
Attachment and Exploration in Adults: Chronic and Contextual Accessibility

Jeffrey D. Green

University of North Carolina at Chapel Hill

W. Keith Campbell

Case Western Reserve University

It was predicted that attachment is associated with exploration in adults. An exploration scale that measures willingness to explore the physical, social, and intellectual environments was constructed. Study 1 measured chronic attachment patterns and found that both anxiety and avoidance correlated negatively with the desire to explore. Study 2 primed attachment styles by exposing participants to attachment-related sentences in an ostensible sentence memorization task. Participants primed with a secure style were more open to exploration than were participants primed with the insecure styles. Together, the results of Study 1 and Study 2 provide converging evidence that the behavior systems of attachment and exploration are linked in adults.

What drove great explorers such as Amelia Earhardt, Magellan, and Sir Edmund Hillary to attempt daring feats? Could their orientation toward relationships have influenced their decision to boldly investigate new realms? To be specific, is attachment style (Bowlby, 1969, 1973, 1980) associated with the desire to explore in adulthood? The present research investigates the connection between attachment and three types of adult exploration via two methodologies. First, we consider attachment from an individual differences perspective and examine the relation between attachment constructs (i.e., avoidance, anxiety) and social, intellectual, and environmental exploration. Second, we consider attachment from a cognitive perspective by employing a priming technique to experimentally manipulate attachment and assess its effects on exploration.

Attachment Theory and Exploration in Children

Attachment theory focuses on the formation of interpersonal bonds, particularly bonds that offer the prom-

ise of security, intimacy, and the regulation of emotion (Bowlby, 1969, 1973, 1988; Reis & Patrick, 1996). Bowlby proposed that the attachment system connecting infant and caregiver evolved due to the prolonged helplessness of human offspring, ensuring that the caregiver nurtures and protects the infant. The attachment system includes the behavior patterns of proximity maintenance (preventing the separation between caregiver and infant from becoming too great), safe haven (the infant taking refuge in the face of threatening situations), and, most relevant to the present research, secure base (using the caregiver as a launching pad for exploration) (Bowlby, 1969, 1980, 1988; Hazan & Shaver, 1994; Reis & Patrick, 1996). Research has emphasized the different patterns of infant behavior that arise from the degree to which the caregiver was responsive to the child (Ainsworth, Blehar, Waters, & Wall, 1978). A secure style develops when the caregiver is consistently available, affectionate, and responsive, resulting in a more trusting, sociable, and confident child. An anxious-ambivalent style develops when the caregiver is inconsistently available and open, resulting in a more uncertain, anxious, and clinging child. An avoidant style develops when the caregiver is cool and unresponsive, resulting in a child who is more emotionally distant, independent, and averse to expressing affection or need.

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The attachment system is but one of several important and interlocking behavioral systems, including sexual mating, caregiving, affiliation, and exploration (Hazan & Shaver, 1994; Reis & Patrick, 1996). Relatively little research has addressed the interplay between these systems (but see Hazan & Shaver, 1990; Kunce & Shaver, 1994). The present research examines the connection between attachment and exploratory behavior.

What is exploration and how does it relate theoretically to the attachment system? According to Bowlby (1969), "exploratory behavior is elicited typically by stimuli that are novel and/or complex" (p. 238). Furthermore, exploration is "mediated by a set of behavioral systems evolved for the special function of extracting information from the environment" (p. 238). The sequence of behaviors that constitutes exploration is as follows: The individual orients toward unfamiliar features of the environment (e.g., objects, individuals), interacts with the environment to acquire new knowledge and skills (e.g., manipulating objects, talking to a stranger), and develops new cognitive abilities and categories (e.g., constructing a category for "teachers" after extracting common features from several exemplars) (Bowlby, 1969; Gibson, 1988).

Bowlby (1969) described attachment and exploration as complementary systems. Exposure to unfamiliar stimuli frequently elicits both approach and avoidance action tendencies, either simultaneously or contiguously. The proximity of the mother to the child and the nature of the relationship between mother and child dictate responses to unfamiliar stimuli both in humans and other primates (Ainsworth et al., 1978; Bowlby, 1969; Harlow & Harlow, 1965). When the mother is present and watchful, the attachment system is quiescent: The child feels secure and confidently explores the immediate environment. However, when the mother is less attentive, the child is alerted and reestablishes closer proximity to the mother. New and unexpected stimuli also lead the child to seek close contact with the mother. The mother provides a sense of felt security, which in turn may empower the child to explore new stimuli. When at play, the child periodically checks in with the mother, particularly when alerted or frightened, but gradually operates in an increasing orbit from the mother (Anderson, 1972).

