using the same words they have heard previously from a caregiver who was helping them regulate their

emotions or behavior. As the child matures cognitively, he learns to manipulate his feelings and behavior without external speech. During this process, self-talk becomes indistinguishable from thought and is known as private speech (Vygotsky, 1978). The caregiver's regulatory speech has thus been internalized, and the child understands the meaning of his own self-talk and is able to manipulate his own thoughts, feelings, and behavior using these symbols. While Vygotsky (1978) focused solely on use of oral language for self-regulatory self-talk, children are capable of other forms of symbolic behavior prior to speech; thus, one may wonder whether children may be able to use other types of symbols for this same type of advanced self-regulatory processes that are seen in preschool children, at an earlier age.

Language as a Tool for Self-regulation

Language abilities have been shown to predict how well preschool age children cope with frustration (Cole et al., 2009; Ponitz et al., 2009). Yet, there is limited research looking at toddlers' language in relation to self-regulation. The existing literature does provides some evidence that language and self-control are positively related at 24 months (Cournoyer, Solomon, & Trudel 1998), and that oral language skills predict toddlers' later self regulation, when controlling for general cognitive skills (Vallotton & Ayoub, 2011). These results provide evidence that even for young toddlers, language skills help children regulate their own behavior, and suggest that children are better able to regulate their behavior as their oral language skills grow. Cole et al. (2010) proposed that expressive language provides children with a means to communicate their needs in a socially acceptable way, and that language also helps children understand their own internal states. Although toddlers are able to use oral language, they may have limited ability to do so because oral language is a relatively new skill that is still developing, and may not be ready to be applied to the task of self-regulation (Cole, Armstrong,

and Pemberton, 2010). Further, for toddlers, it can be particularly difficult to draw upon a new skill when they are upset. However, given that children can use other symbols during the toddler years, including gestures, it may be easier for children to use these other symbols as tools for emotion-regulation in distressing circumstances.

When considering the roles of language in self-regulation, it is important to consider the basic functions of language. Language is both symbolic representation and communication; that is, with language, individuals represent concepts symbolically in their minds, and use the symbols for the purpose of communicating with others. Symbolic representation allows for the separation of the meaning of an object from the object itself (Werner & Kaplan, 1963). Through symbolic representation we can begin to process new ideas by labeling them. Symbolic representation is how an individual distinguishes one thing from another in their mind, organizes concepts into groups or categories, and connects new ideas to existing ones (Werner & Kaplan, 1963). Another important function of symbolic representation is that it gives an individual the ability to recall past events, anticipate future events, and make plans (Werner & Kaplan, 1963). For example, once an individual has a symbol for an emotion, he or she can recognize that specific emotion, and can eventually connect it to its causes or solutions; thus, symbols support the development of advanced self regulation strategies. Through symbolic representation, a child develops an initial understanding of concepts related to emotions and, most importantly, is able to change or build upon this basic understanding of emotions by manipulating these concepts in their minds (Werner & Kaplan, 1963), as well as using this understanding to guide their own behavior. For example, through this manipulation children are able to recognize feelings of sadness and anger in others as well as themselves, and subsequently place these emotions into categories upon which they can apply their existing knowledge.

The other function of language – communication – can also support self regulation. First, communication provides an essential framework for self-regulation; it is through our communication with others that we use social cues to adapt our behavior to new situations (Feinman, 1982). Also, communication allows us to request comfort from others, and communication from others can offer reassurance during distressing situations. Further, communication gives children the ability to negotiate with others and develop acceptable outcomes during emotionally demanding situations (Cole et al., 1996). Communication is also essential for the regulation individuals receive from the environment; as an active participant in his or her own regulation, a young child can use communication to obtain assistance from caregivers in regulating their emotions and behavior (Greenberg, Kushe, & Speltz, 1991; Sameroff, 2010). As children develop cognitive and language skills, they take on greater and greater responsibility in the regulatory interactions with the caregiver (Sameroff, 2010); they fulfill part of that responsibility by using communication to request help, and guide the interaction. Finally, it is partially through communication that children learn new strategies from others' to manipulate their thoughts, feeling, and behavior in order to achieve a desired outcome.

Modalities of Representation and Communication

Gestures, as well as spoken words, can both be used to fulfill the two functions of language – representation and communication - and these two modes work together in a single system (Goldin-Meadow, 2005). Gestures develop first in a child's system of communication (Crais, Douglas, & Campbell, 2004; Tomasello, 2007) and symbolic representation (Goodwyn & Acredolo, 1993; Bates, 1976; Werner & Kaplan, 1963). Gestures are actions produced with the intent to communicate and are usually expressed using fingers, hands, and arms (Iverson and Thal, 1998), as well as the head (Guidetti, 2005). Preverbal children typically use gestures to

communicate; pointing, in particular, is a universal gestures used by children across cultures (Liszkowski et al., 2011), and even used by the blind (Iverson, Tencer, & Lany, 2000; Liszkowski et al., 2011). Gestures that are most common in a child's environment, such as pointing and waving, typically appear first in his/her gestural repertoires (Fusaro & Vallotton, 2011). Pointing is usually one of the first gestures to emerge, and this is typically seen around 9 to 10 months of age (Crais, Douglas, and Campbell, 2004). Children also learn some culturally conventional gestures, for example, thumbs up or head nodding, which are culturally specific gestures that can be used as a replacement for words in many social contexts (McNeill, 1998). Further, children are also capable of using symbolic gestures, which are gestures that establish a shared reference or idea in the absence of the referent (Werner & Kaplan, 1963). In fact, preverbal children can actually invent symbolic gestures; typically developing children can invent and use gestures to represent and communicate concepts prior to oral language (Bates, 1976). According to one study, most preverbal children invent one to five symbolic gestures prior to the onset of oral language; these gestures can represent objects, events, desires, and conditions (Acredolo & Goodwyn, 1988).

