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***Exploring Attachment Dynamics: Implications for  
Overgeneralized Memory and Rumination***

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## Abstract

*Objective and Methods:* This thesis investigates the relationship between insecure attachment (anxiety and avoidance), rumination, and overgeneralized episodic memory retrieval in nonclinical adults, addressing the potential moderating role of rumination in the attachment-overgeneralization link. A community sample of 41 Swedish-speaking women participated in a narrative memory task involving attachment and non-attachment narratives. Two sets of 120 narratives were counterbalanced and presented using E-Prime. Participants classified narratives in a memory task as either 'old', 'similar', or 'new', assessing overgeneralization. Adult attachment styles were assessed using the Experiences in Close Relationships Scale-Revised (ECR-R), with the Ruminative Response Scale-Short Form (RRS-SF) evaluating rumination tendencies. The Marlowe Crowne Social Desirability Scale-Swedish (MCSDS-S) controlled for social desirability bias. Memory indices, including the Overgeneralization Index (OI) and Memory Discrimination (MD), were computed for analysis. Mixed models examined the impact of attachment anxiety and avoidance on overgeneralization (OI), with additional analyses exploring the moderating role of rumination.

*Results and Conclusion:* Contrary to expectations, attachment anxiety and avoidance did not predict overgeneralized memory (*H1*). Rumination did not significantly moderate the attachment-overgeneralization relationship, but interactions between attachment anxiety and avoidance, respectively, and different forms of rumination were found for memory discrimination (*H2*). Overgeneralization was higher for attachment narratives than non-attachment (*H3*), but MD results varied. In conclusion, results offer valuable insights into the complicated relationship between insecure attachment, rumination, and overgeneralized memory in nonclinical adults, highlighting crucial avenues for future research in understanding the nuanced dynamics of attachment-related memory processes.

**Keywords:** Overgeneralized memory, attachment anxiety, attachment avoidance, rumination, narrative memory task.

## Introduction

The quality of the parent-child attachment relationship can have lasting effects on an individual's cognitive and emotional functioning. Attachment theory suggests that early experiences with caregivers shape an individual's attachment style, which, in turn, influences their ability to regulate emotions and form healthy relationships with others (Bowlby, 1988). Insecure attachment, including both the anxious-ambivalent and avoidant styles, is thought to increase the risk of developing overgeneralized memory (OM) and rumination, which can have negative effects on mood, problem-solving, decision-making, and overall well-being (Beyderman & Young, 2016). OM is a disruption defined as memories recalled with little specificity, usually consisting of broad themes and periods of time (e.g., “my time in college”). OM is of significant clinical relevance as it is not only associated with the occurrence of major depressive disorder (MDD) and post-traumatic stress disorder (PTSD) (Williams et al., 2007) but is also involved in the mechanisms responsible for maintaining these disorders. Additionally, OM has been found to predict the development and persistence of these conditions. For instance, OM has been found to predict the likelihood of developing PTSD after a traumatic event (Harvey, Bryant, & Dang, 1998; Gibbs & Rude, 2004), increase vulnerability to developing depression (Minnen et al., 2005), and hinder recovery from episodes of affective disorders (Dalgleish et al., 2001).

Troyer and Greitemeyer (2018) conducted a study on emotion regulation and discovered that when individuals were primed for security, they experienced decreased suppression, rumination, and negative affectivity. Rumination is a thought pattern of repetitive focus on negative experiences, emotions, and self-evaluations, leading to an intensification of negative affect and interference with problem-solving (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Nolen-Hoeksema and colleagues (1999) demonstrated that individuals with a diminished sense of control over significant life events, coupled with prolonged exposure to stress, were more prone to engaging in rumination. They argued that the combination of a sense of low mastery and persistent strain instills a belief in individuals that they have limited means to address their problems. Their problems persistently affect them daily, providing abundant material for rumination (Treyner et al., 2003).

In this study, we will examine the role of rumination as a moderator of the relationship between insecure attachment and OM. Understanding the underlying mechanisms of OM and rumination is crucial for developing more effective interventions. It

can also shed light on how attachment styles affect cognitive functioning. Despite previous evidence of links between insecure attachment with OM and rumination, the specific cognitive mechanisms that underlie the development and maintenance of OM and rumination remain unclear, in both clinical and nonclinical populations. Moreover, it is unclear what factors may moderate the relationship between attachment styles and cognitive functioning. More research is needed to understand the relationship between an individual's attachment style, OM, rumination, and nonclinical distress. Therefore, the aim of this study is to investigate the relationship between attachment styles, OM, and rumination, and to explore the cognitive processes underlying these relationships. Specifically, this thesis examines whether the relationship between insecure attachment and OM is moderated by rumination.

### **Attachment theory**

Attachment theory was developed by John Bowlby in the 1950s. He proposed that the bond between a child and their primary caregiver (usually their mother) is critical for the child's emotional and social development. Attachment bonds are formed through repeated interactions between the caregiver and infant (Jones & Bowlby, 1970), particularly in times of distress, and commonly involve behaviors aiming at maintenance or reestablishment of proximity and soothing the distress of the child. Early interactions between a caregiver and a child are decisive determinants of attachment styles later in life. Secure attachment is characterized by responsive and attentive caregiving, where the caregiver consistently meets the child's needs and provides comfort and support. This creates a secure base for the child, promoting exploration and a positive view of self and others. In contrast, insecure attachment is often a result of inconsistent or insensitive caregiving, where the caregiver may not respond promptly to the child's needs or may be emotionally unavailable. This can result in the child feeling insecure and uncertain about their relationship with their caregiver, leading to behaviors such as clinginess, avoidance, or anxiety (Ainsworth et al., [1978] 2015).

Ainsworth and Bell (1970) suggested that the fundamental paradigm of attachment relies on the caregiver fulfilling the child's need for comfort, security, and emotional support. Greenspan and Bowlby (1974) theorized that these interactions, and their characteristics, are eventually internalized into internal working models (IWM) of attachment relationships and that these models assist us in interpreting social information with others (e.g., peers, and romantic partners). As working models emerge by different patterns of interaction (i.e., secure, or insecure), they can lead to adaptive or maladaptive social processing behaviors. Bowlby (1973) hypothesized that attachment relationships serve as the foundation for the

development of self-reliance. Infants who can rely on their caregivers as a secure base for exploration will tend to be more independent later in life. Conversely, those who have insecure or anxious attachment relationships, including those who were pushed towards premature independence, will tend to be less self-reliant in the long run (Sroufe, 2006).

Attachment is also linked to differences in emotional regulation abilities. Individuals who can handle both positive and negative emotions in a flexible manner are typically securely attached, while those who have limited or heightened negative emotions are more likely to have insecure attachment styles (Cassidy, 1994). In fact, the way an infant regulates their emotions plays a crucial role in maintaining their relationship with their attachment figure, as regulating emotions helps the infant respond to experiences with their caregiver, thereby exerting an influence on the attachment-caregiving system. Thus, emotion regulation can be viewed as serving two purposes: maintaining the relationship and regulating the attachment system (Cassidy, 1994). Additionally, insecure attachment in childhood can lead to a lack of social skills and poor communication skills. These children may easily become anxious in even non-threatening situations, which can lead to chronic vigilance and an increased likelihood of developing anxiety disorders (Hong & Park, 2012).

Attachment theory has been extended to adult romantic relationships, with Hazan and Shaver (1987) showing that attachment styles identified in childhood can predict how individuals form and maintain relationships. One important area of research on attachment styles in adulthood has been the development of measures of attachment styles, such as the two-dimensional Experiences in Close Relationship scale (Brennan, Clark, & Shaver, 1998). This dimensional conceptualization of attachment has helped to better understand the nature of attachment styles in adulthood, captured by two dimensions identified by Brennan and colleagues (1998): Attachment-related anxiety comprises concerns about rejection, abandonment, and feeling unlovable. People with anxious attachment styles may have difficulty trusting others and may engage in behaviors such as clinging, checking in frequently, or becoming overly dependent on their partners. They may also experience feelings of insecurity, anxiety, and jealousy. Attachment-related avoidance refers to the avoidance of intimacy and dependency. People with avoidant attachment styles may have difficulty forming close relationships and may engage in behaviors such as distancing, avoiding intimacy, or becoming emotionally detached. They may also experience feelings of discomfort or anxiety in close relationships. These dimensions are thought to reflect variations in the quality of individual's early attachment relationships with their caregivers. For example, individuals who had caregivers who were inconsistent or unreliable in

responding to their needs may develop an anxious attachment style in adulthood, as they have learned to expect rejection and fear abandonment. Individuals who had caregivers who were consistently unresponsive or neglectful may develop an avoidant attachment style in adulthood, as they have learned to avoid intimacy and dependency to protect themselves from disappointment or rejection (Brennan, Clark, & Shaver, 1998).

