ATTACHMENT AND COPING: PREDICTORS OF MEMORY FOR EMOTIONAL EVENTS

Summerlynn Jean Anderson
B.S., University of California, Davis, 2000

THESIS

Submitted in partial satisfaction of the requirements for the degree of

MASTER OF ARTS

in

CHILD DEVELOPMENT

at

CALIFORNIA STATE UNIVERSITY, SACRAMENTO

SUMMER
2009
ATTACHMENT AND COPING: PREDICTORS OF MEMORY FOR EMOTIONAL EVENTS

A Thesis

by

Summerlynn Jean Anderson

Approved by:

Kristen Weede Alexander, Committee Chair

Karen O’Hara, Second Reader

Date: August 11, 2009
Student: Summerlynn Jean Anderson

I certify that this student has met the requirements for format contained in the University format manual, and that this thesis is suitable for shelving in the Library and credit is to be awarded for the thesis.

Sheri Hembree, Graduate Coordinator

Department of Child Development

7/20/09
Abstract

of

ATTACHMENT AND COPING: PREDICTORS OF MEMORY FOR EMOTIONAL EVENTS

by

Summerlynn Jean Anderson

Memory research has shown mixed results concerning how emotional information is processed (see Christianson, 1992, for review). One individual difference found to relate to emotional processing (Belsky et al., 1997; Laible, 2004) and understanding (de Rosnay & Harris, 2002) is attachment security. Further, because coping strategies are believed to reflect behavioral outcomes of emotion regulation (Contreras et al., 2000), how children cope with emotional situations may also predict their memory for such experiences. The present study aimed to examine attachment qualities and coping strategies as individual differences predicting recall of emotional and attachment-related events. Children ranging from 7.5- to 12.5-years of age viewed a slideshow exhibiting stories that varied in emotion and attachment relatedness. The following week, children were asked to freely recall the pictures and stories, and they completed attachment and coping measures. Results showed children’s attachment security predicted recall of high attachment-related events, specifically separation scenarios. To understand better these results, attachment security was divided into subscales for parental availability and
children's dependency. Findings indicated that children who perceived the parent as more available recalled more attachment-related stimuli, specifically those involving separation. These results indicate that attachment-related events may be processed differently than emotional, but less attachment evoking events, and that memory for such events may be influenced by individual differences in attachment security, particularly how available the child perceives the caregiver.

Committee Chair
Kristen Weede Alexander
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>List of Tables</td>
<td>viii</td>
</tr>
<tr>
<td><strong>Chapter</strong></td>
<td></td>
</tr>
<tr>
<td>1. INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>Methodology</td>
<td>5</td>
</tr>
<tr>
<td>Definition of Terms</td>
<td>7</td>
</tr>
<tr>
<td>Theoretical and Empirical Framework</td>
<td>9</td>
</tr>
<tr>
<td>Limitations of the Study</td>
<td>12</td>
</tr>
<tr>
<td>Organization of the Thesis</td>
<td>13</td>
</tr>
<tr>
<td>2. LITERATURE REVIEW</td>
<td>14</td>
</tr>
<tr>
<td>3. METHODS</td>
<td>37</td>
</tr>
<tr>
<td>Research Question</td>
<td>37</td>
</tr>
<tr>
<td>Research Design</td>
<td>37</td>
</tr>
<tr>
<td>Participants</td>
<td>38</td>
</tr>
<tr>
<td>Measures</td>
<td>39</td>
</tr>
<tr>
<td>Procedure</td>
<td>44</td>
</tr>
<tr>
<td>4. RESULTS</td>
<td>46</td>
</tr>
<tr>
<td>5. DISCUSSION</td>
<td>57</td>
</tr>
<tr>
<td>Age</td>
<td>58</td>
</tr>
<tr>
<td>Attachment and Coping</td>
<td>59</td>
</tr>
</tbody>
</table>
Attachment Security and Memory ................................................................. 61
Limitations ...................................................................................................... 64
Future Research ........................................................................................... 65
Conclusion ..................................................................................................... 66
References ..................................................................................................... 68
## LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Means for predictor and memory variables</td>
<td>48</td>
</tr>
<tr>
<td>2.</td>
<td>Correlations among predictor variables</td>
<td>51</td>
</tr>
<tr>
<td>3.</td>
<td>Regression including security to predict high attachment stimuli</td>
<td>52</td>
</tr>
<tr>
<td>4.</td>
<td>Regression including security to predict separation stimuli</td>
<td>53</td>
</tr>
<tr>
<td>5.</td>
<td>Non-significant regressions including security</td>
<td>53</td>
</tr>
<tr>
<td>6.</td>
<td>Regression using availability and dependency to predict high attachment stimuli</td>
<td>55</td>
</tr>
<tr>
<td>7.</td>
<td>Regression using availability and dependency to predict separation stimuli</td>
<td>55</td>
</tr>
<tr>
<td>8.</td>
<td>Non-significant regressions including availability and dependency</td>
<td>56</td>
</tr>
</tbody>
</table>
Chapter 1

INTRODUCTION

A considerable amount of research has focused on accuracy of child reports about traumatic experiences; however, researchers continue to debate whether children’s recollections of stressful events are reliable. Individual differences in child characteristics may hinder or promote cognitive processing of events, including encoding, storage and recall. Factors shown to influence memory include personal experience with the event (Quas & Schaaf, 2002), attachment styles of parents (Quas, Goodman, Bidrose, Pipe, Craw, & Ablin, 1999; Zeijlmans van Emmichoven, van Ijzendoorn, de Ruiter, & Brosschot, 2003), repeated interviews (Quas & Schaaf, 2002), and psychological disorders (e.g., PTSD; Alexander, Quas, Goodman, Edelstein, Cordon, Jones, Redlich, & Ghetti, 2005). The current study focused on children’s accurate recall of emotional and attachment-related events and included coping strategies as a possible contributing factor in cognitive processing. Results are discussed in terms of individual differences that may influence autobiographical memory of traumatic experiences, specifically those that may be reported in eyewitness testimonies.
Purpose of the Study

The present study was aimed at examining the associations among attachment styles, coping strategies and memory of emotion-eliciting stimuli in middle childhood. Bowlby's (1969/1982) theory on attachment defines attachment quality as a reflection of an internal working model (IWM) of self and others about how relationships are established. The effects of this IWM are thought to be formed as a function of the relationship with the primary caregiver early in infancy, and guide the appraisal of and reaction to novel circumstances. Researchers continue to link attachment qualities to other emotional and cognitive processes. For example, children's attachment security was found to relate to their understanding of emotions (Laible & Thompson, 1998). Moreover, Kirsh and Cassidy (1997) found security related to children's attention to pictures of mother-child interactions and to children's recall of attachment-related stories.

The current research examined children's memory for emotion-eliciting stories and pictures in relation to their attachment security and coping strategies. This study expanded on the established relation between attachment and memory by adding coping mechanisms and focusing on a non-clinical, middle childhood population. It was hypothesized that attachment qualities in children would predict their coping strategies, where secure children would use less preoccupied and avoidant strategies to cope with attachment-related problems. In addition, this study sought to predict children's memory of emotionally-valenced and attachment-related events using the child's attachment quality. It was hypothesized that children greater in attachment security and attachment
availability would have greater recall of emotional stimuli, specifically of negative valence. Finally, it was hypothesized that the relation between attachment and memory would be mediated by coping strategies.

Statement of the Problem

Memory research has shown mixed results concerning information processing in stressful situations (see Christianson, 1992, for review). Children's autobiographical accounts of abuse have been questioned as to what limitations they may have in accurately recalling the traumatic event (Poole & Lindsay, 1995), and researchers have examined the effects of repeated questioning on suggestibility (Quas, & Schaaf, 2002), type of recall (Howe, 2006), the nature of the memory (traumatic vs. non-traumatic, Berliner, Hyman, Thomas, & Fitzgerald, 2003) to assess these limitations. One reason for inconsistent findings may be lack of consideration of individual differences in child characteristics. One important difference involves children's attachment security. It is possible children's memory differs as a function of attachment because they feel more comfortable processing negative information. Secure children are more likely to be open and share their negative emotions with their parent (Laible, 2004). This open communication with their parent possibly reflects an active coping strategy to seek support and reduce distress (Folkman & Lazarus, 1984; Sales, Fivush, Parker, & Bahrick, 2005); therefore, coping should also be considered as a contributor in information processing. Including these two individual differences (i.e., attachment styles and coping
strategies) as predictors of memory for emotional events may unveil distinct differences in recall outcomes and help explain contradictions in findings of previous memory studies.

Significance of the Study

Historical accounts of children’s eyewitness testimony display reoccurring legal scenarios where individuals were imprisoned for false abuse allegations, as well as report victims of child abuse that are not believed until they come forward again in adulthood (see Goodman, 2006). These extremes should bring research for recollection of emotional events to the forefront of memory research. Further investigation of individual differences and their link to memory outcomes is needed to help determine contributing factors to variation in recall.

Attachment security has been established as an individual difference which has shown to influence emotional processing (Belsky, Spritz, & Crnic, 1997; Laible, 2004) and understanding (de Rosnay & Harris, 2002). Furthermore, memory studies have shown processing differences in emotional content (Davidson, Luo, & Burden, 2001) and attachment quality (Zeijlmans van Emmichoven et al., 2003) indicating variation in recall can be attributed to both individual differences and event quality. Coping is thought of as an external behavior in emotion regulation (Contreras, Kerns, Weimer, Gentzer, & Tomich, 2000). It is possible that individual differences in attachment and coping could play a vital role as predictors of memory for emotional and attachment-related events.
Developmental changes in children are thought to affect recall (i.e., memory improved with age, Howe, 2006; Quas & Schaaf, 2002), as well as coping strategies (i.e., changes in coping strategies over time, Kerns, Tomich, & Kim, 2006; Byrne, 2000). It has also been reported that coping strategies relate to attachment styles (Kerns, Tomich, Aspelmeier, & Contreras, 2000; Seiffge-Krenke & Beyers, 2005). These developmental changes in age and coping strategies, as well as attachment styles could contribute to how one remembers a traumatic event. The current study was designed to address possible variations in recall, as children in middle childhood were questioned about emotion-eliciting and attachment-relevant pictures and stories presented in a more controlled environment, and memory outcomes were compared to individual differences in attachment styles and coping strategies.

