ADULT ATTACHMENT AND EXPLORATION:

THE EFFECT OF ATTACHMENT STYLE ON THE EXPERIENCE OF EXPLORATION

A Dissertation

by

ARCHIBALD MCLEISH MARTIN, III

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

May 2009

Major Subject: Psychology

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Approved by:

Chair of Committee, William S. Rholes
Committee Members, Ramona L. Paetzold
Hart Blanton
Heather C. Lench
Head of Department, Les C. Morey

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ABSTRACT

Adult Attachment and Exploration:

The Effect of Attachment Style on the Experience of

Exploration. (May 2009)

Archibald McLeish Martin, III, B.A., Whitman College;

M.S., Texas A&M University

Chair of Advisory Committee: Dr. William S. Rholes

According to attachment theory a key moderator in the enjoyment of exploration is the strength of a person's secure base. To study exploration we placed participants in a situation in which they confronted a novel stimulus. We also gathered self-reported data on their mood immediately before and after this encounter with a novel stimulus as well as their attitudes about the novel stimulus activity. The effect of a "secure base" on this encounter was examined in two ways: first through chronic attachment, and second through priming participants with either a secure attachment prime, an insecure attachment prime or a neutral prime. Thus, this study makes two categories of predictions: the first regarding the effect of chronic attachment, and the second regarding the effect of primed attachment. Regarding the effect of chronic attachment, we predicted that there would be an interaction between the novelty of the stimulus and chronic attachment. Specifically, we found that both chronic attachment avoidance and chronic attachment anxiety predicted greater tense mood following the activity and greater anxiety about the activity. In addition, we found that chronic avoidant attachment

was related to greater anger following the activity and less happiness following the activity. These results remained significant even when mood immediately before the activity was controlled.

Regarding primed attachment, we found that there was an interaction between primed attachment and novelty condition. (During the study, participants in the low novelty condition interacted more extensively with the novelty stimulus than did participants in the high novelty condition.) Specifically, we found that participants in the low novelty condition reacted more strongly to the attachment prime than participants in the high novelty condition. Further, the attachment prime predicted the direction of the change in mood. Thus, for the low novelty conditions, participants primed with secure attachment reported significantly more happiness and higher positive affect on a composite mood scale, compared with participants primed with insecure attachment. In the same way, again for the low novelty conditions, participants primed with secure attachment reported significantly lower levels of anger, compared with participants primed with insecure attachment.

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1. INTRODUCTION

In 1969, Bowlby proposed that a science of human behavior could be created by borrowing from biology, in particular from the literature in ethology and evolution. Through attachment theory, Bowlby argued that one of the chief instinctive systems in humans is a goal-oriented system of attachment. The goal of this system is for an infant to maintain proximity to a primary caregiver who can then protect and help the child in times of need. There are two main strengths to the argument that there is a system for maintaining proximity to a protective figure. First, it explains the findings that attachment behavior is strongest when a person is in need due to a stressful or anxiety-provoking situation. Second, it explains why attachment to others is observed throughout the human lifespan. Even in adulthood, when an individual is sick or in danger, the presence of a trusted other to help and defend is highly adaptive. In adults, though, the primary attachment figure has shifted typically from parents to romantic partners.

Since 1987, when Hazan and Shaver published the first article linking attachment theory to adult romantic relationships, a great deal of research has been conducted on what Bowlby termed the safe haven aspect of attachment theory. The safe haven aspect refers to the external support that securely attached people reliably receive from their primary caregiver. (For greater discussion of this topic, see Feeney & Collins, 2004.) However, a second aspect of the attachment system, the internalize support of the secure base, has been neglected. This aspect refers to the notion that people with good

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This dissertation follows the style of *Journal of Personality and Social Psychology.*

attachment figures learn that, if they encounter something they cannot handle, they can retreat to someone who will protect them and comfort them. Thus, these individuals have internalized greater confidence and are able to more freely explore their environment (Feeney & Collins, 2004). Perhaps the primary distinction between safe haven and secure base support is whether the support is external or internal. In safe haven processes the partner is physically there and capable of providing both instrumental and emotional support. In secure base support the partner does not have to be present; it is a mental representation of the partner (and other important attachment figures) that provides support. In addition, because the secure base is simply a mental representation, the support garnered is mostly emotional support.

Exploration and Its Ties to Attachment

In addition to his theory of attachment, Bowlby (1969) described a complex interaction between attachment behavior and exploration behavior. Bowlby thought of attachment as a control system designed to maintain a certain optimal distance from the attachment figure. For example, infants maintain a close proximity to the mother.[1] However, not all behaviors increase proximity to the attachment figure. In Bowlby's discussion of infant behavior he divides the child's behavior into two groups, "the child's attachment behavior [and the] behavior of the child that is antithetical to attachment, notably exploratory behavior" (1969, p. 237). Thus, Bowlby defined attachment behaviors as those that brought the infant and the caregiver closer together, whereas exploration is the chief motivator for behavior that distances the two. In this

[1] Note that mother and attachment figure are used interchangeably because of precedent and for stylistic reasons, but an attachment figure can take the form of any reliable and consistent caregiver.

way a dynamic equilibrium exists wherein attachment behavior increases proximity and exploratory behavior increases distance such that some optimal distance between the figures is maintained.

Exploration through Development

The attachment behavior of a human child begins around the age of three months, when infants respond differentially to their mother and begin to seek out interaction (Bowlby, 1969, p. 203, 210). At this stage in development, the main function of attachment behavior, proximity, is maintained through crying. As the infant grows and is able to follow his or her attachment figure, crying is less necessary to maintain proximity (p. 201). Once infants begin to crawl, they also begin to engage in more exploratory behavior (crawling away from the mother to stare at new people or putting new toys in their mouths). Even at the age of two or three, most toddlers are comfortable engaging in exploration in strange environments only when their mothers are present. Children become more comfortable exploring their environment outside of their mother's presence by the age of four or five (p. 205). However, if something goes wrong when they are exploring their environment, they immediately seek out an attachment figure (p. 207).

Overall, the optimal distance to an attachment figure increases as an individual moves towards adulthood (Bowlby, 1969, p. 207, 261). In addition to this increased distance, a greater variety of support suffices in times of need. For example, in toddlers, a frightening situation often requires being hugged or cuddled. As adults, however, the level of contact can be satisfied by "an increasingly large range of conditions, some of

which are purely symbolic. Thus, photographs, letters and telephone conversations can become more or less effective means of 'keeping contact' so long as intensity is not too high" (Bowlby, 1969, p. 261). Related to adults' ability to be comforted by weaker contact is the development of mental models. Adults develop and maintain a mental model of how their specific partner and partners in general will treat them (Collins, Guichard, Ford, & Feeney, 2004). This allows adults to rely on a mental representation of their partner without their partner's actual presence.

Exploration

In Bowlby's (1969) discussion of differences in infant attachment to caregivers, one of the main behaviors that distinguishes between secure and insecure attachment styles is exploratory behavior. In describing secure infants, Bowlby noted that "the picture was that of a happy balance between exploration and attachment" (p. 338). His description of insecure infants was quite different. He pointed out that "some tended to be passive, exploring little and/or rarely initiating contact…Others of the [insecurely] attached engaged in exploration, but they did so more briefly than the securely attached; and they seemed constantly concerned about mother's whereabouts" (p. 338). Thus, Bowlby believed the more secure an infant, the more that infant is able to engage in exploratory behavior. More insecure infants are involved in maintaining proximity and thus unable to explore. One explanation for why insecure infants are less able to part from their caregivers could lie in the infant's mental model and the strength of the secure base. That is, children that have developed a secure mental model are more likely to have incorporated a strong sense of a secure base into that model. As they explore, their

anxiety about new situations and events can be immediately reduced through their mental model of their secure base. Insecure infants, however, would not have a strong secure base aspect as part of their mental model because they have not received consistent support. For them, the small anxieties of each new situation could quickly add up, as they do not have the mental support provided by a strong secure base aspect.

Following Bowlby, a number of researchers examined attachment and exploration in infants. Perhaps the first published research article on exploration and attachment was by Main (1983). In this short term longitudinal study, Main first classified toddlers as secure or insecure based on the Ainsworth Strange Situation paradigm (Ainsworth, Blehar, Waters, & Wall, 1978). In later sessions Main found that secure infants played more with both an adult playmate and with an examiner than did insecure toddlers. In addition, during this play the secure toddlers enjoyed the play more, paid more attention to a puzzle toy and were more intensely involved in their exploration than wore the insecure toddlers. Grossmann, Grossmann, and Zimmermann (1999) argue that these attachment differences in infants were due to emotions processing differences. Specifically, they argue that secure infants were able to focus and actively engage in the exploration more because they were freer to organize their emotions around these new experiences and they had the confidence provided by their attachment figures to do so. Similar to Main's results, Cassidy (1986) found that infants who were classified as secure during the strange situation paradigm also showed greater ability to negotiate their environment during the free play portion of the paradigm. Free play in the study was determined through coding video tapes of the infants for skills maneuvering around

toys, crossing distances and reaching for objects without stumbling or falling. This research shows that, at least in infants, even physical ability to explore is affected by the attachment between infant and caregiver. Van den Boom (1994) conducted an experimental study using mothers with irritable infants; some of these mothers received an intervention designed to enhance "maternal sensitive responsiveness." Three months later, the children with mothers who had received the intervention were more likely to be classified as securely attached. These infants, compared to infants whose mothers had received no intervention, were also more exploratory and their quality of exploration improved. These results provide some experimental support for the effects that attachment figures have on exploration. When mothers received an intervention to enhance responsiveness to their infants, the infants reacted to this increased support by exploring more fully. McElwain, Cox, Burchinal, and Macfie (2003) followed up these studies by distinguishing between the reaction of avoidant and anxious infants. McElwain et al. found that infants who were classified as more avoidant displayed more instrumental aggression during play with another child. Children that were classified as anxious, on the other hand, were less assertive with a playmate and were less attentive and had less complex pretend play during a solo exploration situation. (A theoretical discussion of the infant attachment research can also be found in Grossmann, et al. 1999.)

Bowlby and the attachment and exploration literature in general most often discuss exploration in very broad terms. However, it could be useful to reduce exploration into three different aspects—approaching-the-novel, enjoyment-of-novelty,

and anxiety-about-the-novel. Approaching-the-novel, to some extent, takes place before exploration actually occurs and encompasses the choice and desire to seek out exploration situations or the choice to engage in them when the opportunity presents itself. In the infant literature for example, this aspect is captured through coding the amount of time spent with a novel playmate instead of with a caregiver. Enjoyment-of-novelty and anxiety-about-the-novel simply refer to the emotion people experience while they are actively engaged in investigating a novel stimulus or immediately afterwards. For example, in the infant literature this aspect is measured through video coding of smiles while playing or the average length of time spent engaged with a toy. If one were to imagine an exploration situation in situ, it is apparent that all three aspects would be important. Approaching-the-novel determines if people are likely to get themselves into an altogether new situation or at least a situation in which they might be confronted with novel stimuli. Once engaged with the novel, according to Bowlby, enjoyment and anxiety are primary responses to it. By breaking down exploration into its parts in the lab, researchers can focus their efforts on a more easily defined topic than exploration, which actually describes a whole chain of events and reactions.

In addition to providing some clarity to exploration in action, naming these three aspects also allows us to link conceptually the exploration and attachment literature to other areas of research in psychology. While our conceptualization of approaching-the-novel is somewhat different than the more broad definition of curiosity used by that area of research, there are obvious parallels. Kashdan, Rose and Fincham (2004) argue that curiosity is a "positive emotion-motivational system associated with recognition pursuit

and self-regulation of novelty and challenge" (p. 291). While our definition of approaching-the-novel might be somewhat more limited (we are mostly concerned with the pursuit of novelty) and more closely tied to the role the attachment system plays, we believe that useful parallels can be drawn with these two areas of research and we use the work done in developing measures of curiosity in the current study.