The strange situation paradigm of Ainsworth and colleagues (Ainsworth, Bell, & Stayton, 1973; Ainsworth et al., 1978) pitted directly the attachment system against the exploratory system and found that children manifested different patterns of both exploratory and proximity-seeking behaviors. Securely attached children were distressed when the mother disappeared but were comforted by contact with her when she reappeared. When the mother was present, she served as a secure

base from which the child explored the immediate environment. In contrast, anxious-ambivalent children clung to their mother after temporary separation. Preoccupation with the mother and fear of new stimuli hindered exploration. Avoidant children inhibited their distress during the mother's absence and spurned physical contact with their mother after her reappearance for fear of being rebuffed. Nevertheless, they did not replace contact with the mother with unfettered exploration; play often was impaired, rigid, and apparently devoid of true pleasure (Ainsworth et al., 1978). In short, securely attached children are more likely than insecurely attached children to investigate new stimuli in their environment with confidence and pleasure. When the primary caregiver fails to serve as a consistent secure base, the exploratory system is impaired.

Attachment and Exploration in Adults

In recent years, social psychologists have expanded on the research foundation built by developmental psychologists and applied attachment theory to adult love and romantic relationships (Bartholomew & Horowitz, 1991; Brennan & Shaver, 1995; Collins & Read, 1990; Hazan & Shaver, 1987, 1994; Mikulincer & Nachshon, 1991; Simpson, Rholes, & Nelligan, 1992). In addition, researchers have applied attachment theory to areas other than romantic relationships, such as the association between the insecure styles and greater incidence of casual sex, drinking, and eating disorders (Brennan & Shaver, 1995). However, relatively little attention has been paid to the link between attachment style and exploratory behavior in adults. This is surprising because Bowlby considered exploration and attachment to be interlocking behavior systems. Attachment is associated with exploration in children when operationalized as playing with toys; attachment also may be associated with exploration in adults for activities that loosely correspond to playful behavior. Does adult attachment correlate with decisions to choose a nontraditional career, to try skydiving, to make friends at the local gym, or to stroll through a modern art museum?

Hazan and Shaver (1990) proposed that work serves as one type of exploration for adults, arguing that "adult attachment supports work activity just as infant activity supports exploration" (p. 270). Two studies measured attachment style and attitudes toward work via a widely disseminated newspaper survey and a follow-up questionnaire. Securely attached individuals reported feeling more positively about work (e.g., job security) than did insecurely attached individuals. Anxious-ambivalent individuals worked more for the approval of others and reported feeling more negatively about their job security. Avoidant individuals reported feeling more nega-

tively regarding their coworkers and the recognition they received from their coworkers.

Hazan and Shaver (1990) acknowledged that work might not be a valid operationalization of exploration (i.e., investigating novel stimuli) when work tasks are highly predictable and routine. Therefore, in their first study, they included several items tapping leisure activities (e.g., socializing, exercising) as well as the benefits received from these activities (e.g., improved health, stress relief). Surprisingly, responses for the majority of these items did not differ by attachment style. Researchers have surmised that the measures used and the mailed questionnaire format may not have been sensitive or reliable enough to identify differences in leisure activity preferences as a function of attachment style (Hazan & Shaver, 1990; Mikulincer, 1997). In sum, Hazan and Shaver found that securely attached individuals had more positive attitudes toward work and a healthier balance between love and work than did insecurely attached individuals. However, the evidence for attachment style predicting attitudes toward leisure activities was equivocal.

In related research, Mikulincer (1997) investigated the association between attachment style and curiosity (i.e., seeking new information), a cognitive process that likely is associated with exploration. In a self-report study, Mikulincer found that avoidant individuals were less curious relative to secure and anxious-ambivalent individuals when measured via traditional curiosity scales. In another study, insecure individuals were more likely than secure individuals to form judgments based on the first information received and to ignore later information (i.e., to display the primacy effect).

In short, there is evidence that adult attachment styles are associated with work attitudes and with cognitive concomitants of exploration, such as curiosity. However, there is little evidence connecting attachment and exploration beyond the realm of work.