Methodology

Participants

Forty-four children ranging from 7 to 12 years of age and their parent were recruited to participate through advertisement and community events. This study was part of a larger study conducted by Kristen Weede Alexander and Karen Davis O’Hara and was carried out in Rosemarie Kraft’s Laterality Laboratory at the University of California, Davis. Due to psychobiological measures in the larger study, child participants accepted in this study were right-handed, English was their first Language, and parents confirmed the child had no known developmental disorders.
Procedure

The complete study involved two separate visits to the laboratory. During the first session, children watched a slideshow consisting of photographs of people and animals, accompanied by narratives which varied in emotional quality (e.g., valence and attachment-related scenarios). During encoding, children’s brain activity and skin conductance were measured. These measurements are not a part of the present study. After the slide show, parents were asked as a part of the study to not discuss the stories and images until the second session concluded, unless the child initiated the conversation; therefore, parents were allotted unlimited time immediately following the slideshow to talk to their children about what they saw and heard. Parent-child conversations were video taped. This allowed children to remember items on their own, with minimal parental influence. Children then completed a battery of cognitive tests while their parent filled out a questionnaire packet which included items such as demographics, attachment style, depression level, and children’s behaviors.

Approximately a week later, children and parents returned for session 2. Children participated in a recognition task in which brain activity and skin conductance were again measured, followed by a free recall and then cued recall task. Children were then administered a coping and attachment measure, followed by additional cognitive tasks. Parents completed any remaining questionnaires. Before leaving the family was thanked and the child chose a toy and received a certificate with their name on it for participating in the research.
Analysis

Data were analyzed to determine whether there were correlations between attachment qualities and memories for differently valenced emotional stimuli. Correlations between coping strategies and attachment styles were also compared. A regression analysis was used to consider how coping strategies and attachment styles together predict memory outcomes.

Definition of Terms

Attachment

Attachment is used to describe the bond between two individuals, and for the purpose of this study, the bond between child and primary caregiver. Attachment theory proposes that a cognitive model, referred to as an internal working model, is derived from the person’s relationship with their primary caregiver. This model guides the individual’s expectations of relationships are established between one’s self and others (Bowlby 1969/1982).

Security

Security is a quality of attachment that is reflected in children’s positive beliefs and expectations, and views of the self as worthy of affection. According to Attachment Theory, such beliefs are developed over time, and are linked to the child’s experience of their primary caregiver’s availability and responsiveness when elicited by the child.
during times of distress (Bretherton, 1992). Security is also a nomenclature used as a measure of attachment in that “high security” reflects children with positive attachment qualities, and “low security” represents children who perceive their primary caregiver as less available and reliable (Kerns, Aspelmeier, Gentzler, & Grabill, 2001).

**Availability**

Availability is a term derived by Lieberman and colleagues (Lieberman, Doyle, & Markiewicz, 1999) to describe a dimension of attachment security using the Security Scale (Kerns et al., 2001) items, and measures how accessible children view their parents during times of distress.

**Dependency**

Dependency is defined by Lieberman and colleagues (1999) as a dimension of attachment security that measures children’s self report frequency of their utilization of parents (i.e., how often children seek and value their parents’ help when distressed; Kerns et al., 2006).

**Coping**

Coping is thought to be the active outcome of emotion regulation, and describes the strategy an individual uses to regulate oneself when internal or external stressors are taxing (Contreras et al., 2000; Folkman & Lazarus, 1988).
Preoccupied Coping

Preoccupied coping describes the coping strategy that expresses an excessive need for parental physical and emotional support (Finnegan, Hodges, & Perry, 1996). Children who utilize preoccupied coping strategies to minimize their stress level display behaviors such as wanting their parent in close proximity during novel circumstances and showing difficulty in exploration, trouble separating from their mother, worrying about the mother’s whereabouts, and prolonged distress after reuniting with their mother (Finnegan et al., 1996).

Avoidant Coping

Avoidant coping is displayed by children who decline to utilize the caregiver when upset, reject parental affection, and avoid parental interaction during exploration and reunion as a means to decrease internal distress (Finnegan et al., 1996).

Theoretical and Empirical Framework

Attachment and Memory

Research suggests that attachment quality has an effect on memory in children (Kirsh & Cassidy, 1997). When viewing pictures of positive, negative, and neutral interaction between mother and child, insecure-avoidant children were more likely to look away from all drawings more often than other children (Kirsh & Cassidy, 1997).
The children were then tested on memory of six attachment related stories. Secure children recalled stories where mothers were responsive to their child better than insecure-avoidant children. Secure children also had better recall on stories where mothers rejected their children compared to insecure-ambivalent children. These findings suggest that the decreased attention in insecure children may affect the encoding of information, thus decreasing recall of events. Because attention is linked to attachment, the current study will examine attachment qualities along with coping strategies, specifically avoidant coping, to determine their influence on information processing of attachment-related events.

Zeijlmans van Emmichoven and colleagues (2003) also conducted a study focused on the effects of attachment on attention and memory. In an adult sample using threatening positive or neutral stimuli, participants with secure attachment qualities had better free recall of threatening words than the insecure group. The researchers suggested that the secure individuals are more likely to be open in processing negative (threatening) information and therefore more apt to encode information so that it is available for later recall (Zeijlmans van Emmichoven et al., 2003). The current study examined the relation between attachment style and memory in children, expecting to find similar results where more secure children would be more likely to recall negative stimuli better than children rated less secure.

*Memory and Emotion*
Researchers have shown that traumatic events can decrease memory detail (Berliner et al., 2003; Sales et al., 2005); however, non-traumatic negative events involving emotion are reported to be more salient in children than positive or neutral events (Bishop, Dalgleish, & Yule, 2004; Ladouceur, Dahl, Williamson, Birmaher, Ryan, & Casey, 2005; Potts, Morse, Felleman, & Masters, 1986; Terwogt, Kremer, & Stegge, 1991). The way in which negative emotion, stress, and trauma are operationally defined vary, and thus may contribute to differences in memory outcomes. In Davidson and colleagues’ (2001) study, elementary school-age children were given stories about everyday family life with topics covering happy, sad and angry events. Children remembered emotional stories more than non-emotional stories, signifying emotional information may be processed, and thus remembered, differently than other stimuli. Findings also indicated negative valence labels were recalled more than positive labels. The present study used stimuli varying in valence and attachment-related emotions.

Coping and Attachment

Attachment quality, which contributes to the construction of an individual’s internal working model, has been shown to relate to the process of emotion regulation, specifically coping strategies (Contreras et al., 2000; Seiffge-Krenke & Beyers, 2005). Parents’ interaction with their children has not only predicted attachment qualities (Kerns et al., 2000), but also coping strategies (Fivush, Berlin, Sales, Mennuti-Washburn, & Cassidy, 2003). Researchers have shown children’s coping strategies relate to the context mothers use when talking to their children about negative events (Fivush et al., 2003).
For example, when reminiscing with their child about different emotional events, mothers addressed coping through discussing facts of the event and shared emotional resolutions when talking about fear; emotional resolution when discussing sadness; and emotional attributions when talking about anger (Fivush et al., 2003). To address aspects of individual differences in processing emotion, specifically emotion regulation outcomes such as coping, the present study included a measure of coping strategies. This inclusion was intended to address whether children’s coping mediated the link between attachment and memory, therefore, resulting in further explication of the nature of individual differences in recall for emotional stimuli.

**Limitations of the Study**

The findings in this study are limited by sample size and participant diversity. Families were recruited locally from a small university city, and due to limited resources, stipends were not awarded for participation. There should be caution in generalizing results, as the sample did not include families from larger cities, rural communities, clinical populations, or those who did not have time to volunteer four to five hours of their time.

It should be noted that attachment measures were self-report and not projective measures of attachment. The current study used an attachment measure that reflects the child’s perception of a specific caregiver’s availability and responsiveness. The use of projective measures, which assesses the child’s attachment state of mind and categorizes
attachment qualities, may not be comparable to the security continuum in the present study. It is also important to note that memory in this study was solely based on free recall and did not include recognition or cued-recall tasks. The emotional-eliciting stimuli to be remembered was video taped, and may not equal the intensity and frequency of distress that is experienced in “real life,” and more naturalistic traumatic or emotional events.

Organization of the Thesis

The following chapter is a review of literature related to attachment, memory (with emphasis on emotion), and coping. The chapter constructs support for the consideration that attachment is a framework in which individuals base emotional experiences, and in combination with strategies for reducing distress, influence cognitive processing, specifically memory for emotional and attachment-related events. Chapter three describes the methods used in this study, followed by the results reported in chapter four. Finally, chapter five discusses the findings and suggests directions for future research regarding factors which contribute to children’s memory.
Extensive developmental research has focused on attachment in infancy and preschool years; however, there is an increasing interest in middle childhood, specifically cognitive and emotional development during the pre-adolescent years. Although attachment style is thought to remain relatively consistent throughout life, expression of parental needs changes during development in the middle childhood years (Kerns et al., 2006). Likewise, cognitive processes, such as memory, have been shown to relate to emotion during middle childhood (Davidson et al., 2001; Kensinger & Corkin, 2003). Although attachment and memory in preschoolers and adults has been studied, more research is needed to understand the relation between attachment qualities and emotional memories, specifically the processing of attachment-related scenarios, in middle childhood. The current study expands on the established relation between attachment and memory by adding coping strategies and focusing on a non-clinical, middle childhood population.

Attachment

Bowlby’s (1969/1982) theory conceptualizes attachment as based on an internal working model of how relationships are established between the self and others. Parents who are responsive to their children during times of distress are more likely to be
emotionally available (Bowlby, 1969/1982). This availability allows children to approach their attachment figure for comfort and promotes future use of parents as reassuring caregivers when experiencing distress. Consistent parental availability for stress reduction and a sense of safety helps children develop positive beliefs and expectations of themselves and their parents (Bretherton, 1992). These positive beliefs form secure attachments and can lead children to view themselves as reliable and worthy; however, children whose caregivers have inconsistent parenting behaviors may develop insecure attachments and view themselves as incompetent or unworthy (Bretherton, 1992).

Ainsworth’s longitudinal study on infants’ first year of life supported Bowlby’s attachment theory (Ainsworth & Bowlby, 1991). Ainsworth visited mothers of newborns in their homes every 3 weeks and recorded the dyad’s behaviors. After a year of direct observation, Ainsworth conducted the “strange situation” to assess the observed children’s attachment to their mothers. This laboratory observation of mother and child interaction and reaction to separation and reunion is still used today for children around 1 year of age. Ainsworth compared patterns between in-home dyad interactions to the child’s behavior exhibited during the strange situation, which allowed attachment security to be described using mother and child behaviors. Secure infants cried very little by age one, and were more likely to have mothers who were consistent in promptly responding to their child’s cry (i.e., mothers were perceived to be both dependable and available when child appeared distressed). Insecure-avoidant infants were more likely to have mothers insensitive to their needs. For example, mothers rejecting infant signals for desired physical contact or feeding would be considered insensitive to their child’s needs,
therefore contributing to their child’s insecure behavior. Unlike distressed secure children who are quickly comforted when picked up and exhibit positive behaviors of content and exploration when placed back down, insecure-avoidant children who cry and protest their mother’s frequent separation at home, are more likely to be unresponsive when distressed (mother leaving room during strange situation) and avoid contact with mother upon return.