The anxiety-about-the-novel and the enjoyment of engaging in the novel aspects are theoretically similar to the behavioral inhibition and behavioral approach systems first conceptualized by Gray (1972). Regarding our aspect of anxiety-about-the-novel, Gray argues that the behavioral inhibition system (BIS) controls the experience of anxiety and response to anxiety relevant cues, one of which is novelty. While we are concerned specifically with novelty as an anxiety relevant cue a theory that helps to explain anxiety could help to inform the experience of exploration. Regarding our aspect of enjoyment-of-the-novel, Gray argues that the behavioral activation system (BAS) is sensitive to reward as well as being tied to positive mood feelings such as elation and happiness. If BIS can help explain the experience of exploration with regards to negative emotions such as anxiety, then the BAS could help to explain the experience of exploration from the side of positive emotions. Obviously, our conceptualizations of anxiety-about-the-novel and enjoyment-of-novelty are not identical to the BIS and BAS. However we do believe that there are useful similarities and future work drawing together these two lines of research could be fruitful.

Attachment and Exploration Literature Among Adults, Relevant to Approaching-the-Novel

An exploration event usually starts with a person's approach towards a novel stimulus. We begin our discussion of exploration with that first aspect. Mikulincer's (1997) article addressed information processing and attachment with two of the studies focusing on how attachment impacts curiosity. By using measures of curiosity as the dependent variables, these two studies clearly speak to the aspect of approaching-the-novel. The author's first investigation was a questionnaire study that examined the link between attachment style and state and trait curiosity. The results showed that secure individuals had significantly higher scores than avoidant individuals on the measures of curiosity[2]. They also showed that secure individuals were more likely to endorse normative beliefs about the appropriateness of curiosity. These results demonstrate that, even for these broadly defined state and trait curiosity scores, people exhibit differences based on attachment style.

Mikulincer's (1997) also conducted a behavioral test of curiosity in which exploration was operationalized as the number of video clips individuals chose to watch about a new consumer product. Participants in the control condition were told that after watching the video clips they would test the product. In the experimental condition, they were told they would engage in a "social interaction" and that the duration of this second portion of the study was dependent on how much time they spent viewing the clips. This

[2] Adult attachment research has used a wide variety of measures, some of which ask participants to categorize themselves into Ainsworth et al.'s three categories of attachment and some of which measure attachment along two dimensions. Thus, the literature review will sometimes refer to avoidant people and sometime to people as more avoidant depending on whether the attachment measure used was categorical or dimensional.

operationalization of exploration captures the curiosity aspect of exploration since the main dependent variable was concerned mostly with whether the participants would choose to approach these novel stimuli. The results showed that the secure individuals chose to watch more of the clips across both conditions. The avoidant individuals only chose to watch more clips when they thought that the clips would be followed by the social interaction. Thus, Mikulincer argues that they were probably watching the clips because it reduced the time they would spend in the social interaction. Anxious-ambivalent people only chose more clips when they knew it would be followed by the product testing. When the clips were to be followed by the interaction they chose fewer of the clips. Presumably this was to proceed to the interaction as quickly as possible. A major problem with the study (and any generalizations to exploration outside of the study) is the operationalization chosen for exploration. It could be argued that the opportunity to meet a new person is the same or even a better example of approaching a novel stimulus as watching commercials—though it was not scored in that way. Thus, it is somewhat unclear if the avoidant or anxious people were truly less exploratory or if they just had different preferences for types of exploration. Nevertheless, Mikulincer's studies provide a start to approaching a behavioral measure of exploration, and both studies together provide basic support for the idea that attachment influences the aspect of approaching-the-novel.

Green and Campbell (2000) investigated attachment and approaching-the-novel more directly than did Mikulincer. The authors developed a questionnaire to measure willingness to engage in exploration in social, environmental, and intellectual contexts.

This questionnaire was their main dependent variable in both of the studies they conducted. Because this self report questionnaire focused on the initial stages of exploration it falls into our aspect of approaching-the-novel. In their first study, they examined the relation between their approaching-the-novel questionnaire and chronic attachment style. In the second, they inspected the link between their approaching-the-novel questionnaire and primed attachment style. The prime of secure, avoidant or anxious attachment style was accomplished through a "memorization" task in which participants memorized sentences taken from the Hazan and Shaver (1987) attachment style paragraphs. The results of both studies showed that for both chronic and primed attachment, greater avoidance and greater anxiety were related to less desire to approach the novel.

The Green and Campbell (2000) study was the first attempt to create a questionnaire addressing interest in novel stimuli using the broad language of Bowlby. This approach, based in a broad definition like the one Bowlby used, meant that the authors could show that attachment style was directly related to a range of novel stimuli. Therefore, this work can be more easily generalized than Mikulincer's because it moves beyond simply a measure of curiosity to examine specific attitudes towards a range of approaching-the-novel stimuli. In addition, this is the only work to date in the area of adult attachment and exploration that has manipulated attachment style by priming. The primes created similar patterns of exploration as chronic attachment styles. Green and Campbell's study provides preliminary evidence that it is the attachment style and mental models that are causing the differences in exploration. Their work also provides

convergent evidence for Mikulincer's (1997) results that insecure people are less likely to approach novel stimuli.

Carnelley and Ruscher (2000) examined the reasons people having different attachment styles choose to engage in leisure activities. Because this study was focused on the choice to engage in exploration, it too falls under our aspect of approaching-the-novel. The authors found that avoidant and anxious people were more likely to engage in leisure activities as a means of gaining social approval. These results reinforce Mikulincer's (1997), who found that anxious people were less likely to approach the novel when it competes with social interaction. Carnelley and Ruscher also found that anxious people were less likely to engage in thrill-seeking activities. The authors suggest this result could be due to anxious people's preoccupation with relationships, thereby distracting them from those activities. This finding could also be because they do not feel they have the secure base necessary to attempt something which might provoke a great deal of anxiety. Along these lines the authors also found that participants high in anxious attachment used leisure activities as a means to regulate their negative affect about relationships.

Aspelmeier and Kerns (2003) completed a similar study but used freshman college student's reports of beginning university as their operationalization of exploration. Some of these reports were in the form of what the students chose to engage in when placed into this new environment and thus fall into our aspect of approaching-the-novel. Their results confirmed previous research findings that anxious and avoidant people are less curious and less likely to approach novel situations. In their second study,

they found that avoidant people were less likely to spontaneously engage in a novel game.

Finally, Martin (2006) found that people high in anxious attachment report lower levels of need for cognition, lower Big Five-openness to experience, and lower levels of trait curiosity. These results support previous research concerning the robust difference in attitudes that highly anxious or avoidant people (as compared to secure people) have towards approaching novel stimuli.

Together the above studies provide a clear picture that people with insecure attachment styles are much less likely to approach novel stimuli of their own accord. However, there are many occasions when confronting the novel cannot be avoided, for example, being sent away to summer camp, or going off to college or simply leaving home for the first time. Thus, it is of interest how people high in attachment anxiety or avoidance will react when they are forced to confront the novel.

Attachment and Exploration Literature Among Adults, Relevant to Anxiety-about-the-Novel and Enjoyment-of-the-Novel

The first study in the area of adult attachment and exploration was completed by Hazan and Shaver (1990). In this study, exploration was operationalized as work, and the focus of the study was how people felt during their work. This study then does not speak to our aspect of approaching-the-novel; instead it addresses enjoyment of and anxiety about novel stimuli. Hazan and Shaver's results showed that there were many differences between secure people and anxious and avoidant people. Specifically, they found that secure people were significantly more satisfied with their work and felt

significantly more competent than either anxious or avoidant people in the study. Conversely, anxious and avoidant people reported being more dissatisfied with advancement and recognition in their work, greater fear of failure in work, and that love interfered with their work more than it did for secure people in the study. Anxious participants also showed some additional differences from secure people that avoidant people did not. Anxious people, compared to secure people, reported significantly lower happiness with their job security and learning and greater dislike for working alone. They also reported that work was more harmful to their health and relationships, that they were more distracted at work, that they felt more unappreciated, and that they were more motivated by approval than secure people. These results clearly show that anxious and avoidant people enjoy work less than secure individuals. They also show that avoidant and anxious people have a number of specific emotional reactions to work that secure people do not, e.g., fear of disapproval and failure. Although Hazan and Shaver's results provided a productive first step, they also conceded that using work as an operationalization of exploration, or more specifically our enjoyment and anxiety about novel stimuli, might be too limited.

In addition to the findings regarding approaching novelty, Green and Campbell (2000) in their second study, also included a measure related to liking for novelty. Specifically, they asked participants to report liking for three unusual pieces of art, and how interested the participants would be in a detailed discussion of the experiment and how interested they would be in an additional "mystery experiment." These scores were then combined to form a composite score. They found that participants primed for

security had marginally higher scores on this composite measure of liking for novelty than did participants primed for insecurity. This finding must be regarded with caution, though. First, the finding was only marginally significant. Second, the composite score was a combination of both liking for novelty (the pieces of art) and approaching-the-novel (the two "mystery" experiment questions), thus it is unclear whether this finding can speak directly to liking for novelty.

Aspelmeier and Kerns (2003), in addition to the results regarding college students' approaching of novel situations, examined the effect that the novel situation of starting college had on people. In this way, this study provides some insight into attachment differences concerning enjoyment and anxiety about novel stimuli. They found that both anxious and avoidant people retrospectively reported exploration to be more anxiety provoking, were less able to effectively adapt to the novel situations, and were less likely to seek help and support from others.

In an unpublished manuscript Martin et al. (2007) found that when people were confronted with novel stimuli in the lab, there were significant differences in enjoyment and anxiety predicted by people's attachment anxiety and avoidance. Namely, people that were either high in anxiety or high in avoidance reported more negative mood and less positive mood immediately after being confronted with a novel stimulus. When asked directly about the novel activities in which they engaged, they reported less enjoyment of the activity and more anxiety about the activity than their low anxious and low avoidance peers. These results did not have the benefit of controlling for emotion

prior to the novel stimulus though. Lacking emotion data from before novel stimuli, it is unclear then that the participants' reports were due specifically to the novel stimuli.

As can be seen from the literature reviewed thus far, a great deal of work in the area of attachment and exploration has yet to be done. In particular, the exploration aspects of enjoyment and anxiety concerning the novel have largely been understudied. At best, the results in this area of exploration provide only tangential and preliminary evidence regarding the actual experience of exploration based on attachment style. Hazan and Shaver (1990) focused on the domain of work, which can only loosely be tied to exploration as a whole. In addition, they did not gather their data involving any actual exploration situations. Green and Campbell (2000) provided some evidence for enjoyment-of-novelty in the form of their enjoyment of art measure, but this measure also included questions unrelated to enjoyment of novel stimuli and their results were only marginally significant. Aspelmeier and Kerns (2003) provide some solid evidence that chronic attachment style is related to enjoyment and anxiety about novel stimuli. However these results, like the Hazan and Shaver (1990) are only distally related to actually individual exploration situations.

2. PRESENT STUDY

As the literature review shows, the aspect of approaching-the-novel has received a great deal of research. The proposed study seeks to broaden understanding of exploration in adults by focusing on how attachment influences peoples' enjoyment and anxiety toward novel stimuli. The study design allows for two different examinations of this question. First, it allows the examination of chronic attachment style's effects on enjoyment and anxiety experienced when confronted with a novel stimulus. In the current study, enjoyment-of-novelty and anxiety-about-the-novel were operationalized as changes in mood following the activity as well as self reports of anxiety and enjoyment of the activity. The current study adds to the previous literature on attachment and the experience of exploration by including a control (low novelty) condition. This manipulation allows us to compare, under experimental control, changes in mood following a more exploratory situation (high novelty stimuli) to a more minimal exploratory situation (lower novelty stimuli).

The second method the current study uses to answer how attachment influences people's responses to novel stimuli is the use of primed attachment style. Through experimentally manipulating attachment style, the current study obtains the benefits of random assignment. Priming attachment style has been successful in a number of previous studies. In the Green and Campbell (2000) studies the authors primed attachment style and observed differences in approaching-the-novel as well as small differences in liking for novelty. Gillath and Shaver (2007) also successfully primed attachment style and found that the participants that had been primed with an insecure

attachment style prime were more likely to choose less secure and more insecure behaviors in response to hypothetical scenarios. For example, participants could have been presented with a scenario in which they found out that their partner betrayed them by telling a friend a secret. Possible responses the participants could have chosen from might have been to explain why that upset them (secure) or withdraw and give their partner the "silent treatment" (insecure) or tell a secret of their partner's to get even (insecure). Priming has also been shown to affect a wide range of social cognitions as well, such as access to working models and faster retrieval of attachment figure's names. For a full review of the attachment style priming literature see Mikulincer and Shaver (2007b) and Gillath, Selcuk and Shaver (2008).