Brennan and colleagues' (1998) model is consistent with previous research showing that attachment styles identified in childhood can be used to predict the way individuals form and maintain relationships in adulthood, as Hazan and Shaver (1987) found. By providing a more precise and nuanced framework for measuring adult attachment styles, Brennan and colleagues' model has helped to further the understanding of the nature and origins of attachment in adulthood.

### **Attachment scripts and attachment priming**

Attachment scripts are representations of attachment-related events in an individual's mind, referred to as the cognitive building blocks of attachment representations. The construct proposes that people have internal working models of attachment-related events that are based on past experiences and that guide their thoughts, feelings, and behaviors in current relationships (Fivush, 2006). Thus, people have a general script or representation of how attachment-related events are supposed to unfold, such as how a caregiver or partner should respond to an individual's distress and need for security.

According to Cacciola and Psouni (2020), when caregivers provide consistent and clear support during infancy and early childhood, it is likely to lead to the formation of easily accessible scripts of interactions with significant others, particularly in times of need. These scripts involve the expectation that significant others will be willing and able to provide support and comfort. Conversely, if caregivers provide inconsistent or ineffective support during times of distress, it is likely to result in less accessible or incomplete scripts, or scripts that include negative assumptions about significant others. Psouni and Apetroaia (2014) provided evidence that children who recall sensitive support from their caregivers during attachment interviews also produce scripted stories with similar content. Additionally, secure base script knowledge predicted children's ability to respond to distress in an adaptive way, suggesting the importance of attachment scripts in middle childhood for later social and emotional development.

Attachment security priming has been used to investigate the cognitive mechanisms associated with attachment internal working models (that is, with an individuals' attachment

script) and the cognitive foundations of people's attachment-related emotions and actions. Security primes activate a feeling of attachment security by enhancing the accessibility and importance of mental representations in one's memory. Attachment security priming involves activating an individual's attachment system by exposing them to stimuli that remind them of attachment figures or experiences. This can be done through various methods, such as showing pictures of attachment figures or asking participants to write about attachment-related experiences (Mikulincer & Shaver, 2007; Ein-Dor, Mikulincer, and Shaver, 2011).

Research has shown that attachment security priming can impact cognitive functions such as rumination and overgeneralization of memory. Individuals who are securely attached tend to have better emotional regulation skills and lower levels of negative affect, which results in less rumination and better memory specificity (Mikulincer & Shaver, 2019). Attachment security priming has been found to reduce overgeneralization of memory in individuals with insecure attachment (Sze et al., 2013) and to reduce rumination in individuals who have experienced relationship stress (Mikulincer & Shaver, 2007). These findings suggest that attachment priming may be a useful intervention for improving cognitive processes such as memory specificity (i.e., opposite of memory overgeneralization) and reducing maladaptive rumination, particularly in individuals with insecure attachment. The present study examines how attachment scripts, which are activated through narrative reading as a form of attachment priming, affect cognitive processing.

### **Attachment and overgeneralization of memory**

Overgeneralization is thought to result from pattern separation deficits (Lange et al., 2017), a process that has been suggested to represent a phenotypic marker of anxiety disorders and PTSD (Lissek, 2012). In pattern separation, inputs that appear similar are transformed into separate representations, so that they are viewed as distinct occurrences (Dillion & Pizzagalli, 2018). Memory formation involves transforming incoming information into a neural representation that can be stored and retrieved later. Pattern separation helps create distinct memory representations of similar experiences or stimuli, reducing interference and preventing confusion. Failures in pattern separation will result in OM representations. That is, similar events, stimuli, or experiences are not possible to be distinguished and are remembered in a more general, less detailed manner, leading to a reduction in the richness and accuracy of memory recall. Pattern separation is thought to occur within the hippocampus, a region of the brain involved in learning and memory. If pattern separation is too strong, the brain may not effectively generalize experiences, leading

to difficulty encoding and retrieving related memories. Conversely, if pattern separation is too weak, the brain may encode similar events as being identical, leading to the loss of important distinctions and details (Dillion & Pizzagalli, 2018; Williams et al., 2007).

Previous research (Bryant & Bali, 2017) has suggested that individuals with insecure attachment styles, such as those with avoidant or anxious attachment, may be more likely to experience OM. This is thought to occur because individuals with insecure attachment styles may have difficulty processing and integrating emotional experiences, which can lead to a lack of elaboration and detail when recalling past events. Moreover, previous studies have found that attachment insecurity may lead to a greater reliance on cognitive avoidance strategies, such as overgeneralization, to cope with emotional distress (Andriopoulos & Kafetsios, 2015). This may be because individuals with insecure attachment styles may have developed an emotional avoidance coping strategy, leading to the overgeneralization of memories to avoid or suppress negative emotions. It is also possible that the overgeneralization of memories may be a product of the relationship with the attachment figures, as findings from previous studies (Cao et al., 2018) indicate that individuals with insecure attachment process information related to attachment events and non-attachment events similarly. This supports previous ideas that insecure attachment may contribute to the development of overgeneralized autobiographical memory (Beyderman & Young, 2016). An explanation for this finding could be that individuals with insecure attachment styles may struggle to remember specific attachment-related events because they tend to suppress or exclude such memories. Prior research suggests that insecure individuals rely more on global impressions of their relationships rather than specific memories, which may contribute to their difficulty in recalling attachment-relevant events (Fraley et al., 2000).

### **Rumination and memory overgeneralization**

As rumination often involves going over past events or problems in a circular, unproductive way, without finding solutions or closure, it has been linked to a range of mental health problems, including depression, anxiety, and PTSD (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Based on previous literature (Sumner, 2011), two aspects of ruminative processing appear to be particularly maladaptive for autobiographical memory specificity: (1) adopting a conceptual, analytical, and evaluative approach that centers on the causes, significance, and consequences of one's experience, and (2) processing negatively charged self-related material. Previous studies (Sutherland & Bryant, 2007; Crane et al., 2007) that have intentionally induced modes of either rumination or non-rumination and



subsequently investigated their impact on OM provide support for the first component of ruminative processing. This research is grounded in the processing mode theory of rumination, as outlined by Watkins and colleagues (2008). According to this theory, engaging in abstract, analytical, and evaluative thinking—such as reflecting on the causes, meanings, and consequences of one's emotions and depressive symptoms—leads to more detrimental outcomes compared to adopting a concrete, sensory, and experiential approach, which involves focusing on the specific sensory aspects of one's feelings and symptoms (refer to Watkins, 2008, for a comprehensive overview). Notably, these studies have demonstrated that inducing an analytical, evaluative processing mode is linked to higher levels of OM compared to inducing a sensory/experiential processing mode. Thus, suggesting that rumination has a causal influence on OM (Sumner, 2011).

Sutherland and Bryant (2007) ran two experiments that investigated the effects of rumination on the retrieval of autobiographical memories in high-depressed and low-depressed individuals. The first experiment involved administering either a rumination or distraction task before a cued autobiographical memory task. Results indicated that high-depressed participants exhibited increased recall of overgeneral memories following rumination compared to distraction, while the experimental manipulations had no discernible effect on low-depressed individuals. In the second experiment, a positive or negative rumination task was administered prior to the memory task. High-depressed participants demonstrated a higher incidence of overgeneral memories after engaging in negatively valenced rumination compared to positively valenced rumination, with no significant effect observed in low-depressed participants. Although their results were significant for highly depressed patients, their findings support the notion that rumination serves as a mediating factor in the retrieval of OM, underscoring the specific influence of negatively valenced ruminative content in inducing overgeneral retrieval.