The Present Research

The present research focuses squarely on the broad motivational system of exploration, defined as approach behavior toward new and complex stimuli. We operationalized exploration in the social and leisure realms. We measured exploration via several face-valid items assessing social, intellectual, and environmental exploration. These items measure behavioral preferences rather than cognitive processes.

In Study 1, we examined the relation between chronic attachment style and exploration. We predicted that individuals characterized by either anxiety or avoidance would manifest less interest in exploration relative to individuals characterized by security. In Study 2, we took a more cognitive approach and extended the investiga-

tion to contextually activated attachment styles. That is, we addressed whether similar findings could be obtained by priming attachment styles.

Conceptualizing attachment from a cognitive perspective revisits Bowlby's (1969) original description of working models, or the generalized expectations regarding close interpersonal relationships that arise from childhood experiences. Bowlby compared working models to cognitive maps that influence negotiation through the maze of interpersonal relatedness. More recently, Baldwin (1992) expanded the notion of working models by articulating what he calls "relational schemas," which consist of a schema for the self, a schema for a close other, and a script for the expected pattern of interaction between the two.

The relational schema approach to relationships research has several theoretical and methodological advantages over other approaches. Most important, experimental methods can be employed, allowing stronger causal inferences relative to the correlational designs predominant in research on relationships. The concept of priming or construct activation (Higgins, 1996; Sedikides & Skowronski, 1991) has thus far been the most fruitful of these experimental approaches. Priming methodologies can illuminate the structure and content of a particular relational schema as well as the influence of a relational schema on cognitive processes, affective reactions, and self-regulation. At the forefront of this approach, Baldwin and colleagues (Baldwin & Holmes, 1987) have primed relational schemas, such as a close other who manifests contingent versus noncontingent acceptance, and measured variables such as anxiety and self-evaluations. Researchers also have primed present and past romantic relationships and discovered changes in actual-ideal self-discrepancy (Campbell & Green, 1999).

Taken together, investigating attachment and exploration from both a correlational and an experimental perspective may provide converging evidence regarding the association between these behavior systems.

STUDY 1

We predicted that both anxiety and avoidance would be negatively associated with exploration, consistent with theory and with past research (Ainsworth et al., 1978; Bowlby, 1969; Hazan & Shaver, 1990). We also examined the relation between attachment constructs and facets of exploration (i.e., social, intellectual, environmental) to explain further the connection between these two behavior systems. For example, it is likely that avoidance would correlate strongly with reduced social exploration. Individuals who have learned to inhibit the expression of affection likely are averse to joining new social circles or disclosing personal information. Simi-

larly, theory suggests that anxious-ambivalence would correlate strongly with reduced environmental exploration. Individuals chronically high in anxiety likely are averse to the risks associated with many forms of environmental exploration, such as traveling overseas.

Method

Participants. The study included 100 University of North Carolina at Chapel Hill (UNC-CH) undergraduate students (79 females, 20 males, 1 not reported) who completed our exploration index and an attachment style measure in exchange for partial credit toward a course option.

Procedure. We constructed an exploration index from a broad range of potential exploratory activities that conform to the definition of exploration as the investigation of new and complex stimuli (see the appendix). Items assess social exploration (e.g., "I would like the chance to meet strangers"), intellectual exploration (e.g., "I would like to go to a modern art museum"), and environmental exploration (e.g., "If I had the time and money, I would like to travel overseas this summer"). Participants rated 18 items on an 8-point scale ranging from 1 (*does not describe me at all*) to 8 (*very much describes me*). Half of the items were phrased in the negative and were reverse-scored prior to inclusion in the composite exploration index.

Next, participants completed the 13-item attachment checklist developed by Simpson et al. (1992). Simpson et al. transformed Hazan and Shaver's (1987) three-paragraph measure of attachment style into 13 sentences in order to form continuous measures of attachment. In addition, dividing the paragraphs into sentences provided the opportunity to assess participants on more than one attachment dimension. The 13-item checklist has several psychometric advantages over the traditional paragraph version (Hendrick & Hendrick, 1989; Simpson et al., 1992). Participants responded to the items on an 8-point scale ranging from 1 (*strongly disagree*) to 8 (*strongly agree*).