In addition, because the primed attachment style could still influence mood, mood measures were taken immediately after the prime and before the activity. These measures can then be used as a control when measures of activity enjoyment, activity anxiety and mood after the activity are examined. The combination of random assignment and a variable controlling for mood allows the study to rule out mood differences due to either chronic attachment style or primed attachment style.

Through the use of both chronic and primed attachment style as independent variables, four hypotheses emerge. The first two hypotheses address the question of chronic attachment style and the influence of novelty of activity.

H1. *Chronic Attachment Style Will Interact with Novelty of the Stimulus to Predict Mood*

We expect that participants with higher levels of avoidance and anxiety, particularly those in the high novelty condition, will show *lower levels of positive mood* and *higher levels of negative mood* after the activity, when mood before the activity is controlled[3].

H2. *Chronic Attachment Style Will Interact with Novelty of the Stimulus to Predict Attitude about Exploration Activity*

We expect that participants with higher levels of avoidance and anxiety, particularly those in the high novelty condition, will show *lower levels of enjoyment of the activity* and *higher levels of anxiety about the activity*.

H3. *Primed Attachment Style Will Interact with Novelty of the Stimulus to Predict Mood*

We expect that participants primed with *insecure* attachment, particularly those in the high novelty condition, will show *lower levels of positive mood* and *higher levels of negative mood* after the activity, when mood before the activity is controlled, compared to participants in the neutral prime or the secure attachment prime. We also expect that participants primed with *secure* attachment, particularly those in the high novelty condition, will show *higher levels of positive mood* and *lower levels of negative mood* after the activity, when mood before the activity is

[3] Previous research, e.g., Rom and Mikulincer (2003) found that avoidant attachment was related to both lower positive mood and higher negative mood related to task oriented groups.

controlled, compared to participants in the neutral prime or the insecure attachment prime.

H4. *Primed Attachment Will Interact with Novelty of the Stimulus to Predict Attitude about Exploration Activity*

We expect that participants primed with *insecure* attachment, particularly those in the high novelty condition, will show *lower levels of enjoyment of the activity* and *higher levels of anxiety about the activity*, compared to participants in the neutral prime or the secure attachment prime. We also expect that participants primed with *secure* attachment, particularly those in the high novelty condition, will show *higher levels of enjoyment of the activity* and *lower levels of anxiety about the activity,* compared to participants in the neutral prime or the insecure attachment prime.

3. METHOD

Participants

Seventy-one male and 150 female undergraduate students were recruited from the psychology participant pool at a large university in Texas. The majority were introductory psychology students; all received class credit for participation in the study. The mean age of the participants was 18.41 years, with ages ranging from 17 to 21 and *SD* = .72. One hundred and thirty participants were not dating anyone, 15 were dating but not exclusively, 75 were dating just their partner, and 1 participant was engaged. Mean relationship length was 6.34 months, *SD* = 12.11 and ranged from 0 to 60 months.

Materials and Procedure

Participants were run in groups of up to four. When participants arrived at the lab, they were led to a room where they were given an overview of the study and presented with a consent form. The participants then spent two minutes completing a short relaxation task in which they were merely asked to sit quietly and relax. Following the relaxation task they completed a baseline mood measure. Participants were told, "We will be asking each of you to report your mood a few times throughout the study. Please just be honest about how you are feeling and report how you are feeling at that specific moment. We are going to go ahead and ask you for the first time now." Thus, the first time the mood items were administered was simply to help the cover story and lessen suspicion when the time two and time three moods were gathered.[4]

[4] Because the time one mood items were administered primarily for the cover story, they are not used in any of the primary analyses and statistics on the items are reported only for the sake of completeness.

Mood was assessed three times during the study and six different variables were created. Four of the variables assessed mood using pairs of mood words. Participants rated each word according to "how much they feel that way right now" on 9-point Likert scales with "extremely" and "very slightly or not at all" as anchors. These four pairs measured were: happiness, with the words "happy" and "contented;" tenseness, with the words "tense" and "anxious;" anger, with the words "angry" and "frustrated;" sadness, with the words "sad" and "depressed." Item statistics for time one were: happiness: happy item, $M = 5.43$, $SD = 1.72$, contented item, $M = 5.34$, $SD = 1.79$, happiness pair, $r = .53$, $M = 5.38$, $SD = 1.53$; tenseness: tense item, $M = 3.00$, $SD = 1.74$, anxious item, $M = 3.73$, $SD = 2.06$, tenseness pair, $r = .52$, $M = 3.36$, $SD = 1.66$; anger: angry item, $M = 1.48$, $SD = .99$, frustrated item, $M = 2.31$, $SD = 1.74$, anger pair, $r = .49$, $M = 1.90$, $SD = 1.19$; sadness: sad item, $M = 1.90$, $SD = 1.35$, depressed item, $M = 1.70$, $SD = 1.22$, sadness pair, $r = .53$, $M = 1.80$, $SD = 1.13$. The fifth mood variable was one item assessing global mood: "Please enter a number from 0 to 100 indicating how good or bad you feel right now, with 0 being very bad and 100 being very good." Scale statistics for time one were: $M = 78.82$, $SD = 14.70$. The sixth variable was a composite mood score created as a combination of the above scales. All five variables were first converted to Z-scores. The negative oriented scales tenseness, anger, and sadness were reverse coded and then the five scores were summed together. Thus, higher scores are related to more positive mood. Statistics for time one composite mood were: $\alpha = .71$, $M = 0.00$, $SD = 3.41$.

After filling out the time one mood, participants were randomly assigned to read one of three paragraph priming scenarios (secure, insecure, or neutral).[5] As a cover story participants were told that imagining the scenarios in the paragraphs was part of the study, "because we are interested in how people perform on the next task when they are under a cognitive load from imagining this scenario." The secure and insecure primes follow Gillath and Shaver (2007).

Secure. "Next we will ask you to perform some lab activities. While you are doing the activity we would like you to imagine a relationship in which your partner, for a fairly long time, has consistently been available to you, sensitive to your needs, and highly reliable, having your interests at heart and supporting you in every way he/she can. That is, imagine that this person is about as reliable as any other human being could be."

Insecure. "Next we will ask you to perform some lab activities. While you are doing the activity we would like you to imagine a relationship in which your partner, for a fairly long time, has been pretty unreliable, not always very sensitive to your needs, and not always as supportive as one would expect from a partner in a good love relationship. Lately you have been wondering how long this relationship will, or should, continue."

The neutral prime follows Lench and Levine (2005) but was modified slightly to more closely match with the secure and insecure primes.

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[5] The exact time that the participants read the paragraph depended on whether they were in the high novelty activity condition or the low novelty activity condition (see the activity explanation for details).

Neutral. "Next we will ask you to perform some lab activities. While you are doing the activity we would like you to imagine a time you will go grocery shopping, your regular grocery store, the location of the store, walking through the aisles, and the path that you take through the store as you collect your items. Imagine that it is a typical shopping trip, that everything about the trip is perfectly normal."

As opposed to studies which use only secure and insecure primes we chose to include a neutral condition. This neutral condition allows us to compare both the secure and insecure primes to a non-attachment related control. This allows us to test whether, for example, a significantly lower anxiety about the activity in the secure prime is significantly lower than the insecure prime (which should be operating in the opposite direction) or if the secure prime is also significantly lower in anxiety about the activity than a neutral, non-attachment related prime. If we merely compared the insecure prime to the secure prime than all we would know is that there is a difference, but not whether the insecure attachment style prime or the secure attachment style prime or both were related to that difference.

After the paragraphs were read, and while the participants were imagining, they reported on two items, "vividness of their visualization" and "clarity of their visualization." These two items were reported on 7-point Likert scales anchored with "not at all" and "very much" (Mikulincer and Shaver, 2001). Item statistics were, vividness, $M = 5.83$ and $SD = 1.04$, and clarity, $M = 2.64$ and $SD = 1.13$. These items served as a manipulation check, but also as another means to encourage the participants to actively engage in the priming task. A one item manipulation check for the neutral

condition was also asked: “how neutral do you feel right now?” Participants responded on a 7-point Likert scale anchored with “not at all” and “very much so.” After filling out the manipulation check questions, the participants then filled out the mood items a second time so that mood differences following the prime could be controlled for in our final analyses. Item statistics for time two were: happiness: happy item, $M = 5.35$, $SD = 2.19$, contented item, $M = 5.05$, $SD = 2.19$, happiness pair, $r = .79$, $M = 5.20$, $SD = 2.07$; tenseness: tense item, $M = 2.89$, $SD = 1.89$, anxious item, $M = 3.25$, $SD = 1.97$, tenseness pair, $r = .51$, $M = 3.07$, $SD = 1.68$; anger: angry item, $M = 2.48$, $SD = 2.06$, frustrated item, $M = 3.33$, $SD = 2.36$, anger pair, $r = .76$, $M = 2.90$, $SD = 2.07$; sadness: sad item, $M = 2.65$, $SD = 2.09$, depressed item, $M = 2.41$, $SD = 1.86$, sadness pair, $r = .77$, $M = 2.53$, $SD = 1.86$; global mood, $M = 74.63$, $SD = 18.79$; composite mood, $\alpha = .90$, $M = 0.00$, $SD = 4.24$.

Participants next completed the exploration activity. The activity was a simple computer game in which the player starts with an empty landscape. The player then chooses among different actions to alter the landscape's geography and its inhabitants. In the study, participants’ were first given a brief explanation of the game:

> In the game, the player/you are given eight buttons corresponding to eight different actions you can a take. Each action can only be used once and the sequence that the actions are chosen determines the final outcome. For example, if you, the player, choose to make an earthquake and then for it to rain, the crack in the earth created by the earthquake is filled and a river is created. If you had chosen the opposite order to proceed, the rain would run off and then the earthquake would leave an empty crack in the ground.

There is no predefined goal to the game. Participants can choose between trying to be destructive or constructive in ordering their moves. For example, if they choose for

wheat to appear they could choose to have a drought, which would kill the wheat, or for it to rain, which would cause the wheat to grow. In addition, it is also not immediately clear what outcome will occur when choosing actions, thus some experimentation on the part of the participants is required. For example, when the participant makes the wind blow after planting the wheat this could lead to either the wheat spreading and growing, or if the wheat is not established, for nothing to happen. Thus, the game is simple to play but difficult to understand in full. We feel that this game is a good lab proxy for exploration because it follows a format that many people are unlikely to have encountered before, thus making it novel and because the game does not have an easily determined predefined goal, thus providing uncertainty. We feel that this activity is also functionally similar to activities that were used in previous studies of adult attachment style and exploration (puzzle boxes, Aspelmeier & Kerns, 2003; crossword puzzle, Feeney, 2004).

The novelty of the task was manipulated by having the participants in the high novelty condition engage in the task once for 5 minutes and then stop. The participants in the low novelty condition engaged in the task 7 times for 5 minutes each. That is, the participants started the activity and played for 5 minutes, they were then asked to stop and the experimenter reset the game and they started again from the beginning. To keep the low novelty participants interested in the game, they were told to try as many different combinations as possible.

The exact timing of the priming conditions varied based on whether the participants were in the high or low novelty condition. Participants randomly assigned to

the high novelty condition completed the priming manipulation immediately before they started the activity and received the following instructions: “After completing this activity, you will answer some final questions specifically about the activity, and then the study will be finished.” Participants in the low novelty condition completed the priming manipulation between their sixth and seventh times through the exploration activity and received the following instructions: “This is the last time through the activity. After you complete the activity, you will answer some final questions about this seventh and final time through the activity, and then the study will be finished.” In this way, all the participants were exposed to the prime immediately before they ran through the activity for the last time, which they were directed to think about when answering the final questions.