The detrimental effects of rumination on autobiographical memory specificity, as highlighted above, find support in the CarFAX model proposed by Williams (2006). The recursive nature of capture and rumination, functional avoidance's impact on long-term memory formation, and executive control dysfunction's role in impairing specific memory retrieval collectively contribute to the understanding of how overgeneralized memories may develop and persist, emphasizing the interconnectedness of these cognitive processes involved in the development and maintenance of OM.

The CarFAX model (Williams, 2006) aims to explain the development and maintenance of overgeneralized memories through three pathways: capture and rumination

(CaR), functional avoidance (FA), and executive control dysfunction (X). Capture and rumination refer to a recursive process where negative thoughts and emotions feed back into each other, making them self-sustaining. Functional avoidance involves avoiding or suppressing negative thoughts and emotions in the short term but may lead to the formation of overgeneralized memories in the long term. Executive control dysfunction relates to deficits in cognitive control or inhibitory processes, which may result in difficulties in pattern separation and the retrieval of specific memories. It is important to note that these pathways are not independent and can influence each other in the development and maintenance of overgeneralized memories.

The Capture and Rumination (CaR) component of the theory refers to the process where a person with negative self-perceptions fixates on overgeneralized memories that reinforce their self-doubt, rather than searching for a specific memory. This fixation, or "capture," leads to prolonged contemplation, or "rumination" on negative self-beliefs. Individuals who tend to ruminate a lot are more susceptible to this mistake, particularly if they have negative self-perceptions. As a result, they may be particularly prone to developing OM through this mechanism. The reason this happens is because the fixation, or "capture", of negative self-beliefs interferes with the cognitive processes involved in searching for specific memories. When a person is fixated on negative self-beliefs, it can be challenging for them to disengage from these thoughts and focus on the task of retrieving specific memories. As a result, they may retrieve more general memories that are less specific to the event or situation they are trying to remember. Over time, this tendency to retrieve more general memories in response to personal cues can become a habit, leading to the development of OM (Sumner, 2011).

According to the CarFAX model (Williams, 2006), the CaR component suggests that when a person encounters negative information or experiences negative emotions, they may become fixated or "captured" by these negative thoughts, memories, or feelings. This initial fixation on negative information is a crucial first step in the rumination process because it determines whether the person will engage in further rumination or not. If negative information is not initially captured and processed, then it is less likely that a person will engage in rumination. However, if the individual is unable to disengage from the negative information and continues to focus on it, then it is more likely that a person will engage in further rumination. The CaR component also suggests that how the negative information is interpreted can also influence whether a person engages in further rumination. If the negative information is interpreted in a more negative or self-critical way, then it is more likely that

the person will engage in rumination. On the other hand, if the negative information is interpreted in a more neutral or positive way, then it is less likely that the person will engage in rumination.

The FA component refers to the tendency to engage in behaviors that provide short-term relief from negative emotions, but ultimately contribute to the maintenance of rumination. There are four main ideas related to the functional avoidance mechanism theory. Firstly, it suggests that overgeneralization of memories develops as a response to trauma, particularly when it happens early in life. Secondly, OM is seen as a cognitive strategy to avoid distressing memories. Thirdly, memories that are highly distressing, especially those related to trauma, are more likely to be avoided in the early stages of developing the functional avoidance mechanism. Fourthly, avoiding specific details in memories can reduce emotional distress after a traumatic experience, and this avoidance is repeatedly reinforced, leading to the development of an overgeneral retrieval style (Sumner, 2012). According to the CarFAX model (Williams, 2006), the FA component serves several functions for individuals who ruminate. First, it provides a distraction from negative thoughts and emotions, providing temporary relief from distress. Second, it can serve as a way of regulating emotions, as engaging in these behaviors can lead to a temporary reduction in negative affect. Finally, it can provide a sense of control over negative emotions, as individuals may feel that they can manage their emotions by engaging in these behaviors. However, despite providing short-term relief, the FA component of the CarFAX model ultimately contributes to the maintenance of rumination. Engaging in these behaviors can reinforce negative beliefs and emotions and prevent individuals from developing more adaptive coping strategies.

The X component refers to the impaired executive functioning that can occur in individuals who ruminate. Executive functioning refers to a set of cognitive processes that are involved in the control and regulation of thoughts, emotions, and behaviors. This includes processes such as attention control, working memory, and cognitive flexibility. According to the CarFAX model (Williams, 2006), rumination can lead to impairments in executive functioning in several ways. First, rumination can lead to a narrowing of attention, as individuals become preoccupied with negative thoughts and emotions, and are less able to attend to other information in their environment. Second, rumination can lead to a depletion of working memory resources, as individuals use up their cognitive resources to maintain their negative thoughts and emotions. Finally, rumination can lead to a rigidity of thought, as individuals become less able to shift their attention or thinking in response to changing circumstances.

There is increasing empirical support for certain aspects of the CarFAX model (Williams, 2006). Studies that examined the role of self-representations in OM among adults and children support Williams' idea that self-representations are captured during autobiographical memory retrieval. Other studies have manipulated rumination processes in depressed patients and found that rumination is associated with less specific autobiographical memory, further supporting the link between rumination and OM (Crane et al., 2007; Spinhoven et al., 2007).

Following a sad mood induction, Bryant and Bali (2017) revealed that attachment priming led to more specific autobiographical memory retrieval and less categorical retrieval (i.e., summaries or classes of events; “When I’m with my family”), possibly due to a reduction in rumination. The amount of rumination may change depending on whether a trigger is present, but if a person typically responds to triggers by ruminating, they will likely continue to do so unless treatment specifically addresses the rumination or the beliefs that lead to relying on rumination as a coping method (Smith & Alloy, 2009). This is known as rumination as trait, which has been shown to mediate the relationship between depression and episodic memory; suggesting that rumination itself plays a role in the decreased contextual details and specificity of episodic memories (Forner-Philips et al., 2020).

Both rumination and OM are thought to play a role in the development and maintenance of depression. Specifically, rumination may perpetuate negative emotions and lead to feelings of hopelessness and helplessness, while OM may impair problem-solving and adaptive coping strategies. People who ruminate may have difficulty disengaging from negative thoughts and memories, which can lead to the overgeneralization of those memories. Additionally, OM may perpetuate negative thinking patterns, which can then lead to rumination.

### **The present study**

Rumination is a common trait in affect disorders like MDD and PTSD, but it is also seen in individuals with an insecure attachment style. A previous study (Lanciano et al., 2012) investigated the relationship between attachment, emotional intelligence, dysfunctional rumination, and depression in a sample of Italian undergraduate students. They found that attachment anxiety was positively linked to dysfunctional rumination and depression, while attachment avoidance was negatively linked to emotional intelligence. The mediating role of rumination in overgeneralized autobiographical memory has been shown in clinical samples (Liu et al., 2017; Forner-Philips et al., 2020; Beyderman & Young, 2016) yet the degree to

which individuals engage in rumination varies on a continuum, suggesting that the empirically established links in clinical samples may or may not be relevant for daily function and nonclinical conditions. As such, the present thesis investigates (1) the relationship between attachment style and overgeneralization in episodic memory, in a non-clinical sample, and (2) the potential moderating role of rumination in this relationship.

### ***Research Questions***

- To what extent can attachment insecurity (i.e., avoidance and anxiety) predict overgeneralized episodic memory retrieval in nonclinical adults, specifically when completing an attachment narrative memory task?
- Does the extent of rumination moderate the relationship between attachment insecurity and overgeneralized episodic memory retrieval in nonclinical adults, and are the patterns of such moderation similar with respect to attachment anxiety and attachment avoidance, respectively?
- Do patterns of memory overgeneralization hold equally for attachment-related and neutral content?