Symbolic Gestures as Tools for Self-regulation

Gestures can give children the tools to do more than just indicating an object (e.g. through pointing or showing) or expressing refusal or agreement (e.g. through head nods or shakes). Children are able to use symbolic gestures that they have invented or that they have learned from caregivers' modeling, to communicate about a wide range of concepts including objects, future events, requests, emotions, and time concepts. By one year of age, infants can use symbolic gestures to label specific objects and to communicate requests and observations (Acredolo & Goodwyn, 1988). These gestures give children the tools to manipulate and modify

their environment. In one study, it was documented that preverbal children were not only able to communicate about their own internal states - which included sadness, anger, hurt, sleepiness, and fear - through the use of symbolic gestures, but by fifteen months of age, they were also able to converse about others' emotions (Vallotton, 2008). The ability to use gestures to converse about emotions demonstrates that very young children have the ability to represent these concepts and effectively communicate them to a caregiver. Also, by commenting about others' emotions, we see the beginning of empathy which is important to the development of emotion regulation because children begin to realize what gives rise to their own or someone else's mental states, and how these states might be changed (Bretherton, Beeghly, 1982).

Given that children are able to use symbolic gestures, and that they can use them to represent concepts they may not yet be able to verbally communicate, we may wonder whether children can use symbolic gestures for the purpose of self regulation. There is some evidence that children can use other types of gestures for self regulatory purposes. Currently, two studies have looked at the self-regulatory function of common gestures in young children; these gestures included the use of a headshake (Pea, 1980) and pointing (Rodriguez & Palacio, 2007). In the first study, Pea describes the use of a headshake by toddlers as a form of self prohibition. He describes the process in which a child approaches a previously forbidden object or begins to act in a forbidden way, and responds to his own actions with the headshake or "no" gesture (1980). During these instances the child is acting out the typical role of the caregiver by instructing themselves that they should not continue what they are doing. In the second study, a child is documented using gestures during a problem solving task (Rodriguez & Palacio, 2007). The toddler in this study used the same gestures – pointing and showing – that were previously modeled by a caregiver as a private gesture to communicate to herself while trying to solve the

problem (Rodriguez & Palacio, 2007). By using the pointing and showing gestures, she regulated her behavior and completed the task without the aid of a caregiver. Both cases reveal that preverbal children are able think "out loud" using gestures, specifically using the behaviors that have been modeled by their caregivers, which they have internalized.

Some qualitative anecdotes have indicated that infants who use symbolic gestures can use them in the process of emotion regulation. Vallotton (2009, 2011) documents children using symbolic gestures as a tool of prohibition, self monitoring, and planning. Children in these qualitative anecdotes were able to remind themselves that an object was hot, prohibiting themselves from touching it, as well as reminding themselves to be gentle with their peers, and reminding themselves that their parents would come back to pick them up from childcare during a specific activity later in the day. Each of these examples shows that preverbal children understand the meaning of the gestures, and apply them to the task of self- regulation of their emotions and behavior in socially appropriate ways. However, the evidence is limited to a few examples, focusing on circumstances in which children are not visibly upset, and there has been no systematic examination and documentation of the use of symbolic gestures in the process of emotion regulation when children are in fact distressed. Thus, the current study adds to these previous studies by examining the self-regulation strategies that toddlers can employ through symbols – including both words and gestures.

Current Study

In sum, research has shown that as children develop more advanced language skills they begin using more mature regulation strategies. Symbolic gestures can serve the same functions as oral language, yet develop at an earlier age. Therefore, it may be possible for toddlers to use symbolic gestures as a tool for self-regulation. However, this use of symbolic gestures has not

been systematically investigated, and it is possible that toddlers are not yet developmentally ready to use symbols in any form in the service of self regulation. The current study focuses on both gestures and words because toddlerhood is a period of transition in which typically developing children begin to use of symbols, and move from using primarily preverbal to primarily verbal means of communication. This study aims to reveal the strategies toddlers use to regulate their emotions and behavior while interacting with caregivers in situations that may be emotionally evocative, as well as to provide a detailed look at the differences in regulation strategies in different modes of communication: gestures and words.

Research Aims:

1) Describe the emotion regulation strategies toddlers use via symbolic gestures and words during distress in childcare.
2) Determine whether children are able to employ a wider variety of emotion regulation strategies via gesture than via words when they are distressed.

CHAPTER 2

METHOD

Sample

Participates in this study were recruited from an infant and toddler program at a university laboratory school. Seventeen toddlers participated in the study, 8 males and 9 females. The children in the study were between 11 and 28 months of age through the span of the study, and were each observed multiple times over a period of 3.5 months. Although this infant/toddler program was open to the entire community, priority was given to university staff and students, thus, many of the children and their families were members of the University community. Further, though the incomes of this sample varied widely there was a high level of maternal education.

Procedure

Use Symbolic Gestures. Caregivers were head teachers and college students studying child development. They were taught to use symbolic gestures in combination with spoken words when communicating with the children. Caregivers were given a list of gestures to be used, and this list was also sent home to parents. Head teachers in each classroom modeled the use of symbolic gestures. Posters were also placed strategically around the classroom to remind caregivers to use infant signs in specific routines (e.g. descriptions of the symbolic gestures for "eat," "more," and "all done" were placed in the snack area; descriptions of the symbolic gestures for "diaper," and "wash hands" were placed near the diaper area). Children each spent approximately 12 hours per week in the classroom; however, overall exposure to the symbolic gestures was not standardized as use of symbolic gestures likely varied between the caregivers assigned to each child. Infants were never formally instructed or tested on their use of infant signs, they learned through informal interactions and modeling by caregivers.