After the activity, the participants completed the mood items for the third time. When the participants completed the mood scale for the third time they were told to rate their mood specifically based on how they felt during the exploration activity that had just occurred. Item statistics for time three were: happy item, $M = 4.61$, $SD = 2.07$, contented item, $M = 4.55$, $SD = 2.02$, happiness pair, $r = .66$, $M = 4.58$, $SD = 1.86$; tenseness: tense item, $M = 2.63$, $SD = 1.81$, anxious item, $M = .64$, $SD = 1.78$, tenseness pair, $r = .50$, $M = 2.63$, $SD = 1.54$; anger: angry item, $M = 2.34$, $SD = 1.79$, frustrated item, $M = 3.24$, $SD = 2.13$, anger pair, $r = .69$, $M = 2.79$, $SD = 1.81$; sadness: sad item, $M = 2.17$, $SD = 1.65$, depressed item, $M = 1.95$, $SD = 1.54$, sadness pair, $r = .73$, $M = 2.06$, $SD = 1.48$; global mood, $M = 73.11$, $SD = 18.00$; composite mood, $\alpha = .83$, $M = 0.00$, $SD = 3.86$.

The participants then completed a number of items assessing their attitudes specifically about the activity. The first of these items were for our enjoyment of activity and anxiety about the activity scales. All of these items began with the instructions, "Thinking only of the activity I just finished." Participants responded to statements along a 7-point Likert scale anchored with "strongly agree" and "strongly disagree." The enjoyment scale was composed of three face valid items: "I enjoyed the activity," "I thought that the activity was fun," and "The activity bored me" (reversed). Scale statistics for enjoyment of the activity were, $\alpha = .86$, $M = 4.22$, $SD = 1.46$. The anxiety about the activity was also composed of three face valid items: "The activity made me feel anxious," "I worried about how well I was doing with the activity," and "The activity DID NOT make me nervous" (reversed). Scale statistics for anxiety about the activity, $\alpha = .67$, $M = 3.84$, $SD = 1.34$.

Difficulty of the activity and novelty of the activity were also part of the attitude about the activity items and were assessed for use as control variables. Again these items began with the instruction, "Thinking only of the activity I just finished." Participants responded to statements along a 7-point Likert scale anchored with "strongly agree" and "strongly disagree." Difficulty was measured with one item: "The activity was difficult." Scale statistics were, $M = 2.44$ and $SD = 1.49$. The novelty scale was three items: "The activity was novel/original," "The activity felt like a new experience," and "The activity was similar to others I have done before" (reversed). Statistics for the scale were, $\alpha = .70$, $M = 4.85$, $SD = 1.28$.

Following the mood and activity items, participants filled out two curiosity scales, the Curiosity and Exploration Inventory (CEI, Kashdan, Rose, & Fincham, 2004) and the trait half of the State–Trait Curiosity Inventory (STCI, Spielberger, Barker, Russell, Silva, Westberry, Knight, & Marks, 1979). The State-Trait Curiosity Inventory was included because Mikulincer (1997) has shown significant differences based on attachment working models with this measure. The STCI is composed of two subscales addressing trait and state curiosity, but this study used only the trait version because the state version would have been confounded with the exploration task conducted before the scale was administered. Thus, it is unclear what responses to a state based scale would have meant. Ten items were asked to assess trait curiosity, with the instructions, "how do you generally feel?" Participants respond on 4–point Likert scales, in this case anchored by "almost never" and "almost always." These ten items are face valid and meant to tap into curiosity behavior (e.g., "I am curious" and "I feel eager"). Scale statistics for the trait subscale were, $\alpha = .77$, $M = 2.95$, $SD = .44$.

The CEI was included because this measure is a newer measure of curiosity and reflects the ideas in the curiosity literature that have been developed since the STCI. In the CEI curiosity is viewed as two separate but interrelated dimensions: exploration of new stimuli and absorption in a task. The measure is a seven-item measure with two subscales of absorption and exploration. All seven items were responded to on 7–point Likert scales, with "strongly agree" and "strongly disagree" on the ends. Scale statistics were, $\alpha = .71$, $M = 4.83$, $SD = .84$ for the CEI. A sample absorption item is, "My friends would describe me as someone who is 'extremely intense' when in the middle of doing

something," and an exploration item is: "Everywhere I go, I am out looking for new things or experiences." The CEI is also designed to avoid a common confounding variable for curiosity, positive affect, which is part of the STCI (Spielberger et. al., 1979).

Participants then completed the Experiences in Close Relationships scale (ECR; Brennan, Clark, & Shaver, 1998). This scale measures attachment along two dimensions, anxiety and avoidance. Items for the ECR are listed in Appendix C. Scale statistics were: avoidance, $\alpha = .93$, $M = 3.08$, $SD = 1.02$ and anxiety, $\alpha = .90$ $M = 3.95$, $SD = 1.02$. The last questions the participants answered were demographic items regarding sex, age, relationship status (not dating, dating more than one person, dating exclusively, engaged, married) and relationship length were then answered. Finally, participants were debriefed and allowed to leave. See Table 1 for a visual display of the procedure.

4. RESULTS

Pairwise correlations were conducted to examine overall trends in the data (See Table 2). Moderate correlations between the mood scales provided some confirmation that a composite score was appropriate.

Manipulation checks were conducted analyzing the reported novelty of the two novelty conditions and the vividness, clarity and neutrality of the three primed attachment conditions. An independent samples t-test failed to find a significant difference in reported novelty between the novelty conditions: $t(219) = -1.193$, $p = .234$. Thus, our manipulation check showed there is no significant difference in novelty between the high and low novelty conditions. Next we used a one-way ANOVA to test for differences in vividness imagining the scenario between the three attachment primes. No significant differences were found in vividness among the three attachment primes, $F(2, 216) = 1.058$, $p = .349$. Next we used a one way ANOVA to test for differences in clarity in imagining the scenario among the three attachment primes. No significant differences were found in vividness among the three attachment primes, $F(2, 216) = .944$, $p = .391$. Finally, we used a one way ANOVA to test for differences in neutrality in imagining the scenario among the three attachment primes. Significant differences were found in neutrality among the three attachment primes, $F(2, 216) = 8.891$, $p < .001$. Least Significant Difference pair-wise post hoc tests showed that participants in the neutral prime condition reported significantly more neutrality than did participants in the insecure prime condition, $p = .006$. In addition, participants in the neutral condition

reported higher, but not significantly higher, levels of neutrality than did participants in the secure prime condition.

The primary analyses that we conducted first examined the effect of chronic attachment and novelty condition on our primary dependent variables of mood following the activity (time three) and enjoyment of the activity and anxiety about the activity. Second, we investigated the effect of primed attachment style and novelty condition on time three mood and enjoyment of the activity and anxiety about the activity.

H1-H2: Chronic Insecure Attachment Will Interact with Novelty of the Stimulus to Predict Both Mood Change Following the Exploration Activity and Attitude about the Activity.

Hypotheses 1 and 2 of the study were that the interaction of chronic attachment and novelty condition would predict changes in mood following the novel activity and attitudes about the activity. Specifically, the hypotheses predicted that greater chronic avoidance and chronic anxiety would be associated with higher negative mood and lower positive mood and that these effects would be stronger for participants in the high novelty condition than for the participants in the low novelty condition. Multiple linear regression was used to examine the interaction between chronic attachment style and novelty condition. The first step of the regression included only the time two mood variable that matched the time three mood dependent variable. The second step included novelty condition (high novelty = 1, low novelty = 0), chronic attachment anxiety and chronic attachment avoidance. Two two-way interactions were entered for the third step – chronic avoidance by novelty, chronic anxiety by novelty. This model was used to test

our five time three mood scales - happiness, tense, angry, sad and global mood. All statistics related to the primary hypotheses and all significant statistics, except for covariates, are reported.

The first variable tested was the time three mood variable of happiness. The statistics for the model change between the first step and second step showed that there was a significant improvement in the model: $\Delta R^2 = .060$, $\Delta F(3, 213) = 4.972$, $p = .002$. The statistics for the model change between the second step and third step showed that there was not a significant improvement in the model: $\Delta R^2 = .001$, $\Delta F(2, 211) = .088$, $p = .916$. The insignificant improvement in the model means that the effects for chronic anxiety, chronic avoidance and novelty condition are reported from the second step of the model. This main effect of chronic avoidance was such that higher levels of avoidance were associated with lower levels of happy mood; $B = -.326$, $t(213) = -2.838$, $p = .005$. The second primary predictor in step two, chronic anxiety, was not significant: $B = -.038$, $t(213) = -.335$, $p = .738$. Novelty condition was also significant in the model: $B = -.606$, $t(213) = -2.581$, $p = .011$. The direction of this effect was such that participants in the high novelty condition reported significantly lower happiness than did the participants in the low novelty condition. The effects from the non-significant third step in the model are: chronic avoidance by novelty, $B = .040$, $t(211) = .175$, $p = .861$, and chronic anxiety by novelty, $B = .088$, $t(211) = .385$, $p = .700$ (see also Table 3).

The next variable tested was the time three mood variable of tense mood. The statistics for the model change between the first step and second step showed that there was a significant improvement in the model: $\Delta R^2 = .040$, $\Delta F(3, 213) = 3.404$, $p = .019$.

The statistics for the model change between the second step and third step showed that there was a significant improvement in the model: $\Delta R^2 = .029$, $\Delta F(2, 211) = 3.886$, $p = .022$. Because the model change between the second and third step was significant all statistics are reported from the third step of the model. There were three significant predictors, chronic avoidance, $B = .270$, $t(211) = 2.009$, $p = .046$, chronic anxiety, $B = .362$, $t(211) = 2.776$, $p = .006$, and chronic anxiety by novelty, $B = -.514$, $t(211) = -2.784$, $p = .006$. This main effect of chronic avoidance was such that higher levels of avoidance were associated with higher levels of reported tense mood following the activity. The main effect of chronic anxiety was in same direction, but the effect for chronic anxiety was qualified by the significant interaction between anxiety and condition**.** The interaction was such that higher levels of chronic attachment were related to higher levels of tense mood for people in the high and low novelty conditions, but tense mood increased more quickly for people in the low novelty condition (see also figure 1)**.** Chronic avoidance by novelty, was not significant, $B = -.039$, $t(211) = -.208$, $p = .836$, as was novelty condition, $B = .220$, $t(211) = 1.135$, $p = .258$, (see also Table 3).

The next variable tested was the time three mood variable of anger. The statistics for the model change between the first step and second step showed that there was a significant improvement in the model: $\Delta R^2 = .047$, $\Delta F(3, 213) = 3.719$, $p = .012$. The statistics for the model change between the second step and third step showed that there was not a significant improvement in the model: $\Delta R^2 = .004$, $\Delta F(2, 211) = .458$, $p = .633$. The insignificant improvement in the model means that the effects for chronic anxiety, chronic avoidance and novelty condition are reported from the second step of

the model. There was one significant result for the time three mood variable of anger: chronic avoidance, $B = .366$, $t(213) = 3.193$, $p = .002$. The direction of the effect was such that higher levels of avoidance corresponded to higher levels of anger following the activity. The second predictor in the second step, chronic anxiety, was non significant, $B = .119$, $t(213) = 1.035$, $p = .302$, as was the effect for novelty condition, $B = .055$, $t(213) = .236$, $p = .814$. The effects from the non-significant third step in the model are: chronic avoidance by novelty, $B = -.195$, $t(211) = -.844$, $p = .399$, and chronic anxiety by novelty, $B = -.108$, $t(211) = -.473$, $p = .637$ (see also Table 3).

The next variable tested was the time three mood variable of sadness. The statistics for the model change between the first step and second step showed that there was a significant improvement in the model: $\Delta R^2 = 0.34$, $\Delta F(3, 213) = 2.938$, $p = .034$. The statistics for the model change between the second step and third step showed that there was not a significant improvement in the model: $\Delta R^2 = .013$, $\Delta F(2, 211) = 1.741$, $p = .178$. The insignificant improvement in the model means that the effects for chronic anxiety, chronic avoidance and novelty condition are reported from the second step of the model. There was one significant result for the time three mood variable of sadness: chronic avoidance, $B = .222$, $t(213) = 2.451$, $p = .015$. The direction of the effect was such that higher levels of avoidance corresponded to higher levels of sadness following the activity. The second predictor in the second step, chronic anxiety, was non significant, $B = .160$, $t(213) = 1.740$, $p = .083$, as was the effect for novelty condition, $B = .045$, $t(213) = .242$, $p = .809$. The effects from the non-significant third step in the

model are: chronic avoidance by novelty, $B = .179$, $t(211) = .983$, $p = .327$, and chronic anxiety by novelty, $B = -.279$, $t(211) = -1.557$, $p = .121$ (see also Table 3).