Attachment measures, both interview and self-administered, have facilitated attachment research beyond the infant/toddler years. Infant-parent attachment quality is thought to remain relatively stable throughout life and help structure an internal working model of perception and expectation, (Alexander, Quas, & Goodman, 2002; Bowlby, 1969/1982; Waters, Merrick, Trboux, Crowell, & Albersheim, 2000). Newer measures have allowed attachment assessment during different developmental stages and findings have supported the continuity of attachment quality across the lifespan (Waters et al., 2000). In contrast to the observational procedure of the strange situation used to assess the infant’s attachment quality to a particular caregiver, other attachment instruments use interview or self-report approaches to evaluate attachment qualities in adulthood. Interviewing techniques, such as the Adult Attachment Interview (AAI; Main, Kaplan, & Cassidy, 1985), apply a projective assessment of attachment; reflecting the individual’s “state of mind” in reference to attachment (Kerns, Schlegelmilch, Morgan, & Abraham, 2005; Shaver & Mikulincer, 2002). This hour-long interview is thought to subconsciously activate the attachment system as participants describe their relationship with their parents, and assess the person’s general attachment style. In contrast, Brennan, Clark and
Shaver (1998) derived a self-report measure for adults to assess a person’s attachment quality of a specific relationship (e.g. romantic relationship), while still maintaining the parallels of Ainsworth’s attachment dimensions.

Although these measures allow assessment of adult attachment qualities, there continues to be a need for further attachment research in middle childhood bridging the gap from infancy to adulthood. As argued by Yunger and colleagues (Yunger, Corby, & Perry, 2005), self-report questionnaires are valuable when assessing attachment to a specific caregiver during middle childhood; observational studies eliciting the need for parental availability and dependency are not age-appropriate in middle childhood, and projective measures may be skewed by stages of development (i.e., differences in child’s cognitive development or language competence may lead to reliability deficits).

To gain further insight about developmental differences in attachment security during middle childhood, Lieberman and colleagues (1999) derived two security dimensions from the Security Scale (Kerns et al., 2001): availability and dependency. Availability measures the child’s perception of how accessible their parent is to them when needed, and dependency scores reflect children’s utilization of their parent when needing help. Using these attachment security dimensions, Kerns and colleagues (2006) found children who viewed their parents as more available in 3rd grade were more likely to have better emotional regulation two years later. The current study utilizes the self-report Security Scale and Lieberman’s subscales for assessing attachment in middle childhood.
Inquiries on reliability in children’s eyewitness testimony have sparked a wave of research focused on factors influencing children’s memory. From neurological development to environmental influences, results from memory studies have shown variation in recall depending on child’s age (Quas et al., 1999), state of mind (Bishop et al., 2004), measure of retrieval (e.g., free recall, cued recall, recognition; Quas et al., 1999), emotional content (Berliner et al., 2003; Davidson et al., 2001), and individual differences in other cognitive and social skills (e.g., Alexander, Goodman, Schaaf, Edelstein, Quas, & Shaver, 2002).

Studies have shown that development plays a role in memory, as older children are expected to have increased recall compared to younger children. Researchers have teased apart various factors to decipher cognitive process that may occur during development and influence memory. Although it is commonly found that older children compared to younger children have increased recall of details about events, depending on the stimuli, there may be no recall differences (Davidson et al., 2001; Quas et al., 1999). For example, memory differences between age groups were found depending on the length of a dictated event. Older children (9- and 11-years-old), recalled more emotional behaviors than younger children (7-years-old), when listening to longer stories involving emotion; however, no age differences were found in recall of emotional behaviors when stories were shortened (Davidson et al., 2001). This suggests that processing complex information may rely on cognitive development and improve over time. Story duration
may tax younger children’s ability to encode emotional details thus decreasing recall. Emotional influences on memory are discussed later in this review.

Age has also been shown to predict memory in children experiencing a salient event, such as an invasive medical procedure (Quas et al., 1999). Children who experienced a medical procedure at age four years or older were more likely to recall that the medical procedure occurred than were children whose procedure took place at age two or three years old. Age was not a factor of memory accuracy to direct questions when including only those children who recalled the procedure; however, the amount of correct information children provided was positively related. Children’s ability to recall an event, and the amount of accurate information provided, may be a factor of developing encoding abilities, thus increasing their memory of events with age.

Exploration of what causes these age related changes has ensued. Inhibition studies support the theory that encoding abilities increase with cognitive development (Alexander, Goodman et al., 2002). Encoding requires attention at some level. This attentional phase of information processing (an executive function) involves the frontal cortex, which develops rapidly in childhood (Alexander, Goodman et al., 2002; Schacter, Kagan, & Leichtman, 1995). The ability to inhibit attention for irrelevant information is thought to produce more effective encoding, therefore improving recall (Alexander, Goodman et al., 2002; Zeijlmans van Emmichoven et al., 2003). Alexander, Goodman and colleagues (2002) compared young children’s inhibitory ability to their recall of a stressful event. As inhibitory ability increased, children had fewer errors in recall. Although recall errors continued to be inversely related to cognitive inhibition when
accounting for age, executive function overall is still thought to develop into adulthood. It was expected that older children in the present study would have increased recall compared to younger children.

Memory Measurements

Memory assessments have varied in research. Free recall is generally a verbal recollection of events with minimal restriction or guidance. The participant may be asked to narrate an autobiographical account or recall a previous laboratory-presented emotion inducing event or stimulus. However, some researchers have categorized specific open-ended questions as free recall as well (Bugental, Blue, Cortez, & Fleck, 1992). One study’s free recall question included, “What did the doctor say when he looked at the boy’s throat?” (Bugental et al., 1992), which may be viewed as a cued recall response in other studies due to the questions supplying specific information about the event (e.g., it was the doctor who looked in the boy’s throat). Cued recall provides some information to trigger an account or details of an event that one may not recall on their own. This could include supplying options for the participant to choose from, with one option being the correct response, or asking direct question that provide probing details such as, “What did the child’s mom do?” (Kirsh & Cassidy, 1997). Memory studies involving recognition typically provide visual aids (e.g., photographs, slide shows, props) to stimulate recall. For example, after watching a video, a child may be shown pictures of objects and asked to indicate which object he or she saw in the video (Bugental et al., 1992). Props to reenact events are also used to assess what participants, usually children, remember.
Dolls and props were used for children to reenact a medical procedure they experienced (Quas et al., 1999), and also used to aid young children to freely recall an event and minimize verbal differences between age groups (Bugental et al., 1992).

Recall differences have been found depending on type of measurement used (Alexander, Goodman et al., 2002; Zeijlmans van Emmichoven et al., 2003; see Christianson, 1992, for review). Christianson and Nilsson (1984) found less information was elicited using free recall to measure memory of negative emotional stimuli compared to memory of neutral stimuli; however, when recognition was used as a measurement for emotional and neutral content, there was no significant difference. This is not necessarily a reflection of quality in memory measurements, but possibly an indication of cognitive processing differences in encoding, retrieval, and storage (Christianson & Nilsson, 1984).

It is important to keep in mind that memory information to be measured varies as much as memory measurements themselves. An indication of increased recall could represent the amount of information the participant provided (Quas et al., 1999), quality (vivid or abstract) of details recalled (Kensinger & Corkin, 2003), or nature of the content (positive vs. negative; Davidson et al., 2001) among other recall items to measure. The current study used free recall as measure of memory and focused only on whether an event was remembered or not; however, the larger study included cued recall and recognition measures as well as recall content.

Not only do measures of recall differ, but the type of memory to be remembered can also vary. Although there are different classifications of memory, such as episodic, semantic, and autobiographical, theorists suggest these overlap in process as well as
contain their own unique memory qualities. Semantic memory is defined as recall of factual information about the world in general (Burianova & Grady, 2007; Tendolkar, 2008), whereas episodic memory is defined as retrieval involving more specific aspects of the context of time and place (Tendolkar, 2008). Some theorists propose that episodic memory is a part of autobiographical memory in that part of autobiographical memory includes the recall of past events (Tendolkar, 2008), whereas others declare autobiographical memory is a subtype of episodic memory in that it is episodic in nature, but always self-referent (Gardiner, 2001; Tendolkar, 2008).

For the purpose of this study, episodic and autobiographical memories will be addressed as separate entities for the following three reasons. First, autobiographical and episodic memories can be viewed as having distinct characteristics. Episodic memory includes subjective awareness and recall of particular past events (e.g., recall of laboratory produced stimuli), whereas autobiographical memory is more about the context of self-referent and personally significant events (Burianova & Grady, 2007; Horel, 2007; Tendolkar, 2008). Second, autobiographical and episodic memories are thought to differ in retention duration; autobiographical memories typically reference recall regarding longer timeframe retention than episodic memories (Tendolkar, 2008). Finally, neurobiological studies have shown differences in brain activation between autobiographical and episodic recall (Burianova & Grady, 2007). Functional magnetic resonance imaging (fMRI) of adult brain activity during recall found both autobiographical and episodic recall activated the left medialtemporal lobe, with more left posterior and inferior activation of the medialtemporal lobe during autobiographical
recall, and more anterior and superior activation during episodic retrieval (Burianova & Grady, 2007).

Recall of autobiographical accounts is commonly used in memory studies focused on the effects of stress. Memories of “real-life” experienced events are of value to research, as laboratory studies cannot attain the complexity of experiencing stressful event outcomes, such as a natural disaster or abuse. Autobiographical memory studies give insight to eyewitness testimony questions regarding factors that may influence accuracy when one is severely distressed. Although there are benefits in studying a population who experienced trauma, laboratory studies inducing low levels of stress and testing episodic memory are also beneficial. Studies involving laboratory produced stimuli are better apt to manipulate memory variables, such as exposure time, recall delay, event order, and can also enable the systematic recording of autonomic responses to stimuli during encoding.

Children’s recall accuracy can also be a challenge in autobiographical studies. Some studies have used parent reports to account for children’s accuracy (Schaaf, Alexander, & Goodman, 2008) or to rate the child’s level of stress during a previously experienced event (Sales et al., 2005; Quas et al., 1999); however, if the parent witnessed the same event, such as a natural disaster, their report may be biased if they were distressed themselves. This autobiographical accuracy challenge, however, has been minimized in memory and stress studies that used observations of invasive medical procedures (e.g., child receiving inoculations; Alexander, Goodman et al., 2002). During the needed medical procedure, event accuracies were recorded by an observing researcher.
and children’s expressed distress were rated by a non-biased observer (Alexander, Goodman et al., 2002). Although the present study is not measuring autobiographical details, the laboratory setting to recall the emotional stimuli may help minimize accuracy bias, making accuracy easier to account for.