Observations. Research assistants were instructed to video-record children during normal program routines. Toddlers were recorded during regularly occurring situations that could be distressing; these included separation from parents, diaper changes, and spontaneously occurring distress such as conflicts between children, injury on the playground, or a bout of spontaneous separation anxiety. Although diaper changes do not have to be distressing in high quality relationship based programs, it is possible that children experience distress during diaper changes because they may involve an interruption in the child's play, and diaper changes can also involve unpleasant physical sensations, particularly for children with high sensitivity. In most observations children were interacting with a caregiver, with rare exceptions during the first few moments of the spontaneous distress events. In the case of separations and diaper changes, videographers shadowed each child who was pre-selected to be filmed that day, and began filming at the cue of the caregiver, prior to the anticipated situation, and continued recording until the child had resolved any distress and resumed normal play. Videotape lengths ranged from 0.5 to 19 min (*M*=5.29 min). Each child was videotaped between two and nine times over the course of 3.5 months (M = 5 times).

Transcription and Coding

Transcription of words and events. Transcripts were created to represent multiple aspects of the interaction that was video-recorded, from start to finish. Caregivers' and children's words were transcribed verbatim, and the timing of each conversational turn was captured by marking the time of each phrase or event related to the time on the video. Relevant events were also recorded, with time markers, as part of the sequence of the interaction. Events included changes in location, as well as physical actions by the caregiver and children that were relevant to the conversation, and actions of others in the area to which the child or caregiver may respond.

Gesture coding. As part of the curriculum, caregivers were taught the gestures for particular objects, actions, emotions, etc. (see Appendix A for a complete list of gestures and their descriptions), which they modeled for the children and the children learned over time. Coders recorded each gesture (e.g. point, headshake, symbolic gesture for "mom" or "eat") used by the child throughout the episode. In order to be coded, a symbolic gesture had to be identified as one of those used in the curriculum to represent a particular concept; otherwise coders would indicate that the child gestured, but that the gesture type was "unknown." Many gestures involve repetitive motions; if a child repeated a gesture for longer than 3 seconds, the coder would record that gesture a second time as a separate gesture (i.e., two gestures).

Affect coding. Affect codes refer to the child's emotional state throughout the episode. In order to follow the child's reactions, the following categories were developed to provide a basis for tracking subjects' transitions through varying levels of distress. Positive affect was coded when the child was showing clear signs of joy, either by smiling, laughing, or other excited body movements. Neutral affect described the child's state when she was neither visibly happy nor upset. Negative affect was scored when a child expressed physical cues indicating s/he was upset. Signals of negative affect could be subtle such as a lip protrusion (pout), eyebrows oblique (slanted down), eye rubbing, or expressive movements of the arms or legs (i.e., throwing hands down). Oral cues were also used as signals of distress, such as whimpers, crying, or sobbing. Inter-coder Kappas for affect averaged 0.78.

Communicative context coding. Ninety transcripts were coded specifically to examine the use of symbolic gestures and words as aids in regulatory interactions. The coding system captures the communicative purpose of each gesture or word by a child with their caregivers, peers, or with themselves. Each communication attempt was coded with a communication

context code. This event-based coding system was designed to examine the types of regulatory processes in which young children may be able to engage during interactions with their caregivers, according to the theories of Vygotsky (1978) and Sameroff (2010). For example, Vygotsky proposed that children reflect on their own emotions and behavior, therefore the code Self-Reflexive Dialogue (SRG) was created to show children's self-reflexive behaviors. Sameroff proposed that children begin to take a more and more active role in regulatory interactions; even intentionally modifying others' behavior, thus the code of Change/Control Behavior (CSB) reflects children's use of gestures and words to control someone's behavior. Additionally, Vygotsky proposed that children internalize the meaning of symbols through participation in interactions and routines, and Sameroff proposed that children learn regulation strategies through active participation in interactions with caregivers, therefore the code Participate in Coping Routine (PCR) was created to capture children's participation in caregiver-guided coping routines. Once children have internalized the regulatory behaviors of their caregiver they begin to take responsibility for their own regulation, therefore the code Initiate Coping Routine (ICR) was created. Previous research suggests that children use distraction as a form of self-regulation, but we cannot assume that self-distraction is the goal of this behavior, so in order to take a more conservative approach the codes Discussing Something Inside the Immediate Situation (AIS) and Discussing Something Outside the Immediate Situation (AOS) were created to capture this behavior. In most cases, the same gestures and words used by children for each of these strategies were those modeled previously by caregivers as they were helping the child to regulate his or her emotions and behavior, and subsequently become the children's own self-regulatory behavior which reflects the theories of Vygotsky and Sameroff. Table 1 provides the name, description, and examples for each communication context code.

Table 1. Communicative Context Codes

Description	Example	Code
Initiate coping routine	Ask to sing a song; request the caregiver to read a book	ICR
Participate in coping routine	Sing a song that was previously initiated	PCR
Discussing something within the immediate situation	Pointing to wipes while having a diaper change	AIS
Attempt to change or control someone's behavior	Saying "no" when a caregiver is trying to change their diaper; ask to go outside instead of change diaper	CSB
Discussing something outside of the immediate situation	Requesting snack while getting diaper changed; Point out another child's emotional expression	AOS
Self-reflexive	Reminding themselves that a parent will be back later	SRG
Other	No other code applies	OTH
Can't Tell	Can't see or distinguish a gesture or word	CN

Three coders established inter-coder agreement using Cohen's Kappa prior to coding the episodes independently. Cohen's Kappa was used because it accounts for agreement occurring by chance, whereas, percent agreement does not account for chance (Bakeman & Gottman, 1987). Coders achieved a Kappa of .75 or above on 3 consecutive episodes before beginning to code independently (Bakeman & Gottman, 1987). Upon reassessment of 10% of all tapes, coders achieved Kappa scores of .79 and above, with an average was (.97) and a range of (.83- 1.0).