The next variable tested was the time three mood variable global mood. The statistics for the model change between the first step and second step showed that there was a significant improvement in the model: $\Delta R^2 = .050$ $\Delta F(3, 213) = 4.941$, $p = .002$. The statistics for the model change between the second step and third step showed that there was not a significant improvement in the model: $\Delta R^2 = .002$, $\Delta F(2, 211) = .225$, $p = .799$. The insignificant improvement in the model means that the effects for chronic anxiety, chronic avoidance and novelty condition are reported from the second step of the model. There was one significant result for the time three global mood variable: chronic avoidance, $B = -3.632$, $t(213) = -3.517$, $p = .001$. The direction of the effect was such that higher levels of avoidance corresponded to lower levels of global mood following the activity. The second predictor in the second step, chronic anxiety, was non significant, $B = -.640$, $t(213) = -.620$, $p = .536$, as was the effect for novelty condition, $B = .-3.127$, $t(213) = .-1.479$, $p = .141$. The effects from the non-significant third step in the model are: chronic avoidance by novelty, $B = 1.284$, $t(211) = .619$, $p = .537$, and chronic anxiety by novelty, $B = .560$, $t(211) = .274$, $p = .785$ (see also Table 3).

The final variable tested was the composite mood variable. The statistics for the model change between the first step and second step showed that there was a significant improvement in the model: $\Delta R^2 = .073$ $\Delta F(3, 213) = 6.523$, $p < .001$. The statistics for the model change between the second step and third step showed that there was not a significant improvement in the model: $\Delta R^2 = .007$, $\Delta F(2, 211) = .998$, $p = .370$. The

insignificant improvement in the model means that the effects for chronic anxiety, chronic avoidance and novelty condition are reported from the second step of the model. There was one significant result for the time three composite mood variable: chronic avoidance, B = -.912, $t(213)$ = -3.928, $p < .001$. The direction of the effect was such that higher levels of avoidance corresponded to lower levels of composite mood following the activity. The second predictor in the second step, chronic anxiety, was non significant, B = -.330, $t(213)$ = -1.412, p = .160, as was the effect for novelty condition, B = -.729, $t(213)$ = .-1.536, p = .126. The effects from the non-significant third step in the model are: chronic avoidance by novelty, B = .073, $t(211)$ = .157, p = .875, and chronic anxiety by novelty, B = .648, $t(211)$ = 1.408, p = .161 (see also Table 3).

Following the time three mood variables, we also tested the attitude about the activity variables; i.e., the activity enjoyment variable and the activity anxiety variable. In these two models there were no covariates because there was no matching time two variable for the activity scales. Thus the first step of the regression included novelty condition (high novelty = 1, low novelty = 0), chronic attachment anxiety and chronic attachment avoidance. The second step included the two two-way interactions– chronic avoidance by novelty, chronic anxiety by novelty.

When the model was run for the activity enjoyment variable, the statistics for the model change for the first step showed that the model was not significant: ΔR^2 = .012, $\Delta F(2, 217)$ = .911, p = .437. In addition, the statistics for the model change between the first step and second step showed that there was not a significant improvement in the model: ΔR^2 = .005, $\Delta F(2, 215)$ = .558, p = .573. Therefore none of the effects from step

one or step two are interpretable. The effects from the non-significant first step in the model are: chronic avoidance, B = -.136, $t(217)$ = -1.414, p = .159, chronic anxiety, B = .079, $t(217)$ = .827, p = .409, and novelty condition, B = .018, $t(217)$ = .093, p = .926. The effects from the non-significant second step in the model are: chronic avoidance by novelty, B = .147, $t(215)$ = .760, p = .448, and chronic anxiety by novelty, B = .144, $t(215)$ = .746, p = .456 (see also Table 4).

The final variable tested was the activity anxiety variable. The statistics for the model change for the first step showed that there was a significant improvement in the model: ΔR^2 = .090, $\Delta F(3, 217)$ = 7.149, $p < .001$. The statistics for the model change between the first step and second step showed that there was not a significant improvement in the model: ΔR^2 = .002, $\Delta F(2, 215)$ = .261, p = .771. The insignificant improvement in the model means that the effects for chronic anxiety and avoidance are reported from the first step of the model. The primary predictors were two significant results for the activity anxiety variable: chronic avoidance, B = .226, $t(217)$ = 2.657, p = .008 and chronic anxiety, B = .251, $t(217)$ = 2.972, p = .003. The direction of the effects was such that higher levels of avoidance and anxiety corresponded to higher levels of activity anxiety following the activity. Novelty condition was also significant in the model: B = .395, $t(213)$ = 2.282, p = .023. The direction of this effect was such that participants in the high novelty condition reported significantly higher anxiety about the activity than did the participants in the low novelty condition. The effects from the non-significant third step in the model are: chronic avoidance by novelty, B = .113, $t(215)$ =

.661, p = .509, and chronic anxiety by novelty, B = -.048, t(215) = -.281, p = .779 (see also Table 4).[6]

H3-H4 Primed Attachment Will Interact with Novelty of the Stimulus to Predict Mood Change Following the Exploration Activity and Attitude about Exploration Activity

Hypotheses 3 and 4 concern the effect of the interaction of primed attachment and novelty condition on mood during the activity and attitude about the activity. Specifically, we hypothesized that participants primed with insecure attachment, compared to participants in the neutral or secure attachment prime, would show higher negative mood and lower positive mood and that these effects would be stronger for participants in the high novelty condition than for the participants in the low novelty condition. In addition, we hypothesized that participants primed with secure attachment, compared to participants in the neutral or insecure attachment prime, would show lower negative mood and higher positive mood and that these effects would be stronger for participants in the high novelty condition than for the participants in the low novelty condition. These hypotheses were tested with 2 (high novelty versus low novelty) x 3 (Secure Attachment Prime versus Neutral Prime versus Insecure Attachment Prime)

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[6] These eight analyses were also run again with the following covariates entered in the first step of the regression: time two mood variables (happy, tense, angry, sad and global mood), novelty and difficulty of the task, time spent playing computer games and experience playing the game "The Sims." The only significant difference found when running these alternative models was for the time three mood variable of sadness.

The statistics for the model change between the first step and second step showed that there was not a significant improvement in the model: $\Delta R2 = .021$, $\Delta F(3, 205) = 1.888$, $p = .133$. The statistics for the model change between the second step and third step also showed that there was not a significant improvement in the model: $\Delta R2 = .011$, $\Delta F(2, 203) = 1.503$, $p = .225$. Therefore, none of the effects from step two or step three should be interpreted as meaningful. The effects from the non-significant second step in the model are: chronic avoidance, B = .189, t(205) = 2.067, p = .040 and chronic anxiety, B = .111, t(205) = 1.219, p = .224. The effects from the non-significant third step in the model are: chronic avoidance by novelty, B = .101, t(203) = .559, p = .577 and chronic anxiety by novelty, B = -.286, t(203) = -1.624, p = .106.

ANCOVAs. Similar to the above regression each ANCOVA used only the time two mood variable that matched the time three mood dependent variable as a covariate.

For the time three mood variable – happiness – there was a significant effect for novelty condition found, but this effect was qualified by a significant two-way interaction between primed attachment and novelty condition, $F(2, 208) = 5.540$, $p = .005$. Least Significant Difference pair-wise post hoc tests revealed first that the participants in the low novelty secure prime condition showed significantly higher levels of happiness than the participants in any of the other conditions save the low novelty neutral prime condition. Second, participants in the high novelty secure prime condition showed significantly lower levels of happiness than did participants in the low novelty secure prime or low novelty neutral prime (see also Table 5).

No significant main effects or interactions were found for the time three mood variable, tense mood. The main effects were, novelty, $F(1, 208) = .921$, $p = .338$; for attachment prime condition, $F(2, 208) = .220$, $p = .802$; and for the interaction effect, $F(2, 208) = 1.135$, $p = .324$.

For the time three mood variable – anger – there was a significant two-way interaction between primed attachment and novelty condition, $F(2, 208) = 5.494$, $p = .005$. Least Significant Difference pair-wise post hoc tests showed that participants in the low novelty secure prime condition showed significantly lower levels of anger than the participants in the low novelty insecure prime condition and the participants in the high novelty secure prime condition (see also Table 5).

No significant main effects or interactions were found for the time three mood variable – sadness. The main effects were, novelty, $F(1, 208) = .041$, $p = .839$; attachment prime condition, $F(2, 208) = .052$, $p = .949$; and for the interaction effect, $F(2, 208) = 1.985$, $p = .140$.

No significant main effects or interactions were found for the time three mood variable global mood. The main effects were, novelty, $F(1, 208) = 2.047$, $p = .154$; attachment prime condition, $F(2, 208) = .875$, $p = .418$; and for the interaction effect, $F(2, 208) = 1.447$, $p = .238$.

For the time three composite mood variable there was no significant effect for either novelty condition or primed attachment style. However, there was a significant two-way interaction between primed attachment style and novelty condition, $F(2, 208) = 4.780$, $p = .000$. The means for the 2 x 3 ANCOVA are presented in Table 5. Least Significant Difference pair-wise post hoc tests revealed that the participants in the low novelty, secure prime condition showed significantly higher levels of composite mood than the participants in the low novelty insecure prime condition and significantly higher levels of composite mood than participants in the high novelty, secure prime condition (see also Table 5).

No significant main effects or interactions were found for the activity enjoyment variable. The main effects were, novelty, $F(1, 208) = .001$, $p = .998$; attachment prime condition, $F(2, 208) = .652$, $p = .522$; and for the interaction effect, $F(2, 208) = 1.554$, $p = .214$.

For the activity anxiety variable there was only one significant effect. As with chronic attachment style, a significant effect for novelty condition was found, $F(1, 208) = 5.822$, $p = .017$. This main effect was such that participants in the low novelty condition reported greater anxiety about the activity than did those in the high novelty condition. There was no significant effects for attachment prime condition, $F(2, 208) = .097$, $p = .907$; or for the interaction effect, $F(2, 208) = .778$, $p = .653$.[7,8,9]

[7] These eight ANCOVAs were also run again with the following covariates: time two mood variables (happy, tense, angry, sad and global mood), novelty and difficulty of the task, time spent playing computer games and experience playing the game "The Sims." There were no significant differences in the analyses with the additional covariates included.

[8] As one of the final steps in our analyses an omnibus test was conducted to examine interactions between chronic and primed attachment. This test was conducted using multiple regression analysis. ΔR^2 revealed that were no significant improvements to the model, for any of the DVs, when the three way interactions were included in the final step. However, statistical power could have been a problem in these tests.

[9] Our last analyses were to test a secondary hypothesis that curiosity might mediate the relationship between chronic attachment style and our DVs. Following Baron and Kenny (1986), no evidence of mediation was found as chronic attachment style was not significantly related to either of the curiosity scales included in the study.

5. DISCUSSION

The current study provided insight into attachment's influence on mood while engaged with a novel stimulus. The current study tested attitudes specifically about the novel activity – enjoyment of the activity and anxiety about the activity as well as changes in a wide range of moods – happiness, tenseness, anger, sadness, global mood and a mood composite.

This study used two measures of attitudes about the activity, anxiety about the activity and enjoyment of the activity. We found that both chronic avoidance and chronic anxiety predicted significantly higher anxiety about the exploration activity. In regards to primed attachment style, we found no significant effects for anxiety about the activity. Regarding enjoyment of the activity, we found no significant results for either chronic or primed attachment style.

This study also used a number of mood ratings as dependent variables – happiness, tenseness, anger, sadness, global mood and a mood composite. First, chronic avoidance significantly predicted higher tense mood, anger and sadness and lower happiness, global mood and composite mood. Chronic anxiety significantly predicted higher tense mood. In addition, for tense mood, there was a significant interaction between novelty condition and chronic anxiety. This interaction was such that higher chronic anxiety was related to greater tense mood, particularly so for the participants in the low novelty condition. With regards to primed attachment style, we found significant interactions between primed attachment style and novelty condition for happy mood, composite mood and angry mood. In all three interactions we found similar patterns.

Participants in the low novelty secure prime condition showed significantly higher happiness and composite mood and significantly lower angry mood than did the participants in the low novelty, insecure prime and the participants in the high novelty, secure prime conditions.