### ***Hypotheses***

- **H1:** Individuals with higher levels of attachment insecurity (avoidance and anxiety) will exhibit a greater tendency for overgeneralized episodic memory retrieval when completing a memory task, compared to those with lower levels of attachment insecurity.
- **H2:** Rumination will moderate the relationship between attachment insecurity and overgeneralized episodic memory retrieval in non-clinical adults.
- **H3:** Individuals with high levels of attachment avoidance or anxiety will exhibit a greater tendency for overgeneralized episodic memory retrieval for attachment narratives compared to non-attachment, compared to those with low levels of attachment avoidance or anxiety.

## **Methods**

### **Participants**

This study included a community sample, comprised mainly of students studying at a University in Sweden. Participants were recruited for a large EEG study; however, the current study will focus on the behavioral (memory) data and not include any EEG data. To

participate in the study, participants had to be females over the age of 18 and younger than 60, due to differences in memory capacity across the lifespan. Participants had to be a native speaker of Swedish, as reading attachment narratives in a non-native language may alter the intended meaning of the narratives. EEG is a safe technique to measure electrical activity on the scalp, however, those with metal implants or devices such as a cochlear implant or aneurysm clips were excluded from this study. As the study focused on individuals without MDD or PTSD, individuals with these conditions were excluded.

Additionally, participants taking any medication known to affect cognitive functioning or memory, such as certain sedatives, were excluded.

A total of 41 Swedish-speaking women participated in this study with an age range of 19-55 ( $\bar{x} = 25.4$ ,  $SD = 6.8$ ). To prevent potential interactions between the participants' gender and that of the characters in the narratives, males were not included in this study. The distribution of current relationship status in the sample was as follows: 3 participants did not provide information, 19 were in a relationship, and 19 were not currently in a relationship. Participants had on average 15 years of education ( $SD = 3.12$ ), corresponding to 3 years of post-high-school education.

## **Materials**

### ***Narratives***

The structure of attachment-related narratives involved a three-sentence storyline. The first sentence established the character and setting, while the second introduced a crisis or event that triggers attachment schemas. Finally, the third sentence revealed the response of an attachment figure. The critical words or phrases (positive or negative event) that the narrative ended with reflect whether the response of the attachment figure is aligned with the person's expectations. The structure of non-attachment narratives was the same, but the events were mundane and neutral to avoid activation of attachment scripts and expectations regarding the end of the stories.

A total of 240 narratives were created for this study, to activate participants' attachment scripts. There were 30 *parent-child attachment* narratives, 30 *parent-child non-attachment* narratives, 30 *adult attachment* narratives, and 30 *adult non-attachment* narratives. From this original pool of narratives, 30 *similar attachment* parent-child narratives, 30 *similar non-attachment* parent-child narratives, 30 *similar attachment* adult narratives, and 30 *similar non-attachment* adult narratives were created. To create a batch of similar narratives, the character, structure, and level of detail remained the same, however,

small details were changed (e.g., waking up from a nightmare is changed to waking up from a loud noise outside). The two lists, each comprising 120 narratives, were presented to participants in a counterbalanced order on E-Prime. Examples of the narratives are in Table 1.

Table 1: Examples of attachment and non-attachment narratives

Relationship Type	Attachment	Non-attachment	Positive critical word	Negative critical word	Attachment (similar)	Non-attachment (similar)
Parent-child	Robin gets a new bike for his birthday, and he starts riding fast. He falls from his bike, there is blood on his head, and he cries a lot. His mother comes and ...	Robert wants a new teddy bear for his birthday, and he goes to a shop. There are many to choose from, and he looks around. His mother comes and ...	gives a hug	looks at him	Robin gets a new skate for his birthday, and he starts skating fast. He trips and falls, there is blood on his knee, and he cries a lot. His mother comes and...	Robert wants a new Lego for his birthday, and he visits a toy shop. There are different types to choose from, and he looks around. His mother comes and...
Adult-friend/partner	Amanda started a new hobby, and she just knitted her first scarf. She gives it to her best friend as a gift but is nervous as there are many visible flaws. When her best friend opens her gift, she...	Allison is shopping for a present for her friend's 30th birthday. She has a few ideas for what to buy and decides on a nice sweater and wraps it for her friend. When her friend opens the gift, she...	cherishes it	rolls her eyes	Amanda started a new hobby, and she just crocheted her first hat. She gives it to her best friend as a gift but is nervous as there are many visible flaws. When her best friend opens her gift, she...	Allison is shopping for a present for her friend's 40th birthday. She has a few ideas for what to buy and decides on a nice bottle of wine and wraps it for her friend. When her friend opens the gift, she...

### *Narrative memory task*

The narrative memory task used in this study is believed to require pattern separation and was inspired by Yassa and Stark (2011). Pattern separation refers to the ability to distinguish between similar but distinct patterns of information, which occurs in the hippocampus. A pattern separation task is a cognitive task that assesses a person's ability to distinguish between similar but distinct pieces of information in written text. This means that

when a person has good pattern separation abilities, they are less likely to overgeneralize their memory and more likely to remember details that are unique to each experience (Yassa & Stark, 2011). Here, the *old* and *similar* narratives were taken from the 240 narratives developed for the study, while 40 *new* narratives were developed for this task. Each participant viewed 20 *new*, 20 *old*, and 20 *similar* attachment and non-attachment narratives of each relationship type (i.e., parent-child, adult-friend/partner). All narratives were written in English, translated into Swedish, and edited by a Swedish speaker. See Table 2 for examples of the narratives used for this task.

Table 2: Narratives used for the narrative memory task.

Relationship	New attachment	New non-attachment	Old attachment	Old non-attachment	Similar attachment	Similar non-attachment
parent-child	Bonnie has been very happy in her first romantic relationship. But today, unexpectedly, her boyfriend broke up with her. She is heartbroken and tells her mom. Her mom...	Brooke is in her late teens and is going to go out for a coffee with her friend after school. She goes home to start getting ready, she changes and fixes her hair. Her mom gets home as she was leaving. Her mom...	Robin gets a new skate for his birthday and he starts skating fast. He trips and falls, there is blood on his knee, and he cries a lot. His mother comes and...	Robert wants a new lego for his birthday and he visits a toy shop. There are different types to choose from, and he looks around. His mother comes and...	Don is in his early teens. One Friday night he finds out that his group of friends planned and went to a birthday party without him, and he feels devastated. His father...	Mark is in his late teens. On a weekend night he sits on the couch setting up a boardgame that came out when he was a kid, that he wanted to play again. His father comes and...
adult - friend/partner	Diane is in her mid 20s and she recently lost her childhood pet. She loved her dog very much and is heartbroken. Her partner...	Dayna is in her early 30s and is thinking about adopting a dog. She decides to go to the shelter with her partner to look at their dogs. Her partner...	Caroline is in her 40s. She has been trying to have a baby for a long time and now just found out she's unable to have children. When she meets her friend she is devastated. Her friend...	Catherine is married and a mother of 2 children. One of her closest friends just became a first time mom. Catherine gives her tips on childcare. Her friend...	Jan is in her mid-30s and on a backpacking trip with her cousin. While exploring a busy marketplace, her backpack gets stolen and she is left feeling anxious and helpless. Her cousin...	Bredna is in her late 20s and on a road trip with her friend. They've been driving for hours before finding a cozy roadside cafe. They order some food and drinks and settle in to relax after a long day of driving. Her friend...

## Rumination

The Ruminative Response Scale-Short Form (RRS-SF; Treynor et al., 2003) is a 10-item self-report scale that measures an individual's tendency to ruminate when in a sad or depressed mood. Its 10 items, rated using a 4-point Likert scale, are grouped into subscales for Brooding (i.e., deep negative thought) and Reflection (i.e., reflective pondering) with reported Cronbach's  $\alpha$  of .77 and .72, respectively (Treynor et al., 2003). The instrument was translated from English to Swedish using back-translation methods (Brislin, 1970).

## Adult attachment styles

To measure attachment, the Experiences in Close Relationships Scale-Revised (ECR-R; Fraley et al., 2000) was used. It is a 36-item self-report questionnaire designed to assess individual differences with respect to attachment-related anxiety (i.e., the extent to which people are insecure vs. secure about the availability and responsiveness of romantic partners) and attachment-related avoidance (i.e., the extent to which people are uncomfortable being



close to others vs. secure depending on others). Individuals who receive high scores on one or both subscales are typically considered to have an insecure attachment style, while those who score low on both anxiety and avoidance subscales are regarded as having a secure attachment style (Mikulincer & Shaver, 2019). In the present study, Cronbach's  $\alpha$  was .93 and .82 for the anxiety and avoidance subscales, respectively.