Variables

*Total Communication Strategies***.** For each of the communicative context codes, I created three variables to describe how they were used via each of three communication modalities: gesture, words, and gesture + words. These variables are summaries per episode. These variables allowed for the comparison of the total number of strategy attempts children used in each modality within each episode.

Unique Communication Strategies. A series of binary variables were created to indicate whether or not each unique code was employed via each modality in each episode. Subsequently, three continuous variables were created to indicate the number of unique strategies expressed via each modality by combining these binary variables, resulting in the following variables: total unique strategies used via gesture, total unique strategies used via words, and total unique strategies via gesture + word. These variables allowed for the description and comparison of the variety of strategies children used in each modality across episodes.

CHAPTER 3

RESULTS

Descriptive Data

In order to examine the toddlers' use of symbolic gestures during distress, 17 children were followed for 3.5 months, yielding 90 usable videotaped episodes. Table 1 provides descriptive information from all of these episodes. Of the 90 episodes collected for this study, 73 included gesture or talk from a child. Further, of those 73 episodes, 36 included visible or audible signs of distress from the child, as indicated by negative affect or negative vocalizations (i.e., whining or whimpering), and 37 of these episodes included no visible or audible signs of distress.

Table 2. Episode and Child Descriptive Information

	N		Child Age Mean (SD)	Episode Length Mean (SD)
Total Children	17			
# Females		9		
# Males		8		
Total Episodes	90		19.01 (3.99)	5.29 (4.69)
# with Females		52		
# with Males		38		
Total Episodes with Gestures and/or Words	73		18.51 (3.97)	6.4 (4.44)
# communication attempts		825		
# gestures only		547		
# gestures and words		190		
# words only		88		
Episodes that include Distress	36		18.57 (4.73)	7.38 (4.46)
#communication attempts		498		
# gestures only		364		
# gestures and words		96		
# words only		38		
Episodes that do not include Distress	37		18.45 (3.47)	5.5 (4.41)
# communication attempts		327		
# gestures only		183		
# gestures and words		94		
# words only		50		

Toddlers' Regulation Strategies in Two Communicative Modalities

The first goal of the study was to describe the regulation strategies toddlers use through two communication modalities – gestures and words – when they are in distress. Thus, only episodes including child distress were used for analyses. To address this aim, I examined the frequency of each strategy used in each modality. Results show that when children are in distress, their communication attempts consist of 69% gestures, 7% words, and 24% gestures and words combined. In order to better understand how children use the regulation strategies, qualitative anecdotes are provided below to demonstrate the use of the different regulation strategies. Examples were transcribed verbatim, using notes from the observer to describe actions. In order to respect children's confidentiality, names were changed, however gender and age are consistent with the transcripts.

As Clara (20 months) watchers her mother leave, she begins to whimper as she looks silently out the window. Clara's caregiver says "It's hard to say goodbye to mom today, it's hard" and tries to take her over to play with other children. Clara begins to sob while saying "No, no, no" (coded as CSB). The caregiver says "You don't want to play?"Clara signs "Book" by opening and closing her hands (coded ICR). Her caregiver responds "You would like to look at the book with pictures of your family?" Clara replies "Uh huh" and nods her head (coded as AIS).

As Sean's (18 months) caregiver lifts him on to the diaper changing table, Sean begins saying "No, no, no" (Coded as CSB) and begins to cry, saying "Mommy, Mommy" (coded as AOS). His caregiver says "You are thinking about your Mommy? She will be back later." Sean becomes more upset and begins yelling. His caregiver begins singing Twinkle Twinkle Little Star, he stops crying and signs "Star" as he hums with her (coded as PCR).

Ella (17 months) is waving goodbye to her mother. She becomes upset and starts pulling at the gate and saying "Mom" (coded as AOS). Her caregiver says "Mommy has to go bye-bye but she'll be back later (signs later). Ella points at the gate (coded as AIS) and her caregiver says "we have to wait a few more minutes for everyone else to get ready to go outside and play (signs play). Ella walks back toward the gate and signs "Wait" (coded as SRG) as she stands quietly waiting for her class to get ready to go outside.

Donovan (15 months) begins to cry has his mother leaves the classroom. He points to his cubby (coded as AIS), where there is a picture of his family and pets. His caregiver asks "Would you like to get your picture out of your cubby?" They walk to his cubby and he signs "Dog" (coded as ICR) and he removes the picture of his family and they begin talking about his pets.

Eleanora (13 months) is crying as her caregiver lifts her onto the changing table. Her caregiver tells her "It's going to be cold (as she signs "Cold") while talking about the wipes, and Eleanora signs "Cold" (coded as PCR) as they begin their routine of talking about how the wipes are cold. Her caregiver starts to sing a song and Eleanora shakes her head (coded as CSB), her caregiver stops as Eleanora points to another child playing with a train and says "Choo choo" (coded AOS).

Joey (24 months) becomes upset as other children's parents begin to arrive at the end of the day. He points out the window (coded as AOS) and signs "Mom" (coded as AOS) repeatedly. His caregiver says "You're thinking about Mom? She's going to come from that gate to see Joey". He points to himself and signs "Wait" (coded as SRG).