The basic findings described above can be interpreted in a number of different contexts. First, these results are explored in the context of the results we felt were most directly relevant to Bowlby's description of attachment and exploration. Following that, our most novel findings are discussed, in particular, the findings for avoidance and both anger and sadness, which are the first of their kind in the adult attachment and exploration literature. These results are particularly interesting because they can also be interpreted in the context of previous findings regarding attachment and anger and attachment and sadness or depression. The results as a whole can also be understood in the context of previous infant exploration and attachment literature and interpreted in the context of the adult exploration and attachment literature. There were also a number of unexpected results in our study that we will discuss.

Current Findings and Expected Results

The above review of the significant results might lead one to think that chronic avoidance is much more important in the understanding of exploration than is chronic anxiety. That conclusion would be in error, however. Based on research by Aspelmeier and Kerns (2003) and Martin et al. (2007) we suspected that the mood most likely to be affected by attachment during confrontation with a novel stimulus would be tense mood. We also suspected that anxiety about the activity would be one of the variables most

likely to show a significant difference. Our suspicions were confirmed; the current study found that higher insecurity, in the form of higher avoidance or anxiety, was related to increased tense mood during an encounter with a novel stimulus. In addition, this study found that both higher avoidance and higher anxiety were related to more anxiety about the activity. These results regarding tense mood and anxiety about the activity connect well to an attachment theoretical explanation of exploration. Specifically, people with insecure attachment are those whose mental models tell them that the people that are close to them cannot be relied upon for support. Therefore, when these people are placed in a situation in which they do not have much previous experience to guide them, and thus do not know whether they are likely to fail at this new task, one of the primary responses should be the arousal of tenseness and anxious attitudes about the task. For this reason, even though there are fewer significant findings for chronic anxiety, these findings are among the most theoretically important in this study.

This study also found differences in other moods that are similar to previous findings. For example, Hazan and Shaver (1990) found that secure people enjoyed their work more than insecure people. Similarly, in this study we found that people high in avoidance reported significantly less happy mood, global mood, and composite mood following an exploration activity. We also found that changes in happy mood could be directly manipulated by priming attachment style and manipulating the number of times that participants engaged with the stimulus. These results were such that there were smaller changes in happiness for the participants that played the game once, while those who played the game seven times showed a strong attachment style prime effect. The

participants in the secure attachment prime showed significantly higher levels of happiness than the participants in the insecure prime condition. These findings regarding the number of times that participants engaged with the stimulus were opposite of our initial predictions however and are discussed in more depth later. Nevertheless, these results provide key experimental evidence that attachment working models do influence the experience of exploration. These results also further an attachment based explanation of exploration. Specifically, people who are low in avoidance are likely to be people who have strong mental models that those who are close to them are reliable and trustworthy. The same should be true for those participants that were primed with a secure attachment model, one that stressed the reliability and availability of potential support givers. When these people are then placed in a new situation, even one that has an uncertain outcome, they know that they have support they can call upon if necessary. Therefore, these people are free to truly explore and enjoy the novel situation.

Results for Anger and Sadness in the Context of the Adult Attachment Literature

This study tested changes in moods that have not been tested previously in the adult attachment literature. In particular, this study is the first study to specifically explore changes in sadness and changes in anger as a result of confronting a novel stimulus. This study found that people high in avoidance reported significantly higher levels of anger and significantly higher levels of sadness than those low in avoidance. These results provide an interesting new insight into the experience of exploration. In addition, these results also tie the exploration literature back into other attachment literature on anger and sadness (in the form of depression).

A number of studies have shown that avoidant persons display more anger than their more secure counterparts. For example, Calamari and Pini (2003) found that avoidant adolescent women reported more anger on a number of self-report anger scales. Mikulincer (1998) found that avoidant people reported the experience of anger as highly hostile, whereas secure participants reported lower anger proneness and more constructive anger goals. Troisi and D'Argenio (2004) found that avoidant attachment was associated with higher trait anger in a male clinical sample. Further, both Kerns and Stevens (1996) and Kobak and Sceery (1988) found that friends of avoidant people report them to be more hostile. However, the study that has the most bearing on the current results was one conducted by Rholes, Simpson, and Oriña, (1999). In their study heterosexual romantic partners were brought into the lab, the women were placed in an anxiety-provoking situation, and their male partners were made available to offer support. They found that avoidant women were angrier during an anxiety-provoking situation, particularly when they were more distressed and when they received less support from their partners. The avoidant men in the study also reacted with anger when their partners sought support from them. These results lead to one potential explanation for our anger results in the current study. In this study, we know that the novel situation elicited anxiety. This anxiety could be activating the attachment system in general, which for insecure people also brings up the failings of past relationships. Thus, the anger reported by the participants high in chronic avoidance and those participants primed with insecure attachment could be due to the fact that the novel situation prompted them to seek support at some level of consciousness, not necessarily with full

awareness. However the mental model that they had available was that of an unsupportive partner, and like the avoidant women in the Rholes, et al. (1999) study, they reacted with anger to that unsupportive model. A second potential explanation is again based on the finding that the novel situation created anxiety. In this case it could be that the insecure participants, particularly the high avoidance participants, would normally have sought some way to withdraw from this situation as a way of managing their attachment insecurities. However, there was no easy way to escape the situation thus they reacted with anger and frustration due to their inability to escape. This explanation in some way mirrors the results for the avoidant men in the Rholes, et al. (1999) study. The avoidant men did not want to offer support to their partners, but having no easy means of escaping the situation, they reacted with anger.

More than one hundred studies have shown a link between insecure attachment and depression. While there is a stronger link between attachment anxiety and depression, numerous studies have shown a link between attachment avoidance and depression (Mikulincer & Shaver, 2007a). The line of evidence converging on a link between attachment and depression begins with studies linking parents to depressive adults. For example, Harris, Brown and Bifulco (1990) found that people whose parents died or who experienced prolonged separation from their parents were more likely to be depressed as adults, and a number of studies have shown that adults with depression describe their parents as more rejecting, unavailable and unsupportive (e.g. Cassidy, 1995). In the adult attachment literature, a large amount of work has shown both cross sectional and longitudinal support for a link between avoidance and depressive

symptoms (e.g. Rholes, Simpson & Friedman, 2006). The exact relationship between avoidance and depression has also been studied, leading researchers to conclude that avoidant peoples' depressive symptomology is typically associated with perfectionism, self-punishment and self criticism (e.g. Batgos & Leadbeater, 1994). Although the evidence in this study that participants high in avoidance react to novel situations with sadness is certainly a long way from clinical or even non-clinical depression, the current study does raise some potentially interesting linkages.

Bowlby (1969) argued that the exploration system provides the push to learn more about our environment and secure individuals react to these novel situations with heightened positive affect and lower negative affect. Insecure individuals on the other hand react with a range of negative affect and avoidant people in particular reacted with higher sadness. Thus, it could that one possible explanation for increased depression in insecurely attached people is that it is the result of their poorly functioning attachment system undermining their exploration system and hindering their ability to explore and enjoy the world. In particular, our results for sadness and avoidance fit with the findings on depressive symptomology. That is, the same issues which cause depression in avoidant people – perfectionism, self-punishment and self criticism – were raised in confronting the ambiguous and potentially goal oriented novel stimulus in the current study (Batgos & Leadbeater, 1994) In addition to the results for avoidant attachment, the research by Batgos and Leadbeater (1994) also showed that depressive symptoms for anxious people were centered on interpersonal problems. Thus, because the exploration

situation in our study was confronted alone, these interpersonal concerns might not have manifested, thus they did not show increased levels of sadness.

The Current Study in the Context of the Infant Attachment and Exploration Literature

This study in some ways represents a return to the way that developmental psychologists have studied the attachment and exploration systems. In particular, adult attachment researchers have mostly concerned themselves with simply determining if secure adults explore more than insecure adults in a range of areas and across a range of specific dependent variables. Infant attachment researchers have examined measures such as coding the average number of smiles while playing with a novel object in order to assess infant's experience of exploration. Correspondingly, this study returns to the experience of the participants when they are confronted with a novel stimulus. Thus, one of the primary contributions of this study is that it begins to confirm that the same differences in the exploration experience exist in adults that were first documented in children. In particular the current study's results regarding chronic attachment style and happiness, tenseness, sadness, global mood and composite mood all fall in line with Main's (1983) research showing that secure infants display more positive emotion while exploring and that insecure infants display less positive affect and less "playfulness." In addition, our results indicating that primed attachment style influences happiness, anger and composite mood fit well with Van den Boom's (1994) results regarding differences in exploration as a result of manipulating attachment. Specifically, Van den Boom found that when mothers were taught to be more responsive to their infants, their infants explored more and with greater confidence. In our study, when participants were primed

with a secure attachment prime they reported more positive mood following their exploration and less negative mood. Finally, McElwain et al.'s (2003) study, which distinguished between avoidance and anxious infants, also fits well with the present study's result that adults high in avoidance report higher anger following an exploration situation. Specifically, McElwain found that avoidant infants were more aggressive when they played with a new playmate. In our study, avoidant participants reported more anger following exploration than their low avoidant peers.

The Current Study in the Context of the Adult Attachment and Exploration Literature

The current study is consistent with and extends previous work on adult attachment and the experience of exploration. We found that both participants high in anxiety and participants high in avoidance reported more tense mood following exploration and they felt that the activity was more anxiety provoking. We also found that both primed attachment and avoidance predicted changes in happiness and composite mood and that avoidance predicted changes in sadness. In line with our findings, previous research such as Hazan and Shaver's (1990) study of work found that securely attached people were more satisfied with work and felt more competent and that anxious and avoidant people feared failure in work. Aspelmeier and Kerns (2003) also reported that both avoidant and anxious participants felt that exploration was more anxiety provoking and they were less able to adapt effectively to novel situations. Their study, conducted on students entering college, is perhaps a better operationalization of exploration as well, as all of the participants were clearly in a novel situation, whereas

people reporting on their work could have been at the same job for a number of years and this variable was not addressed in Hazan and Shaver's (1990) results.

However, Hazan and Shaver's (1990) and Aspelmeier and Kerns' (2003), results were based on retrospective reports of the experience of exploration. The current study extends their results because the measures of emotion and attitudes about the novel activity were taken immediately after the activity itself. The current study also extends the unpublished work of Martin et al. (2007), who found that there were chronic attachment style differences in reports of mood after two different exploration activities. However, that work did not account for possible differences in mood prior to the exploration activity. The current study extends their finding by controlling for mood immediately prior to the exploration activity. In this way, a strong argument can be made for the mood differences being caused by the experience of confronting a novel activity.

The current study also extends the literature in examining the effects of primed attachment style on the experience of novel stimuli. The only previous study in the area of primed attachment style and exploration was Green and Campbell's (2000) study. In that study, primed attachment style was found to affect reports on an exploration questionnaire. The current study builds on that finding in using a procedure that included an actual novel stimulus and contemporaneous reports of mood during the interaction with that stimulus. Thus the current study avoids problems inherent in retrospective self-reports and is more behaviorally oriented. The priming effects in the current study also provide some evidence for some of the fundamental assumptions about attachment mental models and exploration first laid out by Bowlby (1969), namely that the working

models on attachment should influence the way that people experience novel stimuli. More broadly, the current study also extends the findings regarding priming attachment style. In addition to the number of changes already documented in the attachment priming literature, this study shows that priming attachment style can also elicit changes in the experience of novel stimuli.

This study's focus on emotion could also provide some preliminary evidence for a model of the development of exploration and attachment in adults. In particular, the results of this study show that, for insecure people, there are a wide range of negative emotions and attitudes as a result of interacting with a novel stimulus. Thus, while the experience of emotion occurs after a novel stimulus has been engaged with, the emotion also provides feedback regarding what actions should be taken the next time a novel stimulus presents itself. Thus, the results of this study could be a potential explanation for why numerous previous studies have found that both anxious and avoidant individuals actively avoid exploration situations.