Emotion and Memory

Although multiple factors influence recall, this study aimed to focus on the role emotion plays in memory. Research shows support that emotion contributes a unique factor in information processing (Davidson et al., 2001; Kensinger et al., 2003). Davidson and colleagues (2001) found emotional stimuli were recalled more accurately by children than were non-emotional stimuli. Elementary school-age children listened to stories about everyday family life with topics describing happy, sad and angry events. Two conditions for each topic were created. High-emotion stories (e.g., “Maria noticed that her puppy did not look well and that made her sad”) included emotional behaviors thought to elicit stronger emotion compared to the low-emotion stories (e.g., “Maria noticed that her plant did not look well and that made her sad”; Davidson et al., 2001). All stories included emotional behaviors (e.g., “Ron was happy when his father told him that he was going to buy Ron a brand new bike”) as well as non-emotional (e.g., “Ron and his brother had a snack”).

Children remembered significantly more emotional behaviors than nonemotional behaviors, with no significance found between high and low emotion stories. Increased recall in emotional behaviors remained stable regardless of age, and for both immediate
recall and 24 hour delay conditions. Although differences were found in recall of emotion, valence (recalling negative events over positive ones) was not a significant factor. The authors suggest valence was not a significant contributor to memory because the events children recalled were not personally experienced (Davidson et al., 2001).

Other studies have shown valence differences in memory. In a study with adults, negative emotion words were more vividly remembered in a recognition task compared to neutral words (Kensinger & Corkin, 2003). Although contradictory to Christianson’s and Nilsson’s (1984) results of decreased recall for negative stimuli, the consistency of emotional valance playing an important role in memory remains. Stability in direction of recall of negative emotion may be absent due to differences in measures and stimulus type. One study used free recall of photographed faces (Christianson & Nilsson, 1984), which may be processed differently than recognizing emotionally eliciting words (Kensinger & Corkin, 2003).

The emotional state of a person during information processing, specifically encoding, is thought to also influence memory (Bishop et al., 2004). Clinically depressed adults and children have been reported to have increased recall for negative stimuli, which was also found true in a non-clinical population (Bishop et al., 2004). Bishop et al. (2004) administered The Depression Self-Rating Scale to non-clinical children, aged 5 to 11 years. Children were rated as either high or low depressed depending on their score which assessed physical and cognitive aspects of depression. Children then listened to short stories accompanied by a slide-show and were asked to retell each story the best they could immediately after a short counting delay. Assessing children’s recall of
positive, negative, and neutral stories, Bishop and colleagues found that children who scored high on the depression scale remembered more negative than positive stories, compared to the low depression group.

To better understand how information processing varies as when one’s state of mind is altered, several studies have focused on assessing individual’s autobiographical accounts of an experienced stressful event. Berliner and colleagues (2003) studied children who experienced a traumatic event at some point between 5 to 15 years of age. Children were asked to recall details from the event as well as from a positive event they experienced around the same timeframe. Traumatic events were found to yield fewer sensory details than the recalled positive events. Traumatic memories were also rated as having a greater impact (i.e., “turned out to be a big deal”) than positive events (Berliner et al., 2003). The authors suggest the decrease in sensory recall is possibly due to divided attention at time of distress, thus impacting encoding; and partially due to cognitive avoidance as a coping strategy to minimize anxiety, therefore affecting retrieval.

Bugental et al. (1992) also suggested that negative valence may affect the encoding process. Younger children (ages 5 to 6 years old) who viewed a video of a child receiving a routine medical exam by a doctor, showed an increase in memory errors if the child in the video appeared distressed (Bugental et al., 1992). Although this study assessed children’s memory of an event observed on video and not recollection of an autobiographical account, the autonomic measures of arousal recorded as the children watched the video showed similarly high activity during the negative scenario (child looking distressed) that would be expected in children who themselves experienced a
distressing event. The authors suggested that increased heart rate during negative valance scenarios, which correlated with processing errors, possibly reflected a deficit in attentional ability, resulting in encoding deficits (Bugental et al., 1992).

The timing of stress in regards to experiencing an event (i.e., before, during, or after) is another factor shown to influence memory (Quas et al., 1999). Children who experienced a needed medical procedure, a voiding cystourethrogram fluoroscopy (VCUG), were interviewed 9 to 63 months after procedure and asked additional questions regarding a false surgery they did not undergo (Quas et al., 1999). Children’s level of stress and fear before, during, and after the procedure were rated by their parents and compared to the children’s recall responses to assess the influence of stress on accuracy and suggestibility of events. Children expressing higher levels of distress before and during the procedure were less suggestible when responding to false statements, and children expressing more fear during the VCUG as well as continued expression of high distress after the procedure, were more likely to freely recall less correct information.

Whereas Quas and colleagues (1999) studied effects of stress on memory accuracy and suggestibility, Sales and colleagues (2005) researched stress influences on emotional and cognitive content of recall. The study included children in different SES backgrounds who experienced Hurricane Andrew and compared relations between stress, memory, and psychological functions. Interviews with children were conducted immediately after the storm, and again 6 years later.

Children rated as higher in levels of stress immediately after the hurricane and 6 years later, recalled less information overall. In the initial interview, highly distressed
children were more likely to use less positive emotion words (e.g., happy, glad) and fewer cognitive processing words (e.g., I thought, I wondered) when freely recalling the experience. When interviewed 6 years later, children with high levels of stress recalled the event using more negative emotion words (e.g., sad, scared) and more cognitive processing words than children rated lower in stress level. Children who recalled more information and used a greater number of positive emotion words were more likely to have better psychological outcomes 6 years later. The authors suggested that greater understanding and recollection of a traumatic event influences emotional processing which might be a key factor in helping children cope with the event and lead to better psychological outcomes in future years (Sales et al., 2005). Children reporting more information about a traumatic event may be more willing to share the account as a way to cope by seeking social support, thus reducing stress; however, the decrease of information shared by other children may be an avoidant coping mechanism to reduce any anxiety brought on by stressful recollections (Sales et al., 2005). Seeking support and avoidant behaviors are also characteristics found in attachment qualities. The next section discusses how attachment relates to memory.

Memory and Attachment

The framework of attachment theory is a collaboration of Bowlby's ideas of the effects maternal interaction has on infants, and Ainsworth's ability to create an empirical study testing his theory (Ainsworth & Bowlby, 1991). Today, researchers continue to utilize this framework to gain greater knowledge of how attachment influences
development, including the development of sensory processing (Jerome & Liss, 2005), emotion regulation (Berlin & Cassidy, 2003), memory (Gentzler & Kerns, 2006), and coping (Seiffge-Krenke & Beyers, 2005). In regards to memory, attachment security has shown to affect memory in adults: increases in security predicted greater recall of both positive and negative stimuli (Zeijlmans van Emmichoven et al., 2003).

To better understand the mechanism of the internal working model and how attachment influences the processing of information, Leiberman and colleagues (1999) identified two qualities of attachment: availability and dependency. These security subscales have been used to assess changes in aspects of attachment across middle childhood years (Kerns et al., 2006); however, research is still limited in how these qualities of attachment affect cognitive process (i.e., memory) during middle childhood.

Bowlby’s construct of attachment integrates a patchwork of ethological and psychological concepts, as well as information processing (Bretherton, 1992). He suggests that experiences are encoded and evaluated unconsciously, then stored. New experiences are thought to activate access to this stored information and use past evaluations to assess new stimuli. Research continues to grow in areas of memory and attachment, and to explore further how attachment style influences memory as appraisal of new stimuli may affect how information is coded, stored, and later retrieved.

Attachment security in adults has been shown to influence memory. In a clinical study using out-patient adults diagnosed with anxiety disorders and a control group of a non-clinical population, secure adults had greater free recall of positive, threatening, and neutral words they previously viewed (Zeijlmans van Emmichoven et al., 2003). Out of
the clinical population, secure adults were more likely to recall threatening stimuli compared to insecure, clinical adults.

Attachment and memory studies have also included child populations. When viewing pictures of positive, negative, and neutral interaction between mother and child, insecure-avoidant children were more likely to look away from all drawings more often than other children (Kirsh & Cassidy, 1997). After viewing pictures, children were told a series of stories about a mother’s reaction to her injured child: a rejecting mother, a sensitive mother and an over-reactive mother. Children’s memory of all three attachment-related scenarios was tested using cued recall immediately after each story. Secure children had greater recall of stories. Compared to insecure-avoidant children, secure children were more likely to recall stories that described mothers as responsive to their child. Secure children also had better recall on stories where mothers rejected their children compared to insecure-ambivalent children. These findings suggest that the decreased attention in insecure children, may affect the encoding of information, thus decreasing memory recall of events.

Kirsh and Cassidy’s (1997) and Zeijlmans van Emmichoven and colleagues’ (2003) findings support the theory that attachment security is associated with greater recall of negative stimuli, specifically for threatening and attachment-related conditions. Other studies focused on memory differences within attachment styles have found that secure children had increased memory for positive over negative events, and insecure children remembered more negative events (Belsky et al., 1997). In one study, 3-year-old boys watched a puppet show incorporating happy and sad events and then were given
a recognition task (Belsky et al., 1997). Children were shown pairs of pictures depicting the puppet show events and asked which card accurately showed what happened in the puppet show they had previously watched. Although memories for negative events were more prevalent in insecure children than the positive events, this does not indicate negative valance stimuli were recalled more from insecure children compared to secure children. This study did not report valence memory differences between attachment styles and used recognition as measure of recall. Other research finding memory differences between secure and insecure attachment styles used free recall and reported finding no recall differences between attachment groups when recognition measures were used (Zeijlmans van Emmichoven et al., 2003).

Other factors may also be entwined in the attachment-memory matrix. Studies have revealed that in both children and adults, seeking social and emotional support can reduce stress (Lazarus & Folkman, 1984; Sandler, Tein, & West, 1994). Secure children who perceive their caregivers as accessible and reliable in times of distress, and utilize their parents when they are upset, are theorized to be actively coping to decrease their own stress. This active communication with caregiver, seeking social support, is also a quality exhibited by secure children, and therefore may influence children’s memories of stressful events. It is suggested this willingness or reluctance to share distressing events is a reflection of the child’s coping strategy to reduce stress the best they know how (Sales et al., 2005). For example, a child willing to discuss traumatic event details may be seeking social support to decrease his/her stress level, thus increasing his/her own psychological well-being; whereas a child revealing little detail information may be
exhibiting avoidant coping behaviors to prevent feeling anxious or distressed (e.g., Sales et al., 2005). Hence, it is plausible that coping strategies, which are influenced by past experiences (Contreras et al., 2000), may mediate the association between attachment and memory.