As demonstrated in the qualitative anecdotes above, toddlers can use words and symbolic gestures in a variety of ways during distress. To examine the most common strategies for which toddlers use these symbols in the transcribed episodes, Figure 1 shows the frequency of each strategy employed via gesture, talk, and gesture + talk during distress. Results show that when toddlers are distressed, they most frequently use the gesture-only communication mode when employing each regulation strategy. Children use gesture + words in combination more often than words alone when using all strategies except for Controlling or Changing Someone's Behavior (CSB) and Self-Reflexive (SRG). The majority of the time the CSB code was used with words was when the child was saying the word "No", and was almost always in response to the caregiver.

Figure 2 displays each modality separately, and shows the percent of instances of using each modality that were in the service of each regulation strategy. Results show that children are able to employ most strategies in each modality, yet there is a varying degree in which children employ each strategy through different modalities. Panel A presents evidence that gestures

provide more flexibility than the other modalities, which is reflected in a more even distribution of regulation strategies. Whereas, Panel B shows that when children use words, they are attempting to control someone else's behavior more than 40% of the time. Further when children are using gestures + words (Panel C), they are employing the strategy discussing something inside the situation 60% of the time, and never using self-reflexive strategies.

In order to determine which gestures children were using most frequently, I examined the specific gestures children used when using the gesture only and gesture + talk modalities (Table 3). Results show that about 55% of the gestures children used when using gestures alone to communicate were conventional or ubiquitous gestures (i.e., pointing, head nodding, head shaking, clapping, and waving), consequently, 45% were symbolic gestures. These percentages changed slightly for the gestures used in the gesture plus talk modality, with 63% of gestures being conventional or ubiquitous, and 37% symbolic gestures modeled specifically by caregivers in this environment. Examination of Table 3 reveals that the biggest difference in the gestures + words modality were the more common use of clapping, and the more common use of head gestures indicating agreement or disagreement. Thus, in the gesture only modality, children used more modeled symbolic gestures, and fewer conventional gestures than they did when they combined gestures with words.