Results and Discussion

Following Simpson et al. (1992), we constructed two continuous measures of attachment. Specifically, we constructed a secure-avoidant index from eight items (e.g., "I find it relatively easy to get close to others") and an anxiety index from the remaining five items (e.g., "I often worry that my partner doesn't really love me"). Previous research has validated these two factors (Hendrick & Hendrick, 1989; Simpson, 1990; Simpson et al., 1992). Higher scores refer to greater avoidance and anxiety, respectively. We calculated reliability coefficients for both the secure-avoidant attachment index ($\alpha = .81$) and the anxiety attachment index ($\alpha = .64$). We also

constructed a composite exploration scale ($\alpha = .81$). Anxiety and avoidance were significantly correlated ($r = .16, p < .001$). In addition, the three exploration subscales correlated significantly (r s from .27 to .61, p s < .007).

We conducted a series of regressions that included gender as a predictor variable. No effects involving gender were significant. In addition, we conducted a series of regressions that examined potential interactions between anxiety and avoidance by entering centered avoidance and anxiety scores first as a block and then entering the interaction term.¹ This interaction was not significant for the composite exploration index ($\beta = -0.06, t = -0.63, p < .53$). Similarly, the interaction was not significant for social exploration ($\beta = 0.07, t = 0.69, p < .49$), intellectual exploration ($\beta = -0.08, t = -0.75, p < .46$), or environmental exploration ($\beta = -0.12, t = -1.25, p < .21$). Therefore, we present simple correlations between exploration and the attachment composite indices.

As predicted, interest in exploration-related activities was negatively associated with both dimensions of attachment insecurity. Overall openness to exploration correlated negatively with the secure-avoidant attachment index ($r = -.35, p < .001$). The more individuals described themselves as avoidant, the less they expressed interest in exploratory behaviors. Not surprisingly, the relationship between avoidance and exploration was strong for social exploration items ($r = -.40, p < .001$). However, the overall negative correlation was not due exclusively to the social items; avoidance also correlated negatively with environmental exploration ($r = -.32, p < .001$) and, to a lesser extent, with intellectual exploration ($r = -.13, p < .20$). It is possible that some forms of intellectual exploration (e.g., reading a book) might in some instances serve as an escape from other types of exploration, such as social exploration, partially accounting for the weaker correlation with avoidance.

Also in accordance with prediction, interest in exploration correlated negatively with the anxiety attachment index ($r = -.19, p < .05$). Individuals who described themselves as more anxious expressed less preference for exploratory activities. This relationship was most evident for environmental exploration ($r = -.19, p < .058$) and intellectual exploration ($r = -.18, p < .077$) and less evident for social exploration ($r = -.08, p < .45$). The relatively weaker results for anxiety and social exploration may be due, in part, to the tendency of anxious-ambivalent individuals to be preoccupied and clingy in the context of their close relationships. That is, greater anxiety in some cases might lead individuals to seek out particular types of relationships or social experiences in order to manage their anxiety.

In summary, both anxiety and avoidance correlated significantly with exploration, with avoidance generally yielding a stronger association. All of the correlations between the exploration subscales and both anxiety and avoidance were negative. In particular, avoidance correlated highly with reduced social exploration and anxiety correlated highly with reduced environmental exploration.

STUDY 2

Study 1 provided direct evidence that attachment, conceptualized as an individual difference variable, is associated with orientation toward exploration. Individuals who were more anxious or more avoidant were less interested in social, intellectual, and environmental exploration. However, it is clear that contextual variables also are associated with exploration. Indeed, many avoidant and anxious individuals will try exotic food or bungee jump on occasion.

Therefore, we primed attachment styles in Study 2 to examine potential situational influences of attachment on exploration. Baldwin, Keelan, Fehr, Enns, and Koh-Rangarajoo (1996) examined the availability and accessibility effects of attachment relational schemas and found evidence that individuals possess more than one attachment relational schema in memory. When participants listed their 10 most important relationships and categorized them by attachment style, 88% of the sample reported experiencing more than one attachment style and 47% reported experiencing all three. Thus, although individuals likely have one predominant attachment style (i.e., the most chronically accessible style), additional attachment schemas are available in memory and might be activated under particular conditions. For example, a securely attached individual might have an avoidant schema activated as a result of reading about an avoidant relationship in a novel. Consequently, the temporarily primed avoidant schema might influence subsequent cognitive and affective responses. We surmised that priming attachment would lead to different levels of openness to exploration.