Similarities and Differences Between Avoidance and Anxiety and Between Chronic Attachment and Primed Attachment

In this study both avoidance and anxiety were significantly related to both tense mood and anxiety about the activity. However there were a number of differences between the two chronic attachment dimensions. Namely, avoidance predicted a number of moods that anxiety did not predict in the study. It is not immediately clear why chronic avoidance, and not chronic anxiety, was significantly related to happiness, anger, sadness, global mood and composite mood. One possible explanation is that anxiously

attached people might simply have a less complex emotional reaction to a novel stimulus. When an anxious person confronts a novel stimulus, their first and only reaction to this anxiety provoking event is to search for their psychologically absent attachment figure. This reaction is evident in their use of exploration for social means and social reassurance (Hazan & Shaver, 1990, Carnelley & Ruscher, 2000). On the other hand, avoidant people have more complex reactions to exploration. When an avoidant person is threatened they feel that they have to rely on themselves for support. As opposed to anxious individuals, who get stuck looking for their partner, avoidant people have learned to cope with their anxieties through distancing themselves and using avoidant coping. Coping in this way could then lead to a number of different emotional reactions.

In large part the effects for chronic attachment and primed attachment are parallel. Both forms of attachment show that more security is related to higher positive affect and lower negative affect. The chief difference between chronic attachment and primed attachment is the effect of novelty condition on the results, which is discussed below.

Unexpected Results

The most unexpected result was the way in which the effects for the high novelty and low novelty conditions presented. That is, the nature of the hypothesized effects were that there would be little difference in the low novelty condition, while there would be strong chronic and primed attachment differences in the high novelty condition. The results that were found, however, had the novelty condition completely reversed; all of

the significant attachment by novelty condition effects found that there were greater differences in the low novelty condition with smaller or no differences found the in the high novelty condition. These results may be due to what might be termed “depth of exploration.” Specifically, the nature of the activity is that there were 8 different actions which could be chosen from in the game and that each of the buttons had to be used once and only once. There are then 8 factorial, or 40,320, possible orders in which the game can be played. We are not arguing that it would take even a small fraction of these different orders to make the game anything but a tedious exercise. However, it does raise the issue that both the high and low novelty participants, might in fact both be high novelty participants and the true difference between the groups then, is that one group was able to engage deeply in the game, while the other group only had a cursory exploration of the task. Alternatively, it could be that the results do not need a higher level construct such as depth of exploration to provide an explanation. It could simply be the length of time that the two groups spent engaging in the novel task. In this case, it could be that the people with insecure attachment react more strongly in the low novelty condition because they were forced to engage in the task for a longer period of time. Engaging with the task for a longer period meant that their emotions had a longer time to emerge. The participants primed with secure attachment had more time to feel happy about the task and the participants primed with insecure attachment spent more time feeling tense and angry about the task.

The above explanations perhaps serve as a good explanation for the broad pattern of results for the novelty condition comparisons. However, there is one specific

comparison that is perhaps not explained well by the above argument. This specific problem is that the participants in the high novelty, *secure prime* condition showed the lowest happy mood, the highest anger and the lowest composite mood of any of the groups in the study. The result is curious enough that some explanation should be provided for it specifically. The argument that we offer is that this result could be due to a frustration effect. That is, the secure prime, high novelty participants received a strong secure prime and thus felt especially prepared to take on a new situation. When this new challenge lasted for only 5 minutes they reacted with frustration and lower positive affect.

The second unexpected result was the lack of a significant relationship between attachment style and curiosity. This relationship has been found before in other studies (Mikulincer, 1997; Martin, 2006) and so it is somewhat surprising not to be found again here. The most plausible explanation is likely to be that the measures of curiosity in this study were taken at the very end of the study. There are any number of events that could have interfered with the measure, the most likely being the novel activity. To be explicit, even thought the curiosity measures were supposed to be trait measures, they were given after an exploration task which could have directly affected all of the participants' attitudes towards exploration. The encounter with the exploration task could have temporarily sated secure individuals' curiosity leaving them to report lower curiosity than they would normally. Alternatively, their could have been a change in the insecure participants' reports, the exposure to the exploration task could have temporarily

desensitized insecure participants' reactions to curiosity and they could have reported more curiosity than they would have normally.

Limitation and Future Directions

One of the major limitations of the current study was the inability to successfully control the manipulation of the activity. Despite pilot testing the number of times the participants engaged in the novel activity, the reported novelty of the stimulus was not significantly different for the participants in the high versus the low novelty conditions and the novelty interactions that were found were not predicted. While measuring mood immediately before and after the novelty activity does reduce the concern of a mood confound related to either the attachment prime or variables outside of the control of the study, a controlled manipulation of the novelty activity would be a strong improvement to the study. One future direction on which the author has already gathered data is a development of the "depth of exploration" idea, the proposed account for the current differences in novelty condition findings. In this study, where the results are yet to be analyzed, depth of exploration was manipulated by letting some participants play the game, while other participants were merely allowed to watch as the experimenter showed the game to them. If those results map onto the current findings then depth of exploration would seem to an important variable in understanding the experience of exploration.

There is also some concern that the correlations between mood pairs were not higher. It could be that if the individual items were tested separately that they would not

show matching results. Thus, future studies might include more items so that an alpha could be conducted to measure the degree to which the items formed a single construct.

Although the hypothesis that curiosity would mediate the relationship between attachment and mood while exploring was not found in this study, it remains an important theoretical link. Thus, it is both one of the limitations of this study that this link could not be found and also one of the future directions that could emerge from this research. The link through curiosity provides a possible path through which the differences in mood based on attachment develop over time. In the future, studies would do well to place a curiosity measure at a point where it is less likely to be interfered with, either by giving the measure after some additional distracter tasks, so that any procedure effects can be diminished, or by collecting curiosity measures at a time separate from the rest of the study and the novel activity.

There is also room for a future study to explicitly investigate the approaching-the-novel construct, the one aspect of exploration set out in the introduction that was not directly investigated in the current study. The question of how approaching-the-novel influences exploration might best be answered through a longitudinal design. In the introduction, we argue that the approaching-the-novel aspect should determine whether participants seek out exploration situations in the first place. Once a stimulus is engaged in, then the aspects of enjoyment of a novel stimulus and anxiety about a novel stimulus take hold. Thus, longitudinally we might expect a cyclical model where people approach a novel stimulus, are either punished or reinforced through the emotions they experience while confronting the novel stimulus and thus are either more or less likely to approach

novel stimuli in the future. This question could be tackled in a number of different ways, for example, through a daily diary study method which tracks participants' approach and feelings towards novel stimuli in their daily lives or through experimentally manipulating mood regarding a novel stimulus and measuring changes in approach towards a follow-up novel stimulus.

One might question whether the exploration task used in our laboratory study was a good measure of exploration. We argue that the task used here is as good, or better, than previous tasks that have been used to study exploration in the lab (puzzle boxes, Aspelmeier & Kerns, 2003; crossword puzzle, Feeney, 2004). In addition, the results presented in this study, in controlling for mood immediately before the activity and using mood immediately after the activity as the dependent variable, raise the question of what is causing the change in mood, if it is not confronting an exploration situation? Further, whatever the potential factor might be it must also explain why it is that both chronic and primed attachment style predict the changes found. Despite the evidence regarding the strength of the exploration task used in this study, some readers might still raise doubts that our exploration task is a worthy operationalization of exploration, particularly in light of the arguably more externally valid exploration tasks used in the infant attachment literature. The best answer to a call for more mundane realism might be to move out from the research laboratory. For example, the study that Aspelmeier and Kerns (2003) conducted, using freshman college student's reports of going away to college for the first time, is certainly an externally valid operationalization of exploration. Another externally valid study of exploration might be to study college

students as they complete a semester studying abroad. Measures of attachment style could be taken upon arrival and, over the course of the semester, checklists of activities could measure approaching-the-novel. Reports about mood and attitudes about those activities could provide data related to enjoyment of and anxiety about the novel.

6. CONCLUSION

This study found that both chronic and primed insecure attachment style was related to negative changes in mood as a result of confronting an exploration situation and higher reported anxiety about the activity. Thus, this study provides some of the first evidence that attachment style influences the experience of exploration in adults. As such, it provides an extension on previous adult attachment and exploration literature as it moves beyond the initial choice of whether to explore or avoid exploration. The current study also integrates well with the infant attachment and exploration literature, which has focused more of its efforts on the experience of exploration.

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APPENDIX A

TABLES

Table 1

Procedure.

High Novelty Condition	**Low Novelty Condition**
Introduction and Consent	
Relaxation Task	
Time 1 Mood Questions	
	First six 5 minute sessions of Exploration Activity
Priming Manipulation	Priming Manipulation
Imagination Questions	Imagination Questions
Time 2 Mood Questions	Time 2 Mood Questions
Ps are told they will answer questions about following activity	Ps are told they will answer questions about following activity
First and Last Session of Exploration Activity	Last Session of Exploration Activity
Time 3 Mood Questions	
Activity Questions (Enjoyment, Anxiety, Difficulty and Novelty)	
Curiosity Scales	
Experiences in Close Relationships (Chronic Attachment) Scale	
Demographics	
Debriefing	

Table 2

Correlations Between Attachment and Exploration Variables (N = 221).

			Factors										
	M	*SD*	1	2	3	4	5	6	7	8	9	10	11
1.Avoidance	3.08	1.02	1										
2. Anxiety	3.95	1.03	-.02	1									
3.Time One - Happiness	5.38	1.53	-.11	-.13	1								
4.Time One - Tenseness	3.36	1.66	.18	.16 *	-.09	1							
5.Time One - Anger	1.90	1.19	.09	.11	-.19 **	.35 **	1						
6.Time One - Sadness	1.80	1.13	.12	.25 **	-.22 **	.30 **	.50 **	1					
7.Time One - Global Mood	78.82	14.70	-.14 *	-.16 *	.53 **	-.28 **	-.40 **	-.47 **	1				
8.Time Two - Happiness	5.20	2.07	-.03	-.09	.38 **	-.03	-.12	-.15 *	.28 **	1			
9.Time Two - Tenseness	3.07	1.68	-.01	.16 *	-.15 *	.34 **	.16 *	.21 **	-.23 **	-.53 **	1		
10.Time Two - Anger	2.90	2.07	.05	.16 *	-.06	.12	.23 **	.26 **	-.17 *	-.67 **	.69 **	1	
11.Time Two - Sadness	2.53	1.86	.06	.21 **	-.11	.09	.14 *	.37 **	-.22 **	-.64 **	.55 **	.78 **	1
12.Time Two - Global Mood	74.63	18.79	-.10	-.17 *	.31 **	-.16 *	-.20 **	-.28 **	.53 **	.72 **	-.55 **	-.71 **	-.67 **
13.Time Three - Happiness	4.58	1.86	-.19 **	-.04	.42 **	-.04	.00	-.02	.22 **	.29 **	-.13	-.08	-.13 *
14.Time Three - Tenseness	2.63	1.54	.16 *	.13	-.00	.23 **	.06	.15 *	-.07	-.08	.36 **	.19 **	.14 *
15.Time Three - Anger	2.79	1.81	.21 **	.10	-.01	.15 *	.08	.00	-.07	-.12	.29 **	.25 **	.14 *
16.Time Three - Sadness	2.06	1.48	.16 *	.18 **	-.17 *	.12	.11	.21 **	-.20 **	-.26 **	.33 **	.34 **	.38 **
17.Time Three - Global Mood	73.11	18.00	-.24 **	-.11	.30 **	-.12	-.11	-.11	.43 **	.27 **	-.24 **	-.23 **	-.28 **
18.Activity Enjoyment	4.22	1.46	-.10	.06	.02	.11	.06	.15 *	.02	.08	.05	-.01	-.03
19.Activity Anxiety	3.84	1.34	.17 *	.19 **	-.09	.23 **	-.02	.06	.01	-.01	.13	.07	-.00
20.Novelty of the Activity	4.85	1.28	.02	.05	-.13	.08	.06	.14 *	-.14 *	-.02	.14 *	.03	.04
21.Difficulty of the Activity	2.44	1.49	.06	.05	-.18 **	.12	.03	.00	-.07	-.04	.05	.00 *	-.05
22.Time playing Computer Games	2.20	1.20	-.17 *	.12	.05	-.00	-.07	-.06	.03	.02	.01	.03	.02
23.Time playing "The Sims"	3.38	1.24	-.15 *	.07	-.06	-.09	-.02	-.04	-.07	.02	.07	.00	.00

* Correlation is significant at the .05 level (2-tailed). ** Correlation is significant at the .01 level (2-tailed).