Figure1. Raw Frequencies of Toddler Regulation Strategies

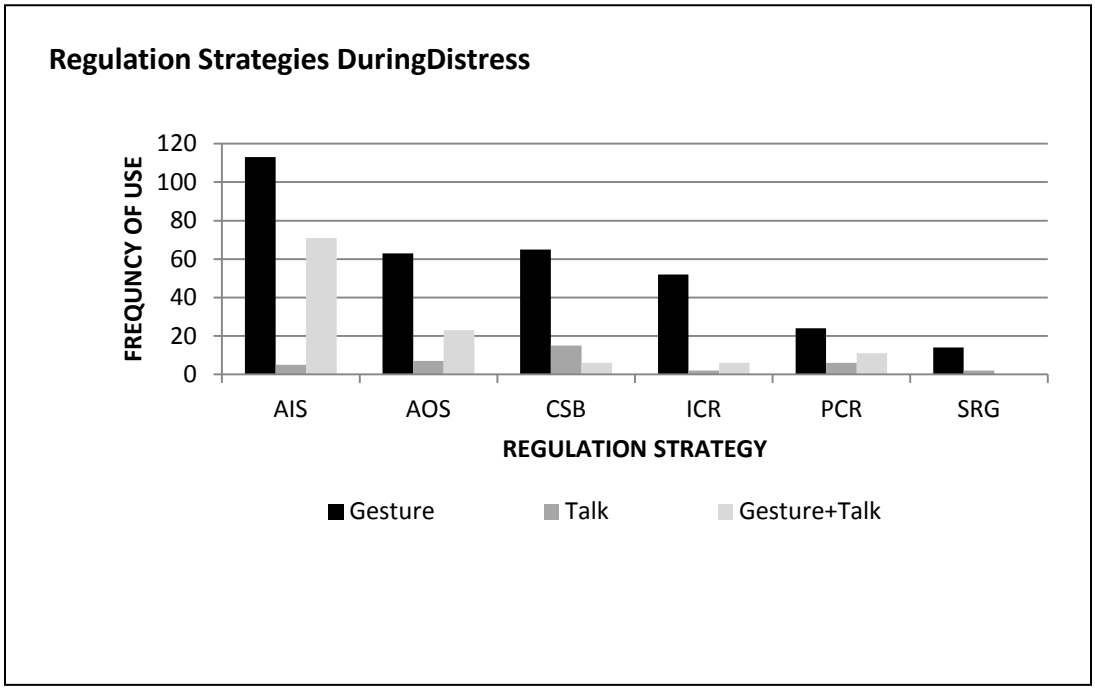

Figure 2. Percent of Regulation Strategies used in Each Modality

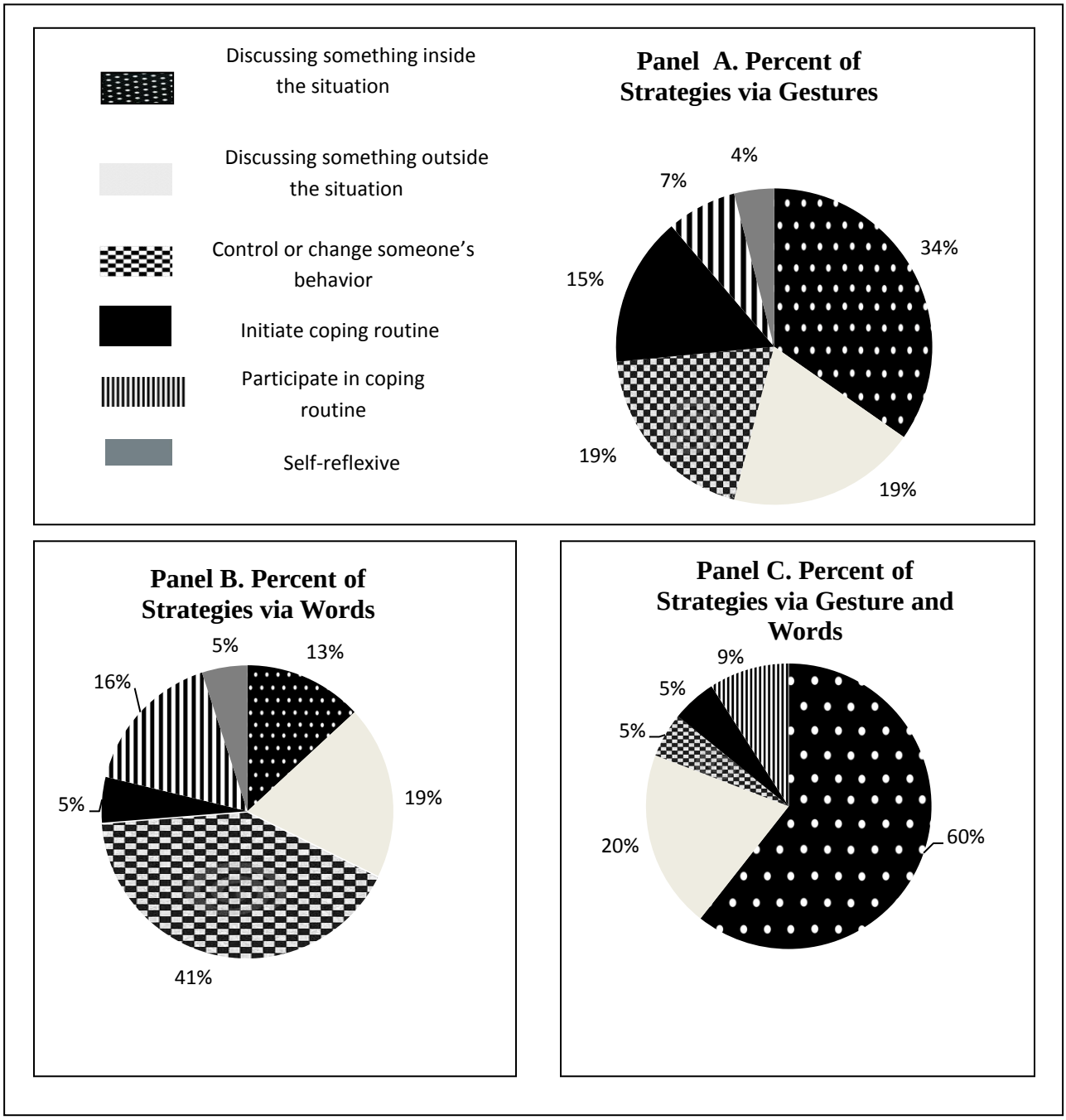

Table 3 Gesture Type used in Each Modality				
	Gesture Only		Gesture +Word	
	Frequency	Valid Percent	Frequency	Valid Percent
Ball	1	0.3	2	2.4
Bottle	25	7.4	0	0.0
Clap	10	2.9	4	4.8
Cold	1	0.3	5	6.0
Cry	3	0.9	0	0.0
Dad	2	0.6	5	6.0
Diamond	1	0.3	0	0.0
Diaper	7	2.1	3	3.6
Dog	2	0.6	1	1.2
Head nod	6	1.8	2	2.4
Headshake	5	1.5	7	8.4
Hear	1	0.3	0	0.0
Mom	28	8.2	6	7.2
More	1	0.3	0	0.0
Outside	7	2.1	0	0.0
Play	7	2.1	0	0.0
Point	138	40.6	34	41.0
Pops-time	2	0.9	4	4.8
Sad	11	3.2	1	1.2
Scared	3	0.9	0	0.0
Shake	2	0.6	0	0.0
Snake	9	2.6	0	0.0
Star	6	1.8	0	0.0
Stop	0	0.0	1	1.2
Touch	1	0.3	0	0.0
Wait	11	3.2	0	0.0
Wash hands	5	1.5	2	2.5
Wave	29	8.5	5	6.0
What	2	0.6	0	0.0
Where	2	0.6	0	0.0
Unknown	10	3.0	1	1.2
TOTAL	338	100	96	100

Regulation Strategy Use via Gestures and Words

The second goal of the study was to determine whether children are able to employ a wider variety of emotion regulation strategies via gesture or via words when they are distressed.

Only episodes in which children were distressed were included in this analysis. To determine which method of communication children used most often when distressed, the number of unique strategies children used in each modality within each episode was compared using a paired samples t-test. The episodes were divided into child age groups in order to examine the results with younger and older toddlers, splitting them around a period of language growth, and allowing for the comparison of children with similar oral vocabularies. Episodes were divided into two groups by child age, those between 11 and 18 months (n = 15 episodes) and those between 19-26 months (n = 21 episodes).

Overall, without considering modality, children in the 11-18 month age group used an average of 3.00 unique regulation strategies per episode, and the children in the older age group used an average of 4.98 unique regulation strategies per episode. As seen in Table 4, in children younger than 18 months of age, there was a significant difference in the number of unique strategies used via the gesture modality (M= 2.20, SD= 1.37) and unique strategies used via the talk modality (M= .267, SD= .45), $t(14)= 4.882$, $p < .001$. There was also a significant difference in the 11-18 month age group in the unique strategies used via gesture and unique strategies used via gesture + talk modality (M= .533, SD= .99) , $t(14) = 4.600$, $p < .001$. The difference in unique strategies via talk and unique strategies via gesture + talk was not significant, $t(14) = 1.169$, $p= .262$. A second set of paired samples t-test was used to compare the unique strategies in each modality within each episode for children 19-26 months of age. There was no significant difference (Table 5) between the number of unique strategies used via the gesture modality (M=2.04, SD= 1.43) and unique strategies used via the talk modality (M=1.28, SD=1.82), $t(20) = 1.25$, $p= .225$; nor was there a significant difference in the number of unique strategies used via the gesture modality and the number used via the gesture + talk