We developed a new method to prime relational schemas. Past research has employed exemplars to activate a particular type of relationship. Participants have been primed with a specific individual, such as a critical other, their academic advisor, or a past romantic partner, via visualization or subliminal presentation (Baldwin, Carrel, & Lopez, 1990; Baldwin & Holmes, 1987; Baldwin et al., 1996; Campbell & Green, 1999). However, relational schemas, like all schemas, are networks of generalized knowledge based on past experience. Thus, the relational schema that is activated by thinking about an individual also may be activated by the semantic content

of that schema. Consistent with this proposition, we used themes that were theoretically related to the three attachment styles in order to activate the attachment relational schemas. We modified a simple sentence memorization task used in prior research to prime causal dimension categories (Williams, 1993) in an attempt to activate more general attachment relational schemas rather than simply knowledge about a particular relationship. This more subtle method of priming should maximize the effective induction of an assimilative priming effect (Bargh, 1994; Higgins, 1996).

In summary, conceptualizing attachment as a cognitive variable complements the individual difference approach and allows an experimental manipulation of attachment. We predicted that those primed with secure attachment would manifest a greater interest overall in exploration relative to those primed with insecure attachment (i.e., a security-insecurity main effect for exploration). Next, as in Study 1, ancillary analyses examined the influence of primed attachment on the exploration subscales. Based on the results of Study 1, we expected that those primed with avoidant attachment would manifest less interest in social exploration. We also expected, consistent with Study 1, that those primed with anxious attachment would manifest less interest in environmental exploration.

Method

Participants. A total of 241 UNC-CH undergraduates (173 females, 67 males, 1 not reported) completed the experiment for partial credit toward a course option. Participants were randomly assigned to one of the three attachment prime conditions; cell sizes ranged from 79 to 81.

Procedure. Participants were presented with a page titled "Memory Task" consisting of 10 sentences. Participants were instructed to "become as familiar as possible with the following sentences; read through the sentences until instructed to stop." Three sentences were filler items that were identical and in the same serial position across all conditions (e.g., "The chairs were ordered neatly around the table"). The remaining 7 sentences constituted the attachment prime manipulation and thus varied across conditions. All the sentences were constructed to assess essential themes for the respective attachment styles, taken from the traditional three-paragraph descriptions (Hazan & Shaver, 1987). The following are examples of sentences used to prime a secure attachment style: "John and Betty trust each other completely," "Tom felt comfortable sharing his feelings with his wife," and "Jean comforted her child." The following are examples of sentences used to prime an anxious-ambivalent attachment style: "Jonathan is never sure

how responsive his girlfriend will be to his attempts at intimacy," "Sylvia's mother is unpredictable, sometimes affectionate and sometimes distant and cold toward her," and "Ellen is constantly worried that her boyfriend will leave her." The following are examples of sentences used to prime an avoidant attachment style: "Chris is reluctant to make a long-term romantic commitment," "John's mom is cold and distant when he tries to hug her," and "Tom does not want to become too dependent on his girlfriend."

Participants read the sentences for 3 minutes, then turned the page over and recalled as many sentences as possible by writing them on a blank sheet of paper. Next, participants were told that the subsequent experimental task involved answering questions about themselves and about relationships. First, they completed the 18-item exploration index. The index was modified slightly from the Study 1 version to emphasize evaluating the self at that moment; the scale used ranged from 1 (*does not describe me at all right now*) to 8 (*very much describes me right now*).

Next, participants completed additional exploration measures developed for Study 2. We added items designed to tap truly novel stimuli. Whereas the exploration scale included behaviors that likely had been previously considered, if not experienced, the additional items were intended to assess immediate reactions to unfamiliar stimuli. Participants rated their liking of three Escher prints on a 10-point scale ranging from 1 (*very much dislike the picture*) to 10 (*very much like the picture*). We chose pictures that presumably were unfamiliar to participants. The pictures were a castle on a steep hill overlooking a town, a dragon biting its own tail, and male and female heads constructed of a single Moebius strip. Participants also indicated their interest in three experiment-related activities on a scale ranging from 1 (*not at all interested*) to 8 (*very interested*). Participants rated how much they wanted to take part in a group task versus a task by themselves for the second part of the experiment, how interested they were in a detailed discussion of the theory behind the experiment at its completion, and their interest in participating in an experiment titled "Mystery Experiment."² Given that participants completed these measures near the end of the procedure, these questions implied that their answers would determine their experiences for the remainder of the experimental session and beyond. Together, the Escher prints ratings and the answers to experiment-related questions constituted our novel stimuli measure.