Table 2 (Continued)

	Factors											
	12	13	14	15	16	17	18	19	20	21	22	23
1.Avoidance												
2. Anxiety												
3.Time One - Happiness												
4.Time One - Tenseness												
5.Time One - Anger												
6.Time One - Sadness												
7.Time One - Global Mood												
8.Time Two - Happiness												
9.Time Two - Tenseness												
10.Time Two - Anger												
11.Time Two - Sadness												
12.Time Two - Global Mood	1											
13.Time Three - Happiness	.28 **	1										
14.Time Three - Tenseness	-.12	-.33 **	1									
15.Time Three - Anger	-.20 **	-.40 **	.59 **	1								
16.Time Three - Sadness	-.37 **	-.36 **	.46 **	.63 **	1							
17.Time Three - Global Mood	.48 **	.65 **	-.43 **	-.57 **	-.55 **	1						
18.Activity Enjoyment	.11	.32 **	-.07	-.21 **	-.12	.33 **	1					
19.Activity Anxiety	.03	-.18 **	.53 **	.32 **	.24 **	-.17 *	.18 **	1				
20.Novelty of the Activity	-.05	.04	.06	.01	.07	-.04	.21 **	.22 **	1			
21.Difficulty of the Activity	.05	-.14 *	.16 *	.28 **	.18 **	-.15 *	.03	.35 **	.15 *	1		
22.Time playing Computer Games	.03	.12	-.06	.01	.00	.05	.30 **	-.08	-.19 **	.10	1	
23.Time playing "The Sims"	.02	.01	-.01	.02	-.04	.00	.05	-.09	-.09	-.02	.26 **	1

* Correlation is significant at the .05 level (2-tailed). ** Correlation is significant at the .01 level (2-tailed).

Table 3

Summary of Hierarchical Regression Analysis for Chronic Attachment and Mood (N = 217).

	Time 3 Mood - Happiness			Time 3 Mood - Tenseness			Time 3 Mood - Anger		
Variable	*B*	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*
Step 1	R^2 = .081**			R^2 = .133**			R^2 = .062**		
Time 2 Happiness/ Tensness/Anger	0.255	0.058	0.285 **	0.336	0.058	0.364 **	0.218	0.058	0.249 **
Step 2	ΔR^2 = .060**			ΔR^2 = .019*			ΔR^2 = .047*		
Avoidance	-0.326	0.115	-0.180 **	0.270	0.134	0.178 *	0.366	0.115	0.207 **
Anxiety	-0.038	0.114	-0.021	0.362	0.130	0.242 **	0.119	0.115	0.068
Novelty Condition	-0.606	0.235	-0.164 *	0.216	0.191	0.070	0.059	0.234	0.016
Step 3	ΔR^2 = .001			ΔR^2 = .022*			ΔR^2 = .004		
Avoidance by Novelty	0.040	0.231	0.016	-0.039	0.187	-0.018	-0.195	0.231	-0.079
Anxiety by Novelty	0.088	0.229	0.035	-0.514	0.185	-0.241 **	-0.108	0.228	-0.043

	Time 3 Mood - Saddness			Time 3 Mood - Global Mood			Time 3 Mood - Composite Mood		
Variable	*B*	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*
Step 1	R^2 = .141**			R^2 = .231**			R^2 = .131**		
Time 2 Saddness/Global	0.301	0.051	0.375 **	0.462	0.057	0.480 **	0.332	0.058	0.362 **
Step 2	ΔR^2 = .034*			ΔR^2 = .050**			ΔR^2 = .073**		
Avoidance	0.222	0.091	0.153 *	-3.632	1.033	-0.206 **	-0.912	0.232	-0.240 **
Anxiety	0.160	0.092	0.111	-0.640	1.033	-0.037	-0.330	0.234	-0.088
Novelty Condition	0.045	0.186	0.015	-3.157	2.107	-0.087	-0.737	0.475	-0.095
Step 3	ΔR^2 = .013			ΔR^2 = .002			ΔR^2 = .007		
Avoidance by Novelty	0.179	0.182	0.088	1.284	2.075	0.052	0.073	0.466	0.014
Anxiety by Novelty	-0.279	0.179	-0.136	0.560	2.047	0.023	0.648	0.460	0.121

* $p < .05$ level (2-tailed). ** $p < .01$ level (2-tailed).

Table 4

Summary of Hierarchical Regression Analysis for Chronic Attachment and Attitude About the Activity (N = 217).

	Enjoyment of the Activity			Anxiety about the Activity		
Variable	*B*	*SE B*	*β*	*B*	*SE B*	*β*
Step 1	R^2 = .012			R^2 = .090**		
Avoidance	-0.136	0.097	-0.095	0.226	0.085	0.172 **
Anxiety	0.079	0.096	0.056	0.251	0.084	0.193 **
Novelty Condition	0.018	0.197	0.006	0.395	0.173	0.148 *
Step 2	ΔR^2 = .005			ΔR^2 = .002		
Avoidance by Novelty	0.147	0.194	0.074	0.113	0.171	0.062
Anxiety by Novelty	0.144	0.192	0.071	-0.048	0.169	-0.026

* $p < .05$ level (2-tailed). ** $p < .01$ level (2-tailed).

Table 5

ANCOVA Results for Primed Attachment by Novelty Condition (N = 221).

Happy Mood

Attachment Prime	Novelty Prime Condition: High *M*	*SE*	Low *M*	*SE*	Total *M*	*SE*	*n* =
Secure	3.857 $_{b, c}$	.296	5.466 $_{a}$	.277	4.661	.203	73
Neutral	4.366 $_{b}$	.305	4.687 $_{a, b}$	.275	4.526	.206	72
Insecure	4.686 $_{b}$	.267	4.400 $_{b}$	.330	4.543	.213	70
n =	108		107		215		

Angry Mood

Attachment Prime	Novelty Prime Condition: High *M*	*SE*	Low *M*	*SE*	Total *M*	*SE*	*n* =
Secure	3.399 $_{b, c}$	.299	2.265 $_{a}$	.980	2.832	.205	73
Neutral	2.598 $_{a, c}$	.308	2.920 $_{a, b}$	.277	2.759	.208	72
Insecure	2.591 $_{a, c}$	.272	3.298 $_{b, c}$	.330	2.945	.215	70
n =	108		107		215		

Composite Mood

Attachment Prime	Novelty Prime Condition: High *M*	*SE*	Low *M*	*SE*	Total *M*	*SE*	*n* =
Secure	-1.415 $_{b}$	.614	1.348 $_{a}$	-.574	-0.033	.420	73
Neutral	-0.071 $_{a, b, c}$	.633	-0.035 $_{a, b}$	.570	-0.053	.426	72
Insecure	0.286 $_{a, b, c}$	.555	-0.506 $_{b, c}$	.678	-0.110	.439	70
n =	108		107		215		

Means with different subscripts are significantly different (based on the Least Significant Difference test) at the p < .05 level

APPENDIX B

FIGURES

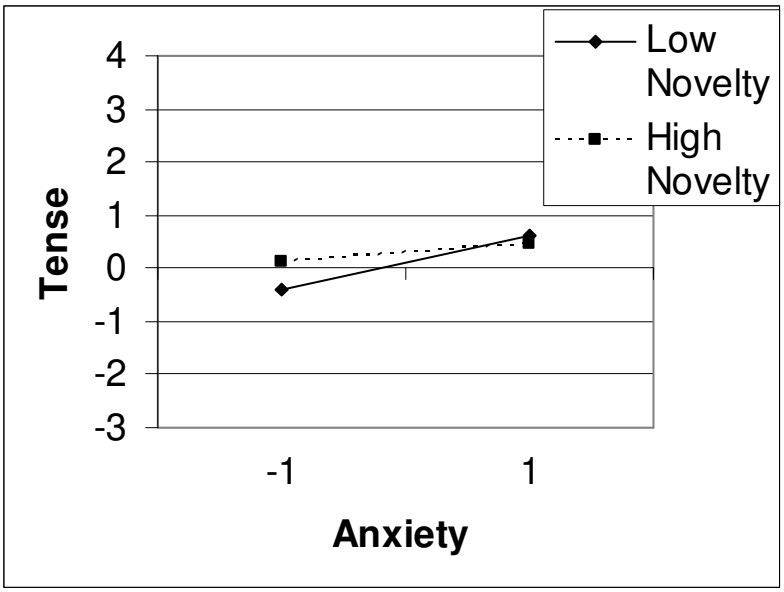

Figure 1. Chronic Anxiety by Novelty Condition Interaction.

APPENDIX C

SCALES

Experiences in Close Relationships

Brennan, Clark, & Shaver (1998)

1 2 3 4 5 6 7

Strongly Agree Strongly Disagree

1. I prefer not to show a partner how I feel deep down. (Avoidance)

2. I worry about being abandoned. (Anxiety)

3. I am very comfortable being close to romantic partners. (Avoidance, Reversed)

4. I worry a lot about my relationships. (Anxiety)

5. Just when my partner starts to get close to me I find myself pulling away. (Avoidance)

6. I worry that my romantic partners won't care about me as much as I care about them. (Anxiety)

7. I get uncomfortable when a partner wants to be very close. (Avoidance)

8. I worry a fair amount about losing my partner. (Anxiety)

9. I don't feel very comfortable opening up to romantic partners. (Avoidance)

10. I often wish that my partner's feelings for me were as strong as my feelings for him/her. (Anxiety)

11. I want to get close to my partner, but I keep pulling back. (Avoidance)

12. I often want to merge completely with romantic partners, and this sometimes scares them away. (Anxiety)

13. I am nervous when partners get too close to me. (Avoidance)

14. I worry about being alone. (Anxiety)

15. I feel comfortable sharing my private thoughts and feelings with my partner. (Avoidance, Reversed)

16. My desire to be very close sometimes scares people away. (Anxiety)

17. I try to avoid getting too close to my partner. (Avoidance)

18. I need a lot of reassurance that I am loved by my partner. (Anxiety)

19. I find it relatively easy to get close to my partner. (Avoidance, Reversed)

20. Sometimes I feel that I force my partners to show more feeling, more commitment. (Anxiety)

21. I find it difficult to allow myself to depend on romantic partners. (Avoidance)

22. I do not often worry about being abandoned. (Anxiety, Reversed)

23. I prefer not to be too close to romantic partners. (Avoidance)

24. If I can't get my partner to show interest in me, I get upset or angry. (Anxiety)

25. I tell my partner just about everything. (Avoidance, Reversed)

26. I find that my partner(s) don't want to get as close as I would like. (Anxiety)

27. I usually discuss my problems and concerns with my partner. (Avoidance, Reversed)

28. When I'm not involved in a relationship, I feel somewhat anxious and insecure. (Anxiety)

29. I feel comfortable depending on romantic partners. (Avoidance, Reversed)

30. I get frustrated when my partner is not around as much as I would like. (Anxiety)

31. I don't mind asking romantic partners for comfort, advice or help. (Avoidance, Reversed)

32. I get frustrated if romantic partners are not available when I need them. (Anxiety)

33. It helps to turn to my romantic partner in times of need. (Avoidance, Reversed)

34. When romantic partners disapprove of me, I feel really bad about myself. (Anxiety)

35. I turn to my partner for many things, including comfort and reassurance. (Avoidance, Reversed)

36. I resent it when my partner spends time away from me. (Anxiety)

VITA

Name: Archibald McLeish Martin, III

Address: A. McLeish Martin,
Department of Psychology,
Texas A&M University,
College Station TX, 77843–4235

Email Address: martinam@neo.tamu.edu

Education: Ph.D., Psychology, Texas A&M University, 2009
M.S., Psychology, Texas A&M University, 2006
B.A., with honors in Psychology, Whitman College, 2003

Peer–Review Publications:

Rholes, W. S., Simpson, J. A., Tran, S., Martin, A. M., III, & Friedman, M. (2007). Attachment and information seeking in romantic relationships. *Personality and Social Psychology Bulletin, 33*(3), 422-438.

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Martin, A. M., III, & Rholes, W.S., (2007, January). Romantic relationships and adult attachment: Providing a secure base for exploration. Poster presentation at the annual meeting of the Society for Personality and Social Psychology, Palm Springs, CA.

Martin, A. M., III, Rholes, W.S., Simpson, J.A., & Friedman, M. (2006, January). Avoidant couple: Not seeking intimate information. Poster presentation at the annual meeting of the Society for Personality and Social Psychology, Palm Springs, CA.