modality (M= 1.66, SD= 1.62), t (20) =.984, p=.337. Similarly, there was no significant difference in the number of unique strategies via the talk modality (M=1.28, SD=1.82) and the unique strategies used via gesture + talk modality (M= 1.66, SD= 1.62), t (20) = .677, p= .506. These results suggest that there is a difference in the variety of strategies that children between 11 and 18 months of age are able to employ in each modality. Specifically, our results suggest that children between 11 and 18 months use a wider variety of strategies via gesture than via talk or via gestures + talk when in distress. In contrast, there were no significant differences in the older age group (19- 26 months) in the strategies children were able to employ in each modality, suggesting that older toddlers are able to use both words and gestures to employ the same regulation strategies.

Table 4. Results of Paired Samples T-test (children 11-18 months)

	Paired Differences							
				95% Confidence Interval				
	Mean difference	SD	Std. error mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1 Strategies via gesture Strategies via talk	1.93	1.53	.396	1.08	2.78	4.882	14	.000
Pair 2 Strategies via gesture + talk Strategies via talk	.266	.883	.228	-.222	.750	1.169	14	.262
Pair 3 Strategies via gesture Strategies via gesture + talk	1.66	1.39	.360	.892	2.44	4.620	14	.000

Table 5. Results of Paired Samples T-test (children 19-26 months)

	Paired Differences							
				95% Confidence Interval				
	Mean difference	SD	Std. error mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1 Strategies via gesture Strategies via talk	.761	2.79	.609	-.508	2.03	1.251	20	.225
Pair 2 Strategies via gesture + talk Strategies via talk	.380	2.57	.562	-.792	1.55	.677	20	.506
Pair 3 Strategies via gesture Strategies via gesture + talk	.380	1.77	.387	-.426	1.18	.984	20	.337

As a result of the previous findings, it was important to look the interaction as a whole, including the caregivers' communication. Caregivers play an important role in the child's regulation, if caregivers are doing the majority of the communication while the child is distressed, the child may not be taking an active role in their regulation and instead relying on their caregiver to provide the regulation strategies. Therefore, children's communication attempts were compared to caregiver communication to determine whether caregivers were responsible for majority of the communication, and thus possibly driving children's communication strategies, in the two groups of children. Results show that in children between 11 and 18 months of age caregivers were responsible for 54% of the total communication attempts, while children

were responsible for 46% of the communication attempts made in the episodes. In children between 19 and 26 months of age caregivers and children were both responsible for 50% of the communication attempts made in the total episodes. Thus, both younger and older toddlers are using gestures and words to play active roles, almost equal to those of caregivers, in regulating their emotions during distress.

Discussion

This study provides an ecologically valid examination of the use of gestures and words in the process of emotion regulation in toddlers, as the observations were made in events and routines that toddlers encounter every day. These naturalistic contexts may produce a more accurate assessment of the strategies toddlers use when they are distressed than do artificially induced scenarios of distress. Further, this study examines toddlers' regulation strategies that are more proactive, including children's attempts to initiate and participate in coping routines, in addition to responding to adults, whereas previous studies have focused mainly on reactive strategies in children at this age. Most importantly, the use of words and gestures were both examined as forms of communication during a period of transition from non-verbal communication into oral language.

In an attempt to understand the regulation strategies toddlers employ through gestures and words, this study examined seventeen children, between the ages of 11 and 28 months, as they used gestures and words to regulate their emotions and behavior during naturally occurring episodes of distress. It was expected that because symbolic gestures can serve the same functions as oral language, and children are able to use symbolic gestures prior to oral language, they would be able to use symbolic gestures to regulate their emotions and behavior when they were distressed.

The first research aim was to describe the regulation strategies toddlers use through gestures and words. The results show that when children are distressed they use gestures more often than words to employ every regulation strategy. It has been hypothesized that children lose their ability to use words when they are upset because it is a relatively new skill, yet, results of the current study show that children are able to use gestures even when they are distressed. Previous research suggests that oral language aids children in their regulation (Cole et al., 2010), and it appears that gestures also give children the ability to regulation their emotions and behavior by communicating their needs, wants, and requests when they are unable to use words. This study also found that children are using gestures more than words and more than gestures in combination with words to employ regulation strategies that are more proactive (i.e., initiate coping routine and self-reflexive strategies), while they are using words most often to employ reactive strategies (i.e., controlling someone's behavior by saying "No" in response to caregivers' actions or words). These proactive strategies give children more control over the situation, and appear to be similar to the more developmentally advanced strategies typically used by preschoolers (Stansbury & Sigman, 2000). In addition, Vygotsky proposed that children use mental tools to monitor and modify on their own emotions and behavior (self-reflexive strategies), but focused primarily on preschool age children; however, this study found that children are able to use self-reflexive strategies for emotion regulation via gesture during the toddler years. Many of the strategies examined in this study have not been previously described in toddlers, which may be because most toddlers do not use symbolic gestures, and thus may be limited to the more reactive strategies they can use with the few words they have during distress.