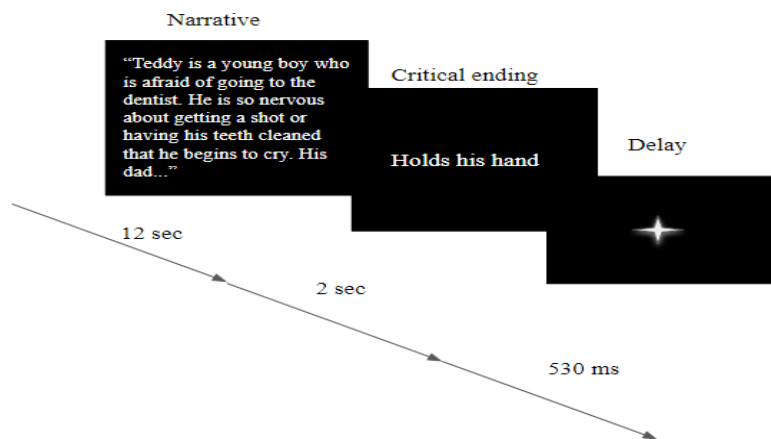
### ***Social desirability***

The Marlowe Crowne Social Desirability Scale-Swedish (MCSDS-S, Thunholm, 2001) is a 13-item measure of individual-level social desirability bias, modeled on and translated from the original Social Desirability Scale (Crowne & Marlowe, 1960). The scale was used to control for social desirability in participants' responses. Items are scored by answering on a 'True' or 'False' basis. One point for yes and zero points for no. The total score is found from the sum of the true statements. The MCSDS-Swedish was found to have good reliability (0.84) (Thunholm, 2001). Also, the original English version of the MCSDS has been found to have good internal consistency, with Cronbach's  $\alpha$  values ranging from 0.66 to 0.79 (Reynolds, 1982).

### **Procedure**

Participants were told that the study investigated memory retrieval during different tasks involving short narratives. An EEG cap was placed on each participant before being presented with any stimuli (remember that the present study does not use EEG data). Participants were asked to read and memorize the 120 attachment and non-attachment narratives on a computer screen. Each narrative was presented for 12 seconds using E-Prime. There was a 530-millisecond delay between each presented narrative. The critical word/ending (e.g., ignored, comforted) concluding each narrative was presented separately, for 2 seconds. For example, "Teddy is a young boy who is afraid of going to the dentist. He is so nervous about getting a shot or having his teeth cleaned that he begins to cry. His dad..." (12 sec), then "holds his hand" (2 sec). Please see Figure 1 for an example of this procedure.

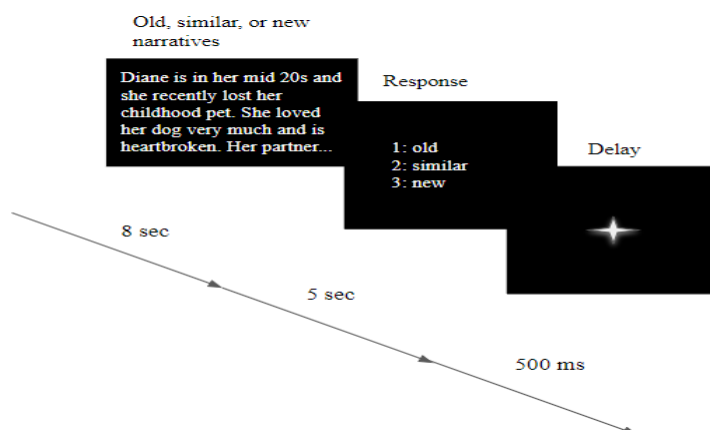
Figure 1: Narrative block procedure



After the initial narrative block, participants were presented with a narrative memory task to evaluate pattern separation abilities to measure the overgeneralization of their memory. A total of 16 attachment and 16 non-attachment narratives were presented, and participants classified each narrative as either old, new, or similar using the number keys of a keyboard to respond (i.e., 1: *old*, 2: *similar* 3: *new*). The narratives were shorter because they didn't include critical words, therefore they were presented faster than the previous narrative block.

Each narrative was presented on a computer screen for 8 seconds at a time with a 500-millisecond delay in between each narrative. The response screen remained active for 5 seconds, if participants don't respond within this timeframe the program will move on. Response time was recorded for each trial. See Figure 2 for an example of the memory narrative task.

Figure 2: Narrative memory task procedure



Narratives were counterbalanced using two lists. Participants completed the ECR-RS, MCSDS-S, and RRS-SF at the end, to prevent potential priming effects and participant fatigue prior to engaging in narrative tasks.

### **Research Ethics**

This study was conducted within Lund University's ethical guidelines, Swedish law and regulations concerning research with humans, and APA guidelines, and approved by the Psychology Department of Lund University. The study procedures are also in line with the declaration of Helsinki. Participants were provided with an information and consent form explaining the EEG procedure before arriving at the lab. The EEG is widely used in psychological research. It is a non-intrusive method and therefore, no harm was expected from it. Participants were informed that they could withdraw from the study, at any moment without justification, and without any consequences for the way they were treated by the researchers. The scales used in this study are known to not cause distress. However, the RRS-SF asks questions involving negative feelings, which may cause some discomfort. Therefore, participants had the option to withdraw at any time and be provided with proper support from senior researchers or psychologists, if needed. No deception or emotional priming was used on participants. The purpose of the study was explained to the participants prior to conducting the study, and a debriefing session was available to all participants to listen to their comments, answer any potential questions, and provide any needed support. No sensitive or other personal data was collected, participants remained anonymous and provided consent prior to participation.

### **Data Preparation and Statistical Analysis**

Data cleaning and statistical analysis were performed using Excel and Jamovi 2.3.26 for Windows.

### ***Memory indices***

In addressing the research inquiries, two primary indices were computed. The primary focus of this study was on the tendency towards overgeneralization, defined as the propensity to incorrectly categorize a Similar Narrative as 'Old.' Overgeneralization was quantified by subtracting the probability of responses 'Old' to a New Narrative (indicative of a general inclination to label it as 'Old') from the probability of labeling a Similar Narrative as 'Old' (Yassa et al., 2011). Therefore, the *Overgeneralization Index* (OI) = Similar narrative

identified as old - new narrative identified as old. Note that OI is the main dependent variable used throughout the statistical models.

To enhance the comparability of our findings with those of other studies, we implemented an additional analysis using the widely adopted metric of *Memory Discrimination* (MD) performance. This involved computing the difference between the probability of selecting 'Similar' for a New Narrative and the probability of selecting 'Similar' for a similar narrative. This adjustment helps mitigate any potential bias that participants might have in favor of the 'similar' response, as previously acknowledged (Kirwan & Stark 2019).

### ***Hypothesis testing***

Before turning the focus on overgeneralization, we tested for potential effects of the experimental design (condition, denoting attachment versus non-attachment scripts, and value, denoting positive versus negative story conclusions), and attachment (anxiety and avoidance, respectively) on memory accuracy overall, as a control step in the statistical analysis. *Memory accuracy* was defined as all the correct identifications of material as new, old, or similar, respectively. Two Mixed Linear Models (for OI and MD, respectively) were set up for testing *H1* and *H2*. Avoidance and anxiety were entered as covariates in the first round, and brooding and reflection were added in the second round. In a third round, the experimental design features of condition (attachment-related stories versus neutral stories) and value (positive endings versus negative endings) were included in the models for OI and MD.