Coping

Coping has been defined as the outcome aspect of emotion regulation that occurs as a strategy to regulate oneself when internal or external stressors are too taxing on the individual (Contreras et al., 2000; Folkman & Lazarus, 1988). Several studies investigating the mechanism of the internal working model relate attachment to the process of emotion regulation, specifically coping strategies (Contreras et al., 2000; Seiffge-Krenke & Beyers, 2005). Sieffge-Krenke and Beyers (2005) found that secure adolescents and young adults used more active coping styles than other strategies and Contreras and colleagues (2000) reported that constructive coping (support seeking and problem solving) was used more by children rated greater in attachment security. How this emotion regulation outcome, deemed coping strategies, mediates the relation between attachment styles and memory in middle childhood is yet to be determined.

Studies of coping strategies have focused on individual differences. Byrne (2000) found gender and age differences in coping strategies of children 7- to 12-years old. Boys were more likely to use problem-focused coping strategies and girls used more emotion-focused strategies to manage general fears and anxieties. Older girls used more emotion-focused strategies than younger girls who used problem-solving strategies. The current
study aimed to explore individual differences in attachment style in relation to coping strategies.

Parent-child communication is also thought to relate to coping. Fivush and Sales (2006) studied coping and attachment in relation to parent-child conversations, observing middle childhood-aged children and their parents discussing a stressful event they experienced together. Conversations about life threatening events (asthma attacks) showed that more anxiously-attached mothers talked more about the event and gave more explanations. When conversations included a conflict between mother and child, anxious mothers talked more about other people's emotions who were involved in the conflict (vs. their own or their child's emotions), than less anxious mothers. Researchers suggested that anxious mothers focused on others as a coping strategy to lessen the emotional intensity of the event discussed. This may be a less effective coping strategy to handle uncomfortable emotions. When looking at the relation between coping and conversation styles, mothers, who indicated they used more effective coping strategies, appeared to be more engaged with their child, used more explanations, and had greater emotional expression. Children of mothers who used more effective coping were reported to show more flexible coping (Fivush et al., 2006). This suggests that parents' communication with their children may affect children's coping styles.

Other coping and parent-child communication research has signified greater emotional openness between parent and child assists the child in building more constructive coping skills (Gentzler, Contreras-Grau, Kerns & Weimer, 2005). In one study using a middle childhood population, mothers and fathers reported how they tended
to react to their child’s negative emotions, and their children talked about how much of their negative emotions they are willing to share with their parents (Gentzler et al., 2005). Results showed that both parents’ reactions to their children’s negative emotions and children’s emotional expressiveness toward their parents were predictors of coping strategies.

Mother-child conversations regarding a negative event showed mothers who conversed more about negative events exhibited more acceptance and encouragement towards their children verbally expressing their negative emotions (Gentzler et al., 2005). Children of these “openly expressive” mothers were more likely to use constructive coping styles. Constructive coping styles were also more common among children who indicated they were more willing to share their emotions with their mother as well as children who were rated as having greater emotional openness during the observed mother-child discussion. Constructive coping was defined as coping styles that relied more on support-seeking and problem-solving strategies and less avoidant or aggressive behaviors (Gentzler et al., 2005). Attachment qualities have also included support-seeking and avoidant behaviors.

The present study aimed to decipher the relation between attachment and coping in middle childhood. Coping is believed to mediate emotions by transforming appraisal and affecting outcomes (Folkman & Lazarus, 1988). Developmental changes during middle childhood may also be a factor in information processing. When looking at attachment behaviors over time, older children indicated that they utilized and sought support from their parent less than when they were younger, but their perception of their
parents’ availability remained constant (Kerns et al., 2006). In the current study, it was proposed that attachment styles and coping strategies would relate to emotions elicited by emotion-evoking and attachment-related stimuli, thus affecting memory outcomes in middle childhood children.

One limitation of memory and coping research has been the ability to control for event details during distress. As discussed earlier, memory-distress studies often rely on interviewing people who experienced a natural disaster, illness, or trauma in which reliability in accuracy of details are often compromised by lack of a non-biased witness. Other studies involving possible distress on the child, such as the Strange Situation when the infant’s mother leave the room, provide opportunity to observe the child’s emotion, but cannot measure memory of the event.

Recording stressful medical procedures has been a reliable source to observe distress and account for memory accuracy; however, they are usually limited to recording only one emotional stimulus that cannot be controlled for the precise emotion it elicits. To better understand cognitive processing and the influence individual differences have on memory, there is a need to study recall of a variety of emotion-evoking stimuli and simultaneously provide some stimuli control. Although the present study did not examine autobiographical accounts of personally experienced events, it did however, incorporate recalling multiple stimuli designed to elicit various emotions (i.e., happy, sad, reunion, separation, and neutral pictures and stories) that were observed by the children.

The present study incorporated self-reports of attachment security and coping strategies to measure individual differences in middle childhood-age children to address
effects that individual differences may have on information processing. First, it was hypothesized that differences in attachment qualities would predict children’s coping strategies. Specifically, preoccupied and avoidant coping tactics would be employed less by more secure children. Next, it was hypothesized that children who are more secure, and specifically those who perceive their parents as more available, would have increased recall of emotional events, particularly the negatively valenced events. Lastly, it was hypothesized that children’s coping response during distressing circumstances would mediate the relation between attachment and memory.
Chapter 3

METHODS

Research Question

The purpose of this research is to address four questions pertaining to memory, attachment and coping in middle childhood. First, does attachment quality relate to memory of emotionally valenced stimuli? Second, does attachment quality relate to memory of attachment related stimuli? Third, does attachment quality predict coping strategies in children? Finally, is the relation between attachment and memory moderated by coping strategies?

Research Design

This quantitative study examined relations between memory, attachment and coping and was a part of a larger study designed by Kristen Weede Alexander and Karen Davis O’Hara, conducted in Rosemarie Kraft’s laboratory. Attachment variables were assessed using Kerns and colleagues’ (2001) self-report attachment security questionnaire which included a quantitative measure of security, as well as attachment dependency and attachment availability subscales (Lieberman et al., 1999) to further assess attachment style. Children’s coping strategies were assessed for preoccupied and avoidant coping
styles using Children’s Coping Strategies Checklist (Finnegan et al., 1996). Memory outcomes were determined through free recall assessment of a laboratory event. This study examined if memory differences exist among various emotional stimuli (attachment-related and valence), and if this variability is partially explained by participants’ attachment and coping styles.

As seen in previous memory studies with children, I predicted that older children would have increased recall compared to younger children. Children’s attachment quality was proposed to predict children’s memory of positive and negative valenced and attachment-related stimuli, such that children reporting more perceived security and parent availability would have greater recall of emotional stimuli, specifically negative valenced stimuli. As found in some adult studies, I expected that attachment styles would be a predictor of coping strategies in children, such that children perceiving themselves as more secure would be less likely to use preoccupied or avoidant coping. Because coping is known to relate to memory of events, it was predicted that coping strategies would mediate the relation between attachment and memory.

Participants

Forty-four children between 7 and 12 years of age (M = 9.65 years, SD = 1.31 years, 64.9% females) from a university city in California and surrounding areas participated in the study. Participants were recruited through community events, after-school programs, and through advertisement (newspaper, posters). Children participating
were right-handed, with English as their native language, and had no known
developmental delays according to their parents. There are missing data for 4 participants
who either did not return for session 2 or refused to participate during session 1.

Measures

Memory Slide Show

Children viewed a slide show containing 24 photographs of people or animals
accompanied by a 30 second narration depicting details of each event. Picture/story pairs
were determined to evoke either happy, sad, attachment separation or attachment reunion
emotions, or were considered emotionally neutral as pre-rated by university students.
Emotional slides reflected items comparable to those images children might see when
viewing the news or news magazines. An example of a “happy” image showed children
on a waterslide; the accompanying story stated:

Pat is at the amusement park with a close friend from school. It is the summer and
they had the day off, so they got to stay there all day. They have been going on all
their favorite rides and having a wonderful time. They both love being outdoors
and this is their favorite place. It is a very hot day, and they agree that the
waterslides are the most refreshing. After this ride, Pat will go get an ice cream
cone.

Each picture had an alternative image equal in content (red and black snake and yellow
and black snake) with an identical story used creating two sets of images, 48 pictures
total. Children either viewed one set or the other during the encoding phase. To help
prevent order-effect, each set was counterbalanced resulting in four different picture/story
variations. Image order began with neutral images and ended with attachment-related images; remaining pictures were shown randomly. The attachment system is thought to be activated when encountering attachment-related scenarios/stimuli; therefore, to minimize any occurrence of the attachment system being engaged when viewing happy or sad images, attachment-related images and stories concluded the slide show. Between each picture/story pair, random shapes appeared on the screen as a distracter.

The following week, children returned to the laboratory and were asked to freely recall any details from any of the pictures or stories they saw and heard the previous week. Verbal instructions read:

I want to see what you can remember from last time you were here, last week. I am going to ask you to tell me about some of the things you saw and heard. Remember when you sat here and watched a show with some pictures and stories? That is what I am asking you about now. I am not sure exactly what you heard and saw, so I need you to tell me every thing that you can.

The researcher gave children three prompts, such as asking “Anything else?” after each picture/story was initially recalled. Children were allowed unlimited time to recall picture/story details and sessions ended when children responded “No” after asked if they could recall another picture or story they saw or heard. Free recall sessions were video and audio taped and children’s answers were coded by trained researchers. Children accurately identifying any detail of a picture or story were scored as positive in regards to remembering that stimuli.

The measure of free recall used in the current study was proportion free recall per emotion category. That is, for happy, sad, reunion, and separation, because children viewed three picture-story pairs in each category, their total recalled in each category was
divided by three. For neutral and composite high attachment (separation, reunion), low attachment (sad, happy), negative valence (sad, separation), and positive valence (happy, reunion), there were six total picture-story pairs viewed and thus the proportions were created by dividing the total recalled by six.

Children’s Attachment

To assess children’s perceived attachment to their parent, the Security Scale was administered (Kerns et al., 2001). This middle childhood attachment instrument is a self-report measure focused on the child’s perception of security with their primary caregiver, specifically, responsiveness and availability of an attachment figure, tendency to rely on an attachment figure during stressful situations, and communication with the attachment figure (Kerns, Klepac, & Cole, 1996). The 15 Security Scale items were verbally administered to avoid children’s reading and response inaccuracies. A response board was also provided as an option for children to point to their selected answer. Security items were formatted such that children were given attachment related statements regarding two types of children and asked which child was most like them, following Harter’s (1982) “Some kids... Other kids” design (Kerns et al., 1996). Children then rated whether this was “Sort of true” or “Really true” for them. For example, one item from the Security Scale states:

Some kids find it easy to trust their mom/dad. BUT Other kids are not sure if they can trust their mom/dad.