The second research aim was to determine whether children are able to employ a wider variety of self-regulation strategies via gestures than via words. Regardless of modality, younger

toddlers employed an average of 3 different regulation strategies per episode, and older toddlers employed an average of 5 regulation strategies per episode, indicating that as children transition into a period of rapid language growth their ability to use more diverse regulation strategies increases, which is supported by previous research (Luria,1959). However, the young toddlers in this study (< 19 months) used gestures three times more often than words alone to regulate their emotions and behavior during distress, and were also able to use significantly more unique strategies when using gestures to communicate than when using words or gestures and words together. However, there was no difference in the number of unique strategies that older toddlers employed via gestures, words, and gesture + words, indicating that symbolic gestures are most useful for young toddlers because once children have more advanced language skills they are able to use words to employ many of the same regulation strategies.

This study was conducted in the context of interactions between children and their caregivers, therefore it was important to consider the communication of both partners to rule out the possibility that the caregivers were taking the largest role in regulating the child through their words and gestures instead of the child taking an active role in their regulation. When looking specifically at the interaction between the caregiver and the child, in both the older and younger age groups, the caregivers and children were both contributing equally to the communication happening in the episodes. This indicates that children are equal contributors in the interaction and are able to engage in conversation with their caregivers in order to regulate their emotions, instead of relying on their caregivers to provide the regulation strategies. This finding has practical implications for the teaching of symbolic gestures, as we would expect that for younger children the caregiver would do the majority of the communication when the child was distressed; yet our results show that children can use symbolic gestures to equally engage in

conversations with adults when distressed. Future research should experimentally examine whether children who use symbolic gestures are actually more actively engaged in their own regulation in comparison to those who are not taught to use this tool.

Limitations

A significant limitation of this study was the small sample size, consisting of only 17 children. Ninety episodes were observed, and a majority of them (73, or 81%) included gesture or talk from the child. However, only 36 of these episodes included visible signs of distress, and thus were the focus of the current study. It is possible that children in the other 37 episodes were also distressed but were regulating themselves such that they did not manifest visible indicators of distress; however, we chose to examine only those episodes in which we could be certain the child was dealing with distress. The small sample size limited the analyses to simple comparisons. In future, a larger sample could allow for a more comprehensive look at how the use of gestures and words for regulation change over the course of toddlerhood. Further, our sample was only collected in one context, a childcare setting in a university community in which children had parents with high levels of education. Thus, these findings should be replicated using a larger sample, in more diverse contexts. Future studies should follow children longitudinally to study children's self-regulation skills from infancy through the transition from gesture to language. An experimental study is also needed to examine whether the use of symbolic gestures for self-regulation facilitates children's regulation abilities strictly when they are preverbal or whether this skill continues to develop once children have more advanced language skills.

Conclusion

This study is one of the first to document preverbal children using symbolic gestures as a "tool" to regulate their own emotions and behavior during distress, giving us further insight into the internal worlds and capacities of preverbal children. These descriptive findings provide an initial understanding of how symbolic gestures may give children the ability to use advanced emotion regulation strategies that we would not expect to see until they can integrate their use of oral language into their regulation strategies. Given the sophistication of some of the strategies observed, it is possible that symbolic gestures actually enhance children's emotion regulation strategies; however this is not possible to determine without experimental study.

Finally, these finding have practical implications for the teaching and implementation of symbolic gestures in the home and childcare programs. Not only has research shown that symbolic gestures promote effective communication between children and caregivers, but it also appears that symbolic gestures give children a tool to express their own desires, feelings, and thoughts, and to actively participate in shaping their regulatory interactions with caregivers and regulating their own emotions and behavior.

APPENDICES

APPENDIX A

Table 6. Symbolic Gestures use in Childcare

Gesture	Description
Angry	Clawed hand running down in front of face (also have a "mad" expression)
Dad	Open palm, thumb tapping forehead
Goodbye	Waving good-bye
Later	Rotated right thumb/forefinger in open left hand
Mom	Open palm, thumb tapping chin
Outside	Open palm twisting (as if opening a door knob)
Pop	Tapping back of palm to chin
Sad	Draw forefinger down cheek
Wait	Right fist tapping open left hand
Cold	Arms to side shaking
Happy	Open hands, palm out, to frame sides of face
Hear	Open palm over ear
Hurt	Closed fist tapping chest
Loud	Hands over ears
Noise	Finger to ear
Scared	Open palm tapping chest
Want	Open hands, palm out, to frame sides of face
All done	Hands open, palms down, waving back and forth
All gone	Same as "all done"
Clapping	Clapping hands
Clean-up	Palm facing down making a circular motion
Close	Open palm twisting
Gentle	One hand stroking the other hand
Head Shake	Head shaking “no”
More	Index fingers tapping together
Play	Closed fist with pinky and thumb sticking out, hand rotating
Stop	Hand open, palm out, held at arm’s length
Snack	Fingers together tapping mouth

APPENDIX B

Table 7. Variables

Variable Label	Description of Variable
CODE Via Gesture	Continuous frequency variable indicating the number of times each specific regulation code was expressed via gesture in the episode
CODE Via Word	Continuous frequency variable indicating the number of times each specific regulation code was expressed via words in each episode
CODE Via Gesture +Word	Continuous frequency variable indicating the number of times each specific regulation code and was expressed via a combination of gestures and words in each episode
Unique CODE Gesture	Dichotomous variable indicating whether or not each specific code was used via gesture in each episode
Unique CODE Word	Dichotomous variable indicating whether or not each specific code was used via words in each episode Whether or not each regulation code was utilized in each episode via word
Unique CODE Gesture +Word	Dichotomous variable indicating whether or not each specific code was used via a combination of gestures and words in each episode
Total Unique Codes Via Gesture	Continuous variable indicating the total number of specific strategies used via gesture in each episode
Total Unique Codes Via Word	Continuous variable indicating the total number of specific strategies used via words in each episode
Total Unique Codes Via Gesture +Word	Continuous variable indicating the total number of specific strategies used via gesture and words combined in each episode

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