## **Results**

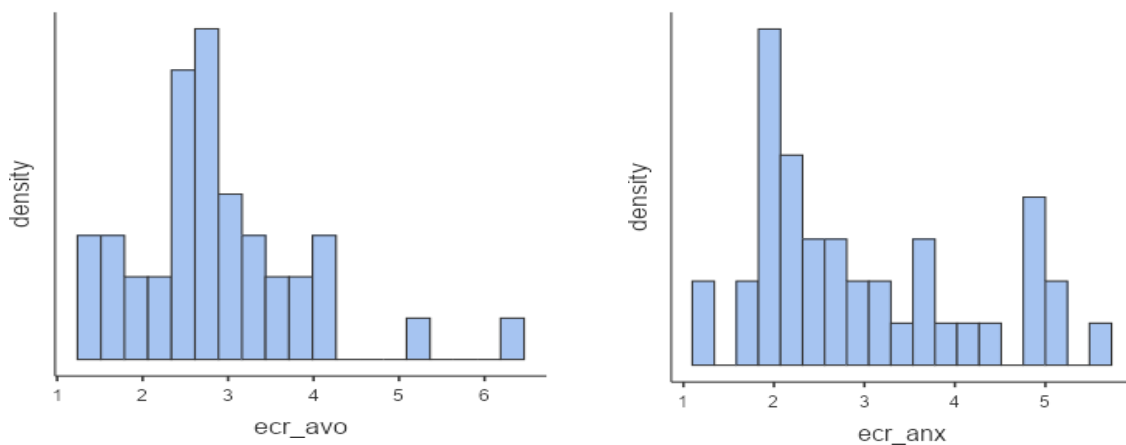
### **Descriptive statistics**

See Table 3 for descriptives of the independent (i.e., attachment & rumination) variables. The mean for OI was 0.09 (SD = 0.11, range -0.05-0.60) and for MD, it was 0.58 (SD = 0.19, range 0.06-0.95). The overall distribution of each variable exhibited a bell-shaped curve, resembling a standard normal distribution (Fig. 3).

Table 3: Descriptive statistics of independent variables

	Age	Relational Status	ECR avoidance	ECR anxiety	SOC desirability	RSS brooding	RSS reflection	Education (years)
N	41	38	41	41	41	41	41	38
Mean	25.4	1.5	2.9	3	6.6	11.2	13.5	15
Median	23	1.5	2.7	2.7	7	11	14	15
STD	6.9	0.5	1	1.2	1.9	2.9	3.5	3.1
Minimum	19	1	1.3	1.2	3	7	7	12
Maximum	55	2	6.3	5.6	11	17	20	21

Figure 3: Distribution of attachment avoidance and anxiety



### Associations among the study variables

Both subscales of rumination, brooding, and reflection, positively correlate with both the anxiety and avoidance subscales of attachment (Table 4). The reflection subscale of rumination was also the only measure that positively correlated with social desirability. Regarding the memory indices, the memory discrimination index displays a low ( $p < .057$ )

positive correlation (tendency) with attachment anxiety, suggesting a trend between higher attachment anxiety and enhanced memory discrimination.

*Table 4: Correlation among the study variables (N=41)*

	Avoid	Anxiety	Social Des	Brood	Reflection	OI	MD
Avoid	—						
Anxiety	0.574 ***	—					
Social Des	-0.095	0.128 *	—				
Brood	0.291 ***	0.472 ***	0.042	—			
Reflection	0.256 ***	0.394 ***	0.187 **	0.287	—		
OI	0.143	-0.056	-0.005	-0.108	0.119	—	
MD	0.005	0.176	0.129	0.120	-0.017	-0.519 ***	—

Note: \* =  $p < .05$ , \*\* =  $p < .01$ , \*\*\* =  $p < .001$

### ***Control analysis: Total memory accuracy***

A mixed model with Memory Accuracy as the dependent variable, condition (attachment vs. non-attachment material) and value (positive/supportive endings vs negative/non-supportive endings), and avoidance and anxiety as potential predictors, captured 62% of the total variance in accuracy (AIC = -419.876) and revealed no significant effects. Follow-up analysis within material with positive and negative endings, respectively, revealed an effect of attachment anxiety ( $F = 4.66, p = .035$ ). Notably, our participants performed well in the memory task, with an average performance of  $\bar{x} = 0.77$ .

### **H1 Do individuals with high attachment insecurity exhibit overgeneralized memory?**

A mixed model with OI as the dependent variable and avoidance and anxiety as covariates tested whether individuals with higher levels of attachment avoidance and anxiety will exhibit a greater tendency for overgeneralized episodic memory retrieval during the completion of the narrative memory task. Random effects were assigned to the intercepts of subjects in this model and subsequent models. Contrary to predictions, neither attachment anxiety

nor attachment avoidance predicted memory overgeneralization (see Table 5). These results were replicated in a similar model, with MD as the dependent variable.

*Table 5: Fixed Effect Omnibus tests (avoidance and anxiety on OI)*

	<i>F</i>	Num df	Den df	<i>P</i>
Avoidance	0.906	1	37	0.347
Anxiety	1.156	1	37	0.289
Avoidance * Anxiety	0.431	1	37	0.516

*Note: Satterthwaite method for degrees of freedom*

## **H2 Is rumination implicated in memory overgeneralization of individuals with higher levels of attachment insecurity?**

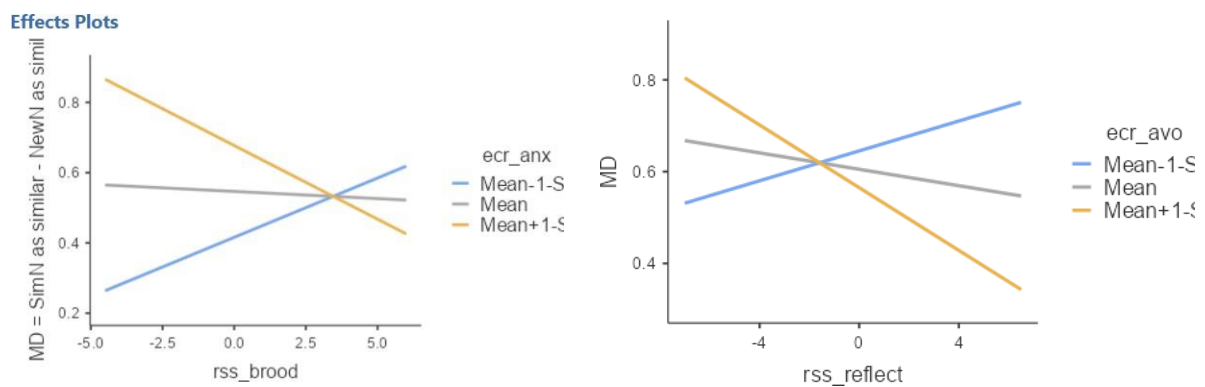
In the next step, brooding and reflection were added as covariates, besides attachment avoidance and attachment anxiety, in the mixed models for OI and MD, respectively. There were no significant main effects or interactions in the model for OI. In the model with MD as the dependent variable, there was a significant interaction between anxiety\*brooding ( $F_{(1, 30)} = 5.82, p = 0.02$ ), and avoidance\*reflection ( $F_{(1, 30)} = 5.80, p = 0.02$ ). The main effect of attachment anxiety was also significant ( $p < .05$ ). The model captured 60% of the overall variance in MD ( $R^2_{\text{conditional}} = .598$ ). See Table 6 for model parameter estimates and Figure 3 for the effects plot.