Very true for me  Sort of true for me  Sort of true for me  Really true for me
The *Security Scale* consisted of 15 items, which were scored from 1 to 4, ($M = 3.41$, $SD = .37$, and ranged from 2.20 to 4.00; Cronbach’s alpha = .77; Table 1). Security composite scores were calculated by computing the average of the 15 items; higher scores indicated more perceived security with caregiver (i.e., higher attachment security). Children were asked to respond about their primary caregiver to ensure security scores of children would reflect their attachment perception of the parent participating in the parent-child communication measure. Previous studies have reported good reliability (from .63 - .93) and validity when using the *Security Scale* as a self-report attachment measure for middle childhood (Kerns et al., 1996; Kerns et al., 2001; Lieberman et al., 1999).

Subscales of security were used to assess children’s perception of their parent’s availability and their dependency on their parent (Lieberman et al., 1999). Dependency subscale items included 9 of the 15 *Security Scale* items that reflected children’s dependency on parents. Dependency items were averaged to calculate children’s dependency score ($M = 3.25$, $SD = .45$, and ranged from 2.00 to 4.00; Cronbach’s alpha = .71; Table 1). The availability subscale included the remaining 6 out of 15 *Security Scale* items that reflected perceived parental availability qualities. Children’s responses to the availability items were averaged to calculate their availability score ($M = 3.65$, $SD = .44$, and ranged from 2.33 to 4.00; Cronbach’s alpha = .70; Table 1). Higher availability and dependency scores indicated that children felt their parent was more available and
children more dependent on parents’ assistance when needing help (Lieberman et al., 1999).

Children’s Coping Style

The Children’s Coping Strategies Questionnaire (Finnegan et al., 1996) was used to assess children’s preoccupied and avoidant coping styles. The researcher verbally communicated questions and responses to the child to provide consistency in delivery, as younger children may not obtain the reading skills needed to self-administer this questionnaire. Children were read 28 scenarios followed by two examples of how other children felt in the given situation and were asked to choose which best answer described how he or she felt. For example, a preoccupied strategy on the question read:

You and your mother are at a busy shopping mall in Miami and suddenly you can’t find your mother. You are upset, but a little later you find each other.

Some kids would soon get over being upset. BUT Other kids would stay worried that they might get separated again.

Very true Sort of true Sort of true Really true
for me for me for me for me

Children were then given options to choose the degree to which they were like that child, sort of true or really true. This gave a 4-point Likert scale to measure the degree of preoccupied coping. Items were scored from 1 to 4 with mean preoccupied coping scores averaging 2.55, \(SD = .68\), ranged 1.00 to 4.00; Cronbach’s alpha = .82); and mean avoidant coping scores averaging 1.49, \(SD = .45\), ranged 1.00 to 2.50; Cronbach’s alpha = .81; Table 1). Items reflecting preoccupied coping were averaged to calculate the
child’s mean preoccupied coping score; likewise for mean avoidant coping scores. The children’s questionnaire was administered at the end of the first session, before the attachment questionnaire.

Procedure

As parents arrived at the lab, researchers explained the procedures to the parent and child. Parents signed a consent form and children 12-years and older signed an assent form. All children were read an assent form and verbally agreed to participate before beginning any procedures. During session one, children were led into an adjacent room to view the slide show and the session was videotaped. In the larger study, children’s brain activity (EEG) and skin conductance were also recorded. At the conclusion of the presentation, parents and children were allowed unlimited time to discuss what they saw and heard on the slide show. Parents were then asked to not discuss the stories and images until the second session concluded, unless brought up by the child. Cognitive tasks were administered as the final part of session one. Children were allowed to select a small toy, thanked for participating and reminded of the second session.

Approximately one week later children returned to the laboratory and were asked to freely recall what they remember about the pictures and stories they saw the week before. Responses were recorded by the researcher as well as audio taped. Cued recall questions were asked next, followed by a recognition task that involved recording brain activity. A brief attention task was next administered. At the end of session two, children
were administered an attachment and coping questionnaire, followed by additional
cognitive tasks. Parents also completed questionnaires which were not included in the
present study. Children received another small toy and a certificate of participation.
Chapter 4

RESULTS

Preliminary Analyses

The present study aimed to examine the relation among attachment styles, coping strategies, and memory. Descriptive statistics can be found in Table 1. Children’s security scores ranged from 2.20 to 4.00 \((M = 3.41, SD = .37)\). When security scales were separated into subscales (Lieberman et al., 1999), children’s attachment availability scores ranged from 2.33 to 4.00 \((M = 3.65, SD = .44)\) and attachment dependency scores ranged from 2.00 to 4.00 \((M = 3.25, SD = .45)\). Children’s preoccupied coping strategy ranged from 1.00 to 4.00 \((M = 2.55, SD = .68)\) and avoidant coping ranged from 1.00 to 2.50 \((M = 1.49, SD = .45)\). Free recall proportion memory for all pictures ranged from .00 to .38 \((M = .16, SD = .10)\), such that the average free recall from children was 3 to 4 of the 24 displayed pictures. One child did not freely recall any pictures or stories, and two children recalled the greatest number of pictures at 37.5\% (9 out of 24 pictures).

Correlational analyses followed by multiple regressions were used to identify which coping strategies and attachment styles were related to memory. Correlations between gender and other variables were largely nonsignificant, with two exceptions. Gender was positively related to children’s avoidant coping, \(r = .45, p < .05\), such that
girls were more likely to indicate using avoidant coping than boys; and to free recall memory for positive stimuli, \( r = .39, p < .05 \), such that girls remembered more positive (i.e., happy and reunion) stimuli than did boys. Gender is not considered further.

Hypothesis Testing

Correlational Analyses

Age predicting coping, attachment, and memory. Correlations with age and other variables were examined (Table 2). Age was largely nonsignificant, with one exception. For memory, free recall of separation stimuli was negatively related to memory, \( r = -.38, p < .05 \), such that as children aged, they recalled fewer separation stimuli. Age was not associated with any other memory, attachment, or coping variables. Because of its relation with memory in this study and the body of memory research, age is included in further analyses.

Child attachment predicting coping. Correlations between children’s attachment security composite and subscales (dependency and availability) with coping were examined. Correlations among attachment and coping can be found in Table 2. Children’s composite security was positively related to preoccupied coping, \( r = .40, p < .05 \), and negatively related to avoidant coping, \( r = -.74, p < .001 \), indicating that children who reported feeling more secure with their caregiver were more likely to increase their use of preoccupied coping and decrease their use of avoidant coping.
Table 1

*Means for Predictor and Memory Variables*

<table>
<thead>
<tr>
<th></th>
<th>$M$</th>
<th>$SD$</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td>9.65</td>
<td>1.31</td>
<td>7.50-12.67</td>
</tr>
<tr>
<td><strong>Attachment Quality</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Security Composite</td>
<td>3.41</td>
<td>.37</td>
<td>2.20-4.00</td>
</tr>
<tr>
<td>Availability</td>
<td>3.65</td>
<td>.44</td>
<td>2.33-4.00</td>
</tr>
<tr>
<td>Dependency</td>
<td>3.25</td>
<td>.45</td>
<td>2.00-4.00</td>
</tr>
<tr>
<td><strong>Coping Strategy</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preoccupied</td>
<td>2.55</td>
<td>.68</td>
<td>1.00-4.00</td>
</tr>
<tr>
<td>Avoidant</td>
<td>1.49</td>
<td>.45</td>
<td>1.00-2.50</td>
</tr>
<tr>
<td><strong>Free Recall Proportion</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sad</td>
<td>.32</td>
<td>.29</td>
<td>.00-.67</td>
</tr>
<tr>
<td>Happy</td>
<td>.05</td>
<td>.11</td>
<td>.00-.33</td>
</tr>
<tr>
<td>Separation</td>
<td>.31</td>
<td>.24</td>
<td>.00-.67</td>
</tr>
<tr>
<td>Reunion</td>
<td>.10</td>
<td>.19</td>
<td>.00-.67</td>
</tr>
<tr>
<td>Neutral</td>
<td>.07</td>
<td>.10</td>
<td>.00-.07</td>
</tr>
<tr>
<td>High Attachment</td>
<td>.20</td>
<td>.16</td>
<td>.00-.67</td>
</tr>
<tr>
<td>Low Attachment</td>
<td>.14</td>
<td>.12</td>
<td>.00-.33</td>
</tr>
<tr>
<td>Positive</td>
<td>.07</td>
<td>.11</td>
<td>.00-.33</td>
</tr>
<tr>
<td>Negative</td>
<td>.27</td>
<td>.18</td>
<td>.00-.50</td>
</tr>
<tr>
<td>All Pictures</td>
<td>.16</td>
<td>.10</td>
<td>.00-.38</td>
</tr>
</tbody>
</table>
When security was broken into subscales, attachment dependency, but not attachment availability, was related to coping. Attachment dependency was significantly related to preoccupied coping, $r = .49, p < .01$, and avoidant coping, $r = -.81, p < .001$. As children felt they were able to depend on their primary caregiver more, they used more coping strategies involving greater vigilance and less involving avoidance toward their primary caregiver. Due to high correlations between children’s attachment and coping scales, only attachment constructs will be included in memory analysis.

**Child attachment security predicting memory.** A series of correlations were conducted including children’s free recall and attachment variables. Specifically, correlations between security and five memory variables (i.e., happy, sad, reunion, separation, and neutral) and their composites were completed. Children’s composite security was significantly associated recall of high attachment-related stimuli (i.e., separation and reunion), $r = .39, p = .05$, and separation, $r = .35, p < .05$ (Table 2). Children who reported feeling more secure with their caregiver recalled more high attachment stimuli, specifically those pictures and stories displaying separation scenarios. Regression analyses followed to explore further these results and are presented in a later section.

**Child attachment availability and dependency predicting memory.** Lieberman and colleagues (1999) separated children’s security into two components: availability and dependency. Doing so permits investigation of different qualities of attachment security and may elucidate the nature of the relation between attachment and memory. Correlation analyses including attachment availability and dependency with memory variables were
examined. Results revealed a significant association between attachment availability with memory for high attachment (i.e., separation and reunion), $r = .39, p < .05$, reunion, $r = .34, p < .05$, and positively valenced stimuli (i.e., happy and reunion), $r = .33, p = .05$ (Table 2). As children viewed their caregivers as more available, their recall of stimuli high in attachment relevance, specifically for reunion, and positive valance increased. Attachment dependency was not a predictor of memory; however, there was a trend towards a positive association with recall of separation stimuli, $r = .31, p = .07$.