*Table 6: Mixed model of interactions between attachment and rumination on MD (N = 41)*

Variables	Estimate	SE	95% Confidence Interval		df	t	p
			Lower	Upper			
(Intercept)	0.60507	0.03011	0.54606	0.66409	30.0	20.0953	< .001
ecr_avo	-0.04056	0.03496	-0.10907	0.02795	30.0	-1.1603	0.255
ecr_anx	0.06257	0.03018	0.00341	0.12172	30.0	2.0730	0.047
rss_brood	0.00476	0.00947	-0.01381	0.02332	30.0	0.5024	0.619
rss_reflect	-0.00895	0.00765	-0.02394	0.00604	30.0	-1.1699	0.251
ecr_avo * ecr_anx	0.00749	0.03218	-0.05559	0.07057	30.0	0.2327	0.818
ecr_anx * rss_brood	-0.02270	0.00942	-0.04116	-0.00425	30.0	-2.4115	0.022

Variables	Estimate	SE	95% Confidence Interval		df	t	p
			Lower	Upper			
ecr_anx * rss_reflect	0.00645	0.00977	-0.01269	0.02560	30.0	0.6605	0.514
rss_brood * rss_reflect	1.31e-4	0.00345	-0.00664	0.00690	30.0	0.0380	0.970
ecr_avo * rss_brood	0.02314	0.01431	-0.00490	0.05118	30.0	1.6172	0.116
ecr_avo * rss_reflect	-0.02552	0.01060	-0.04630	-0.00474	30.0	-2.4074	0.022

Figure 3: Effects plot of interaction anxiety X brooding, and avoidance X reflection, on MD



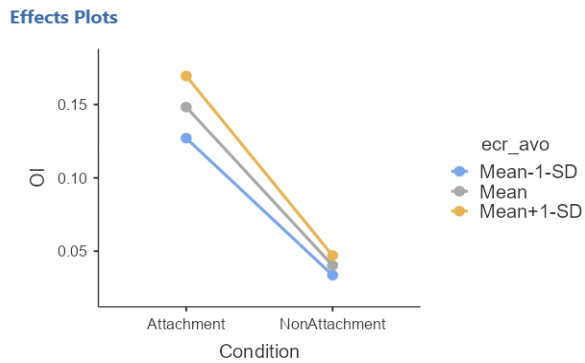
### H3 Do individuals with higher levels of attachment anxiety/avoidance exhibit overgeneralization more often for attachment compared to non-attachment content?

A final pair of mixed models (for OI and MD, respectively) was calculated to observe whether the narrative condition (i.e., attachment or non-attachment narrative) and value (i.e., negative, positive, and new) had any influence on overgeneralization. The models included condition and value as factors, and avoidance, anxiety, brooding, and reflection as covariates. The model revealed a non-significant interaction ( $p = 0.14$ ) of value on overgeneralization. Figure 5 displays the effect plots for the interaction of narrative value and attachment on OI. The model for OI revealed a main effect of condition ( $F_{(1, 116)} = 61.41, p < 0.001$ ), showing higher levels of overgeneralization for attachment ( $M = 0.15$ ), as compared to non-attachment ( $M = 0.04$ ), content. Figures 4a and 4b illustrate the non-significant (trend) interactions between condition and attachment avoidance, and attachment anxiety, respectively. The model for MD did not replicate the effect of condition. Instead, the previously found effect of attachment anxiety was still significant ( $F_{(1, 33)} = 4.86, p = 0.035$ ), while trends were maintained for the interactions anxiety\*brooding ( $F_{(1, 33)} = 3.24, p = 0.086$ ), and avoidance\*reflection ( $F_{(1, 33)} = 3.98, p = 0.056$ ).

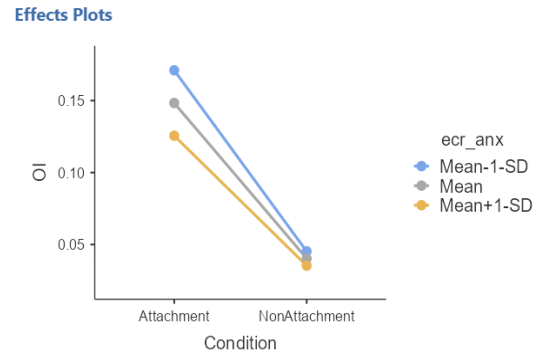


Figure 4: Interaction of narrative condition and attachment on OI

4a – Attachment avoidance



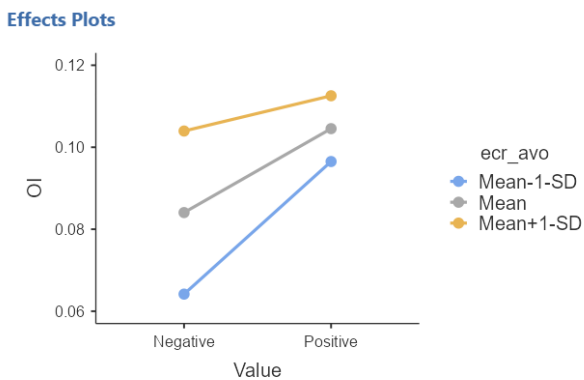
4b Attachment anxiety



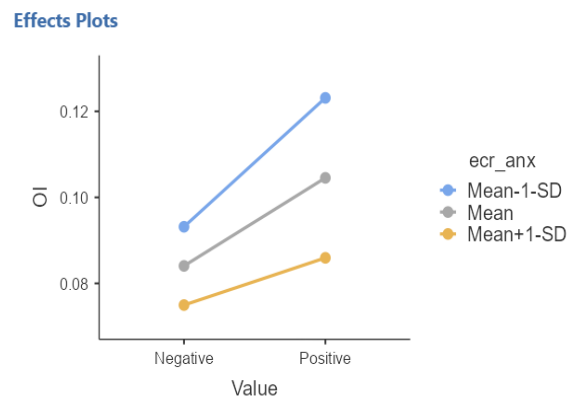
Note: avoidance\*condition  $p=0.393$ , anxiety\*condition  $p=0.295$

Figure 5: Interaction of narrative value and attachment on OI

5a – Attachment avoidance



5b – Attachment anxiety



Note: avoidance\*value  $p=0.483$ , anxiety\*value  $p=0.575$

## Discussion

The present thesis aimed to investigate the relationship between attachment style and overgeneralization in episodic memory within a non-clinical sample and explore the potential moderating role of rumination in this relationship. The preceding analysis of this thesis highlights the complex relationship among attachment style, rumination, and OM, emphasizing the necessity for a more comprehensive investigation.

Participants actively participated in a discrimination memory task where their ability to distinguish between similar but distinct narratives was assessed. Two key memory indices, Memory Discrimination, and Overgeneralization Index, were employed to measure their

performance in accurately discriminating between old, new, and similar narratives. In general, participants were highly accurate in the memory task. Notably, both subscales of rumination, brooding, and reflection, exhibited positive correlations with both the anxiety and avoidance subscales of attachment. This implies that individuals with higher levels of attachment anxiety and avoidance tend to engage in more ruminative thought processes, encompassing both the contemplative and brooding facets. Of particular interest is the finding that the reflection subscale of rumination stands out as the only measure that positively correlates with social desirability. This suggests that individuals who describe a greater tendency for reflective rumination for themselves appear also more attuned to socially desirable responses, possibly reflecting a heightened self-awareness or a heightened tendency to more idealized views of self.

Unexpectedly, we did not find any significant attachment-related main effects or interactions on overgeneralized memory, suggesting that attachment avoidance and anxiety, on their own or in conjunction with facets of rumination, may not be directly influencing the overall tendency for overgeneralized episodic memory during the completion of the narrative memory task, at least in this nonclinical sample. Furthermore, the study unveils that overgeneralization occurs differentially in attachment and non-attachment narratives. While attachment anxiety relates to increased overgeneralization in positive attachment narratives, attachment avoidance exhibits a similar pattern for negative attachment narratives. These context-dependent influences underscore the importance of considering narrative content in understanding memory processes.

A few speculative explanations for this result include individual differences within attachment categories (individuals with the same level of attachment anxiety may still exhibit considerable variability in other psychological factors that could impact memory processes); the role of other factors (psychological or contextual); sample characteristics (demographics or cultural influences); and methodological limitations.

On the other hand, the memory discrimination model revealed a noteworthy low positive correlation with attachment anxiety. Although this correlation did not reach statistical significance, the trend observed suggests a potential association between higher attachment anxiety and enhanced memory discrimination. This trend may indicate that individuals with elevated attachment anxiety levels may demonstrate a more refined ability to discern and discriminate between different memory traces, warranting further exploration in future studies.

Regarding the control analysis centered on overall memory accuracy, the mixed

model revealed that an increase in self-reported anxiety corresponds to an elevated memory accuracy, specifically in narratives with positive endings. This suggests that attachment anxiety may influence memory accuracy in specific contexts, providing additional nuances to the relationship between attachment dimensions and memory processes.

We further investigated if patterns of memory overgeneralization hold equally for attachment narratives in specific, compared to non-attachment narratives. Specifically, we assumed that individuals with elevated levels of attachment avoidance or anxiety would demonstrate a heightened inclination for overgeneralized episodic memory retrieval when presented with attachment narratives compared to non-attachment narratives, in contrast to those with lower levels of attachment avoidance or anxiety. Our results indicate that, in fact, overgeneralization occurs more in attachment than non-attachment material, independent of individual attachment dimensions. This finding aligns with the idea that the content of attachment-related narratives may contribute to the development of overgeneralized autobiographical memory (Beyderman & Young, 2016; Sutherland & Bryant, 2007). However, the model for MD did not replicate the effect of condition observed in the OI model. Despite the absence of a direct effect of narrative condition in the MD model, the sustained significance of attachment anxiety and the trends in interaction effects emphasize the intricate dynamics at play. Attachment anxiety appears to independently contribute to memory discrimination outcomes, while the interactions hint at the potential moderating role of rumination behaviors in this relationship.

In the present sample, the mean attachment anxiety was  $\bar{x} = 3.0$  with a standard deviation of  $SD = 1.2$ . The question arises: do individuals with elevated anxiety levels demonstrate attachment anxiety levels that are significantly high or moderate when compared to other populations? To address this, I looked at other studies that measured attachment anxiety in various adult populations. Wongpakaran and colleagues (2023) conducted four studies measuring ECR anxiety levels in diverse populations in Thailand. In Study 1 involving nonclinical adults, the mean was  $\bar{x} = 3.3$  with  $SD = 1.3$ . Study 2, focusing on clinical adult populations, reported  $\bar{x} = 3.9$  with  $SD = 1.8$ . Study 3, which examined older nonclinical adults, reported  $\bar{x} = 3.8$  with  $SD = 1.4$ . Lastly, Study 4, involving older clinical adults, found  $\bar{x} = 4.0$  with  $SD = 1.00$ . Comparatively, Read and colleagues (2018) conducted a study in Australia, where a nonclinical sample of 253 adults exhibited similar anxiety levels with a mean of  $\bar{x} = 2.99$  and  $SD = 1.28$ . Therefore, attachment anxiety levels in the present study fall within the range observed in both the Thai and Australian nonclinical samples (Read et al., 2018; Wongpakaran et al., 2023).

### **Rumination as a mechanism**

Rumination continues to be a topic of ongoing debate within previous literature and research. This cognitive process is acknowledged for its inherent dual nature, encompassing both adaptive and maladaptive dimensions, often categorized as 'trait' or 'state' rumination. The ongoing discourse on the adaptiveness or maladaptive nature of rumination takes on a nuanced perspective when examining its correlation with memory overgeneralization.

In contrast to previous studies that intentionally induced modes of rumination or non-rumination to investigate their impact on OM (Sutherland & Bryant, 2007; Crane et al., 2007), the current research focused on analyzing rumination as a trait rather than an experimentally induced state. Unlike the experimental approach of inducing rumination, my thesis analyzed rumination as a trait, acknowledging the stable individual differences in the tendency to engage in repetitive and intrusive negative thinking. Surprisingly, the results did not reveal a significant association between trait rumination and OM, deviating from the findings of studies that experimentally induced rumination. This discrepancy implies that while experimentally induced rumination might contribute to heightened levels of OM, the same may not necessarily be applicable to trait rumination. Alternatively, it could indicate that my limited sample size might not accurately represent the broader population and may have failed to encompass a range of ruminative behaviors within a nonclinical context.

However, regarding MD, a notable interaction was observed between attachment anxiety and brooding, as well as between attachment avoidance and reflection. These results suggest that the impact of attachment anxiety on memory discrimination is contingent upon the level of brooding. This interaction implies that the tendency for individuals with higher attachment anxiety to exhibit reduced memory discrimination is particularly pronounced when coupled with higher levels of brooding. Brooding may exacerbate the negative influence of attachment anxiety on MD, leading to a more pronounced reduction in the ability to discriminate specific memories. While rumination did not serve as a mediator on OI, the moderation effects observed in MD suggest that the impact of rumination may be contingent on the level of attachment insecurity.

Studies discussed in this paper consistently demonstrate associations between experimentally induced high engagement in rumination and the overgeneralization of memory, treating rumination as a state variable assessed in the moment. Conversely, when the studies examined rumination as a trait, associations with memory overgeneralization were not consistently found. This suggests that it is not merely the predisposition to ruminate but

the active engagement in rumination, particularly in the moment, that intricately links with memory overgeneralization. This distinction underscores the critical need to differentiate between trait and state perspectives when assessing the relationship between rumination and cognitive processes. Therefore, it is important to emphasize that this thesis did not experimentally manipulate rumination as a state, which may have impacted the OI results. Instead, the focus was on exploring the trait aspects of rumination and its potential long-term associations with memory overgeneralization.

### **Limitations**

This study is subject to several limitations that warrant consideration. First, the small sample size, comprising exclusively Swedish women, poses challenges to the generalizability of the results. While the inclusion of a specific gender identity and age range (19-55) was intentional for controlling variables, it simultaneously restricts the external validity of the findings. It is crucial to acknowledge that cultural norms and values can significantly influence attachment patterns. As such, the need for more inclusive research criteria with diverse samples representing various perspectives on attachment and family bonds becomes evident. Future investigations should prioritize the inclusion of larger and more representative samples to enhance the robustness and applicability of the study's outcomes.

A second limitation stems from the reliance on self-report measures for assessing attachment and rumination. This method introduces potential biases related to response accuracy and social desirability effects. Participants may provide responses influenced by factors such as limited self-awareness or discomfort in acknowledging attachment-related emotions. To address this limitation, future research could benefit from adopting more comprehensive measures of attachment, such as the Adult Attachment Interview (George, Main, & Kaplan, 1985), to capture a richer and more detailed understanding of individuals' attachment dynamics.

Furthermore, the study's confinement to a laboratory setting, where participants were required to maintain a static seated position for a few hours, may introduce discrepancies between laboratory conditions and real-world experiences or behaviors. To enhance the ecological validity of the findings, future research should explore more naturalistic settings that better mirror individuals' day-to-day experiences. Additionally, incorporating tasks that actively engage participants in rumination and distraction processes within these ecologically valid settings could provide a more realistic portrayal of attachment dynamics in diverse contexts. Moreover, the inclusion of different valences of ruminative thoughts, encompassing

both positive and negative dimensions, would enrich our understanding of how attachment processes intersect with varying emotional states.

### **Conclusion and clinical applications**

In conclusion, my thesis investigated the relationship between attachment insecurity, rumination, and OM processes. Although predominantly yielding non-significant results, this study provides valuable insights and highlights crucial avenues for future research. The identified associations between attachment anxiety and OM retrieval highlight the relevance of attachment dynamics in shaping cognitive outcomes. Examining attachment dynamics and overgeneralization in nonclinical contexts makes a significant contribution, expanding our comprehension beyond clinical frameworks. This comprehensive investigation into routine cognitive processes highlights the impact of attachment on memory retrieval. A crucial aspect highlighted in this study is the necessity for a balanced consideration of both trait and state perspectives in the broader discourse on rumination and its cognitive consequences. Recognizing that individuals engage in rumination to varying degrees, both as a trait and in response to specific situational cues, contributes to a more comprehensive understanding of its impact on memory specificity. This approach is vital for capturing the diverse ways in which rumination may influence episodic memory.

The suggestion to explore how attachment anxiety interacts with other psychological factors emphasizes the complexity of memory retrieval processes within the context of attachment insecurity. This highlights the importance of considering attachment insecurity and rumination behaviors in understanding cognitive processes. Subsequent research should broaden its scope to unravel the connection between attachment dynamics and diverse psychological factors, fostering a more comprehensive understanding of the elements influencing memory outcomes. This study serves as a steppingstone, paving the way for deeper explorations into the intersection of attachment, rumination, and OM. My findings and I encourage researchers to expand their investigations beyond clinical settings, embrace diverse perspectives, and adopt a nuanced view that considers both trait and state aspects of rumination within cognitive functioning.

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