Regression Analyses

To further explore these correlations, a series of regressions was conducted to account for children’s age and general mnemonic ability (i.e., free recall of neutral stimuli). Memory scores for each emotion (i.e., happy, sad, reunion, separation, and composites of high attachment-related, low attachment-related, positive valence, and negative valence) were entered as the dependent variable for each regression. Predictors included attachment variables, age, and memory for neutral scenarios. The single attachment security score was used in the first set of regressions, and the two attachment subscales (i.e., availability and dependency) were entered in the second set.
Table 2

Correlations among Predictor Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Attachment Quality</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Security Composite</td>
<td>.00 (36)</td>
<td></td>
<td>.09 (36)</td>
<td>.73*** (36)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Availability</td>
<td>.09 (36)</td>
<td>.06 (36)</td>
<td></td>
<td>.06* (36)</td>
<td>.36* (36)</td>
<td></td>
</tr>
<tr>
<td>4. Dependency</td>
<td>-.06 (36)</td>
<td>-.06 (36)</td>
<td>.90*** (36)</td>
<td></td>
<td>.36* (36)</td>
<td></td>
</tr>
<tr>
<td><strong>Coping Strategies</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Preoccupied</td>
<td>-.03 (29)</td>
<td>.40* (28)</td>
<td>.09 (28)</td>
<td>.49** (28)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Avoidant</td>
<td>.04 (29)</td>
<td>-.74*** (28)</td>
<td>-.30 (28)</td>
<td>-.81*** (28)</td>
<td>-.47** (29)</td>
<td></td>
</tr>
<tr>
<td><strong>Free Recall</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Sad</td>
<td>.10 (37)</td>
<td>-.10 (34)</td>
<td>.01 (34)</td>
<td>-.15 (34)</td>
<td>.10 (27)</td>
<td>.05 (27)</td>
</tr>
<tr>
<td>8. Happy</td>
<td>.05 (37)</td>
<td>.19 (34)</td>
<td>.06 (34)</td>
<td>.23 (34)</td>
<td>.26 (27)</td>
<td>-.22 (27)</td>
</tr>
<tr>
<td>9. Separation</td>
<td>-.38* (37)</td>
<td>.35* (34)</td>
<td>.25 (34)</td>
<td>.31* (34)</td>
<td>.10 (27)</td>
<td>-.39* (27)</td>
</tr>
<tr>
<td>10. Reunion</td>
<td>.04 (37)</td>
<td>.22 (34)</td>
<td>.34* (34)</td>
<td>.80 (34)</td>
<td>.19 (27)</td>
<td>-.30 (27)</td>
</tr>
<tr>
<td>11. Neutral</td>
<td>.17 (37)</td>
<td>-.06 (34)</td>
<td>-.25 (34)</td>
<td>.08 (34)</td>
<td>-.28 (27)</td>
<td>.04 (27)</td>
</tr>
<tr>
<td>12. Positive</td>
<td>.06 (37)</td>
<td>.28 (34)</td>
<td>.33* (34)</td>
<td>.17 (34)</td>
<td>.29 (27)</td>
<td>-.37* (27)</td>
</tr>
<tr>
<td>13. Negative</td>
<td>-.24 (37)</td>
<td>.17 (34)</td>
<td>.12 (34)</td>
<td>.16 (34)</td>
<td>.16 (27)</td>
<td>-.31 (27)</td>
</tr>
<tr>
<td>14. High Attachment</td>
<td>-.26 (37)</td>
<td>.39* (34)</td>
<td>.39* (34)</td>
<td>.28 (34)</td>
<td>.18 (27)</td>
<td>-.44* (27)</td>
</tr>
<tr>
<td>15. Low Attachment</td>
<td>.05 (37)</td>
<td>-.02 (34)</td>
<td>-.06 (34)</td>
<td>.01 (34)</td>
<td>.26 (27)</td>
<td>-.17 (27)</td>
</tr>
</tbody>
</table>

*Note: Ns are indicated in parentheses next to each correlation. *p < .10; **p < .05; ***p < .01; ****p < .001 (two-tailed test)*
Security predicting memory. The regression predicting recall of high attachment stimuli was significant, \( Adj. R^2 = .19, p < .05 \), with security being a positively predictor, \( \beta = .40, p > .05 \) (see Table 3). When looking at recall of separation and reunion independently, variation in recall of separation, but not reunion stimuli was significantly accounted for, \( Adj. R^2 = .26, p < .01 \), with security related positive predictor, \( \beta = .36, p > .05 \) (Table 4). Recall of separation stimuli was also negatively related to age, \( \beta = -.42, p = .01 \). Children with more positive overall security scores were more likely to recall attachment related events, specifically scenarios involving parent-child separation, even when partiailling out the effects of age and cognitive ability. Regressions predicting recall of happy, sad, valence composites, and reunion variables were not significant (Table 5).

Table 3

Regression including Security to Predict High Attachment Stimuli

<table>
<thead>
<tr>
<th></th>
<th>( \beta )</th>
<th>( t )</th>
<th>( F (3, 30) )</th>
<th>( \text{adj}R^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>-.29</td>
<td>-1.82</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Neutral</td>
<td>.24</td>
<td>1.46</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Security</td>
<td>-.40*</td>
<td>2.56</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Model</td>
<td></td>
<td></td>
<td>3.55*</td>
<td>.19</td>
</tr>
</tbody>
</table>

* \( p \leq .05 \)   ** \( p \leq .01 \)
Table 4

*Regression including Security to Predict Separation Stimuli*

<table>
<thead>
<tr>
<th></th>
<th>$\beta$</th>
<th>$t$</th>
<th>$F (3, 30)$</th>
<th>adj$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>-.42**</td>
<td>-2.71</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Neutral</td>
<td>.30</td>
<td>1.94</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Security</td>
<td>.36*</td>
<td>2.42</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Model</td>
<td></td>
<td></td>
<td>4.86**</td>
<td>.26</td>
</tr>
</tbody>
</table>

* $p \leq .05$  ** $p \leq .01$

Table 5

*Non-significant Regressions Including Security*

<table>
<thead>
<tr>
<th></th>
<th>$F$</th>
<th>df</th>
<th>adj $R^2$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Happy</td>
<td>.84</td>
<td>(3,20)</td>
<td>-.02</td>
<td>.48</td>
</tr>
<tr>
<td>Sad</td>
<td>.63</td>
<td>(3,20)</td>
<td>-.04</td>
<td>.60</td>
</tr>
<tr>
<td>Negative</td>
<td>1.07</td>
<td>(3,20)</td>
<td>.01</td>
<td>.38</td>
</tr>
<tr>
<td>Positive</td>
<td>1.03</td>
<td>(3,20)</td>
<td>.00</td>
<td>.39</td>
</tr>
<tr>
<td>Reunion</td>
<td>.51</td>
<td>(3,30)</td>
<td>-.05</td>
<td>.68</td>
</tr>
<tr>
<td>Low Attachment</td>
<td>.19</td>
<td>(3,20)</td>
<td>-.08</td>
<td>.90</td>
</tr>
</tbody>
</table>
Attachment availability and dependency predicting memory. The second set of regressions, which was designed to decipher which security components (i.e., availability or dependency) predicted memory of attachment-related stimuli, revealed that variability in the recall of the high attachment stimuli was significantly predicted, \( Adj. R^2 = .27, p = .01 \), with attachment availability positively predicting, \( \beta = .53, p < .01 \). Recall of high attachment stimuli was also negatively related to age, \( \beta = -.39, p < .05 \), and positively related to cognitive ability (recall of neutral stimuli), \( \beta = .36, p < .05 \) (Table 6). When considering high attachment-related stimuli individually, variation in recall of separation stimuli was significantly predicted, \( Adj. R^2 = .27, p = .01 \) (Table 7). Attachment availability was positively related, \( \beta = .37, p < .05 \). As found with recall of high attachment-related stimuli, age was also negatively related, \( \beta = -.47, p < .01 \), and cognitive ability positively related, \( \beta = .37, p < .05 \), to recall of separation stimuli.

Independent of children’s age or overall recall ability, the more children viewed their parents as available to them, the more likely they were to recall high attachment scenarios, specifically separation stimuli. Regressions equations predicting recall of reunion, happy, sad, or valence composites were not significant (Table 8).
Table 6

Regression using Availability and Dependency to Predict High Attachment Stimuli

<table>
<thead>
<tr>
<th></th>
<th>$\beta$</th>
<th>$t$</th>
<th>$F (4, 29)$</th>
<th>$adjR^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>-.39*</td>
<td>-2.44</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Neutral</td>
<td>.36*</td>
<td>2.20</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Availability</td>
<td>.53**</td>
<td>2.97</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Dependency</td>
<td>.01</td>
<td>.08</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Model</td>
<td></td>
<td></td>
<td>4.02**</td>
<td>.27</td>
</tr>
</tbody>
</table>

* $p \leq .05$  ** $p \leq .01$

Table 7

Regression using Availability and Dependency to Predict Separation Stimuli

<table>
<thead>
<tr>
<th></th>
<th>$\beta$</th>
<th>$t$</th>
<th>$F (4, 29)$</th>
<th>$adjR^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>-.47**</td>
<td>-2.96</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Neutral</td>
<td>.37*</td>
<td>1.27</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Availability</td>
<td>.37*</td>
<td>2.07</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Dependency</td>
<td>.10</td>
<td>.58</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Model</td>
<td></td>
<td></td>
<td>4.03**</td>
<td>.27</td>
</tr>
</tbody>
</table>

* $p \leq .05$  ** $p \leq .01$
Table 8

*Non-significant Regressions Including Availability and Dependency*

<table>
<thead>
<tr>
<th></th>
<th>$F$</th>
<th>df</th>
<th>adj $R^2$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Happy</td>
<td>.80</td>
<td>(4,29)</td>
<td>-.03</td>
<td>.54</td>
</tr>
<tr>
<td>Sad</td>
<td>.47</td>
<td>(4,29)</td>
<td>-.07</td>
<td>.76</td>
</tr>
<tr>
<td>Negative</td>
<td>.83</td>
<td>(4,29)</td>
<td>-.02</td>
<td>.52</td>
</tr>
<tr>
<td>Positive</td>
<td>1.12</td>
<td>(4,29)</td>
<td>.02</td>
<td>.37</td>
</tr>
<tr>
<td>Reunion</td>
<td>1.16</td>
<td>(4,29)</td>
<td>.02</td>
<td>.35</td>
</tr>
<tr>
<td>Low Attachment</td>
<td>.29</td>
<td>(4,29)</td>
<td>.02</td>
<td>.88</td>
</tr>
</tbody>
</table>
Chapter 5

DISCUSSION

The present study aimed to investigate individual differences in information processing, specifically memory for emotional and attachment-related stimuli, and whether coping strategies contribute to the relation between attachment qualities and memory of emotional and attachment-related events. Studies have found links between attachment and emotional memory in preschoolers and adults, but there continues to be a need to learn about emotion and cognitive processing during middle childhood. Developmental changes in children’s coping and parental utilization (Kerns et al., 2006) during middle childhood suggest other social and cognitive factors may be modified during these years and possibly concurrently contribute to information processing. The present results supported the hypotheses by showing that children rating themselves with higher attachment security recalled more high-attachment stimuli, specifically those involving separation. When attachment security was separated into dependency and availability subscales, these results applied specifically to the availability subscale; children who perceived their parents as more available recalled more high attachment-related stimuli, specifically separation scenarios.
Age

Consistent with a plethora of studies showing effects of age on memory (e.g., Bugental et al., 1992; Davidson et al., 2001; Quas et al., 1999), it was expected that children's memory would improve with age. Surprisingly, age was largely nonsignificant with one exception; younger children recalled more separation stimuli. It is possible that separation pictures and stories elicited stronger emotions from younger than older children. Previous research has shown that stimuli that evoked arousal were associated with increased memory (Kensinger & Corkin, 2003); therefore, younger children may be more aroused (i.e., separation scenarios depicting children removed from their parents were perceived as more threatening to younger children, thus creating more emotion) by negative attachment-related stimuli than older children, leading to greater recall. It is also possible that younger children process negative information differently than older children, or have a decreased understanding of the event. Researchers suggest that better understanding may relate to the openness of communication about the event, thus leading to better psychological functioning (Sales et al., 2005). In a study involving recall of a traumatic event, highly stressed children who indicated lack of understanding of the event used more negative descriptors when recalling the event than less stressed children (Sales et al., 2005). This processing difference could also reflect differences in coping abilities, which can change with age (Kerns et al., 2006). It is possible that younger children may not use the coping strategies needed to facilitate understanding of negative emotions or events, thus making the negative memory more pronounced.
The lack of associations between age and memory for other stimulus types may be due to the arousing nature of the emotional stimuli at all ages. It is possible that other measures of memory, such as total units recalled in free and cued recall, may show stronger age differences.

Attachment and Coping

It was hypothesized that attachment qualities would predict children’s coping strategies, such that more secure children would be less likely to implement preoccupied and avoidant strategies during times of need. As expected, more secure children reported less use of avoidant coping (i.e., were less likely to avoid or reject parents when feeling distressed and less likely to use them as a resource); however, more secure children were more likely to indicate use of preoccupied coping strategies. It is possible that the qualities of preoccupied coping (e.g., excessive need for parent in new and stressful situations; Lieberman et al., 1999) describe behaviors too similar to those displayed by securely attached children. Although preoccupied coping is meant to measure excessive use, both preoccupied coping and secure attachment indicate behaviors of children who use parental assistance to lessen stress.

Interestingly, when looking at subscales of security, it was attachment dependency, and not attachment availability, that predicted children’s coping. Children who felt they could rely on their parents more in times of need (i.e., attachment dependency), were more likely to use preoccupied coping and less likely to use avoidant
coping. This is consistent with attachment theory in that children who perceive their parents as more dependable may also utilize their parents more because they believe their parent can help them to resolve their internal distress (Kerns et al., 2006). Preoccupied coping uses support seeking as a mechanism to cope. This parallels secure children’s behavior, as secure children also seek parents as a secure base in times of distress (Ainsworth & Bowlby, 1991). These findings complement other studies; however, previous research using a larger sample size also found an increase of perceived parental availability predicted a decrease in avoidant coping (Kerns et al., 2006). It is possible that if the current study had a greater number of participants, results would converge with previous findings.

The mediation model was not tested due to high correlations between attachment qualities and coping strategies. In previous studies correlations between the two measures were not as strong (Kerns et al., 2000) even though item contents are very similar. It is possible that the two measures indicate identical attachment qualities with the difference being the Security Scale reflects internal perceptions of attachment, and coping strategies describe the external behaviors exhibited to decrease distress specific to attachment-related perceptions. Future studies using multiple measures of coping, with divergent validity (less related to attachment), (e.g., Children’s Coping Strategies Checklist; Ayers, Sandler, West, & Roosa, 1990) are still needed to determine the nature of the coping - attachment relationship in the prediction of memory.
Attachment Security and Memory

As expected, attachment quality predicted children’s memory. In the present study, more secure children were more likely to recall high attachment scenarios (i.e., separation and reunion); suggesting the cognitive process for perceiving attachment-related events is unique in emotional processing. For the high attachment stimuli, the negative events (separation), and not the positive reunion events, were recalled more. Although it was not negative stimuli overall that was significantly remembered more by highly secure children as hypothesized, this increased recall of negative scenarios depicting separation between parent and child further suggests that mechanisms used to process general emotion may be different than those used to process attachment-eliciting events. This increased recall of separation by more secure children is supported by other research that reports a positive association between security and recall of negative events (Kirsh & Cassidy, 1997; Zeijlmans van Emmichoven et al., 2003). Recall of negatively valenced events overall were not significant possibly due to the negative valence events not being intense enough to evoke an emotional response from this age group.

Furthermore, increased separation recall could also reflect greater comfort in open, non-defensive mental operation in more secure children, which may allow for greater processing of negative information (Zeijlmans van Emmichoven et al., 2003). It is also possible that more secure children initiated discussions about the separation events more with the parent after the encoding, before Session 2, reinforcing memory of the events.
Although Verschueren and Marceon (2005) did not find evidence for the two Security Scale dimensions, availability and dependency, the results in the present study support that the two subscales reflect different attachment qualities and differentially predict memory for different events. Attachment availability, but not attachment dependency, proved a significant predictor of memory for reunion and positively valenced stimuli. This suggests children’s perception of how accessible their parents are during times of need may influence how they process positive events, specifically positive attachment-related events (reunion). Although contrary to the hypothesis, these findings concur with affective memory research that report secure children significantly remembered more accurately positive events than negative events (Belsky et al., 1997).

In addition, attachment availability also predicted recall of high attachment-related events (reunion and separation). Parental accessibility may play an important factor in processing attachment-related events during middle childhood years. How children perceive their parents’ availability when experiencing stressful encounters, may affect how children appraise the situation, thus creating variance in their encoding, storage or recall of the event. Further studies are needed to better identify which memory mechanisms are affected by individual differences of attachment. These attachment availability findings are supported by research that showed secure children, compared to insecure children, recalled more correct details about both stories describing a mother who responded sensitively to their child’s injury (i.e., positive attachment-related) and to stories where the mother rejected the child (i.e., negative attachment-related; Kirsh & Cassidy, 1997).
Although not statistically significant, there was a trend for attachment dependency predicting recall of separation stimuli. It is possible that with a larger sample size we would have had the statistical power to detect a relation between attachment dependency and separation as well, although the regression results suggest dependency is not a major contributor to memory for these stimuli.

When considering children's age and general cognitive ability in a series of regressions, only high attachment-related and separation stimuli remained significant as predicted by composite security and attachment availability. Although age and cognitive ability were also found to be predictors of high attachment-related and separation stimuli, when controlled for, attachment measures continued to predict memory. Attachment dependency was no longer significantly related to any recall categories. The remaining correlations possibly did not continue to be significant due to developmental factors (i.e., age and cognitive development) influencing changes in information processing. It is also possible that the significance disappeared due to lack of statistical power. Further studies including a larger sample size are needed to see if current findings are reliable and to see if other variables, not found significant in this study, contribute to memory.

Findings in the present study may reflect a developmental change in that the stability of attachment availability, as found in previous studies (Kerns et al., 2006), serves as a better predictor for security in this age group. For example, Kerns et al. (2006) found that children in middle childhood begin to depend on their parents less as they mature, but their perceived parental availability remained stable.
The finding that attachment availability was a predictor and not attachment dependency could possibly be that the two subscale items are measuring internal vs. external attachment qualities. For example, perhaps availability reflects the child's internal perception of attachment with primary caregiver, and dependency reflects the external behaviors of attachment in that it measures on a continuum the utilization of a parent during times of distress or discomfort. This also would suggest that the attachment availability items better reflect overall attachment security to parent during this developmental stage.

Limitations

Although this research supports the relation between individual differences in attachment qualities and memory of attachment-related events, limitations need to be considered when interpreting results. First, the small sample size limited the statistical power. A greater sample of participants possibly could conclude additional associations between memory and attachment. This sample, also lacking in diversity, could have contributed to the limited variability in some of the scores, thus concluding in non-significant results. For example the narrow range of coping avoidant scores, which reflected a lower use of avoidant coping in this population, could show greater variability (i.e., an increase of reported use in avoidant coping) in a larger or more diverse sample. Greater variability in more diverse populations could result in more significant associations between coping, attachment and memory. Second, this study only used
proportion of free recall as a measure of memory. Other measures including cued recall, units of free recall provided, and recognition may represent different memory processing, thus resulting in diverse recall outcomes. Next, the measure for cognitive ability reflected memory scores for recall of neutral stimuli. Other standardized measures of cognitive ability should be considered in future studies to see if the relation between recall of attachment-related events and cognitive ability remains. Finally, the present memory findings are limited to the assumption that parents did not initiate conversation about what their child saw and heard on the encoding video before returning to the second session. Future memory studies should include parent report of how often the child or the parent discussed the events depicted on the encoding video. Controlling for recall repetition may influence current findings.

Future Research

Previous studies on attachment or memory have found associations with individual differences beyond those investigated in the current study. First, peer attachment/relations may be an important consideration. Children in middle childhood were found to utilize peers more than parents to meet needs of companionship (Kerns et al., 2006). The influence of peer utilization and attachment may have an effect on how children in middle childhood process and recall varying emotional circumstances.

Second, parent attachment has been found to be a predictor in children’s recall (Quas et al., 1999), for which the present study did not account. Third, parents’ emotion
regulation should be considered in terms of how children observe their parents cope with distressing situations. Fourth, several studies have indicated that decreased attention to distressing stimuli could also affect memory of event. Specifically, Kirsh and Cassidy (1997) found that insecure-avoidant children were more likely to exhibit decreased attention (actively looking away) from pictures depicting mother and child interaction, thus affecting encoding, and influencing recall. It is also suggested that during distressing events, avoidant children’s attention is divided and memory detail is negatively affected (Berliner et al., 2003). Of course, children’s attention may be influenced by previously discussed individual differences in attachment (parent, child, and peer), emotion regulation, and coping. Therefore, future studies should take into consideration the potential interactive effects of peer relations, parent attachment and children’s attention during encoding when assessing attachment and memory of children in middle childhood.

Conclusion

Although present findings may be considered preliminary, there is a strong argument that attachment qualities influence information processing, specifically memory for negative attachment-related events. These individual differences affecting recall should be considered when evaluating various memory outcomes in other studies. A child’s appraisal of a traumatic event may be influenced by his or her internal working model, which is thought to be influenced by parental availability and reliability, and the quality of the event itself. These influences, in conjunction with other factors, should be
considered when assessing children’s ability to provide accurate memory reports, specifically of traumatic experiences.
REFERENCES