Finally, participants completed some demographic items and the 13-item attachment style questionnaire (Simpson et al., 1992) used in Study 1.

Results and Discussion

Attachment and exploration. We averaged the 18 exploration items to form a composite index ($\alpha = .75$). In addition, we constructed a composite index of the novel stimuli dependent measures ($\alpha = .57$). As in Study 1, the exploration subscales were significantly correlated (r s from .27 to .42, p s < .001).

The two composite exploration indices were entered into a MANOVA in which the independent variable was secure versus insecure attachment prime.³ As expected, the attachment main effect was significant, $F(1, 239) = 4.97, p < .027$. In addition, the interaction was marginally significant, $F(1, 239) = 3.55, p < .06$. Therefore, we examined the two exploration composites separately. The type of attachment prime differentially affected willingness to explore as measured by our exploration index: Participants primed with a secure attachment style were significantly more likely to endorse exploration-related behaviors ($M = 6.15$) than were participants primed with an insecure attachment style ($M = 5.91$), $F(1, 239) = 4.44, p < .036$. Similarly, participants primed with security expressed marginally greater liking for novel stimuli ($M = 5.37$) relative to participants primed with insecurity ($M = 5.14$), $F(1, 239) = 2.82, p < .09$. Thus, the hypothesis was supported regarding both novel stimuli and social/leisure activities. Moreover, the pattern of results of Study 2 is generally consistent with the pattern of results of Study 1 using a different methodology.

Next, ancillary analyses were performed to investigate the relation between the exploration subscales and all three levels of primed attachment. The attachment prime main effect was significant in the case of intellectual exploration, $F(2, 238) = 3.58, p < .029$. Participants primed with a secure attachment style ($M = 6.28$) expressed significantly greater interest in intellectual exploration than did both participants primed with an anxious attachment style ($M = 5.86$), $t(160) = 2.37, p < .019$, and participants primed with an avoidant style ($M = 5.88$), $t(158) = 2.23, p < .027$. The attachment prime main effect was marginally significant in the case of environmental exploration, $F(2, 238) = 2.81, p < .062$. Participants primed with a secure style ($M = 6.33$) expressed significantly greater interest in environmental exploration than did participants primed with an anxious style ($M = 5.93$), $t(160) = 2.20, p < .029$. However, participants primed with a secure style did not express significantly greater interest in environmental exploration than did participants primed with an avoidant style ($M = 6.26$), $t(158) = .42, p < .68$. Finally, the attachment prime main effect was not significant in the case of social exploration, $F(2, 238) = .13, p < .88$. Participants primed with a secure style ($M = 5.85$) did not express significantly

greater interest in social exploration than did participants primed with an anxious style ($M = 5.77$) or participants primed with an avoidant style ($M = 5.78$).

In summary, priming attachment insecurity elicited relatively less interest in exploration. In addition, priming attachment insecurity also elicited reduced interest in novel stimuli (i.e., liking for Escher prints and interest in experiment-related items). These results are consistent with predictions and with the findings of Study 1. Ancillary analyses of the exploration subscales also revealed general consistency between Study 1 and Study 2. Individuals primed with anxious-ambivalence were significantly less interested in environmental exploration than were individuals primed with security. However, unlike Study 1, avoidance was not associated with reduced environmental exploration relative to security. In addition, individuals primed with security were significantly more interested in intellectual exploration than were individuals primed with insecurity. Finally, less consistent with Study 1, primed attachment did not significantly affect interest in social exploration. It may be that the social exploration items, relative to the intellectual and environmental exploration items, are more stable and thus relatively impervious to contextual priming effects.

Chronic and contextual activation. Baldwin et al. (1996) also primed attachment style. In a conservative test of their results, they reexamined their data using chronic attachment style as a covariate. We also analyzed our data using chronic attachment style as a covariate, although we used the two attachment indices (Simpson et al., 1992) rather than the trichotomous attachment measure. As in Study 1, we calculated a secure-avoidant index ($\alpha = .80$) and an anxiety index ($\alpha = .67$) from the 13-item attachment measure. Avoidance and anxiety correlated significantly with each other ($r = .29, p < .001$). When these indices were added as covariates to our model, either individually or collectively, the effect of primed attachment on exploration remained unchanged.

We also examined whether the primed attachment styles influenced scores on the attachment style questionnaire. Avoidance scores, $F(1, 238) = .03, p < .87$, and anxiety scores, $F(1, 238) = 1.95, p < .16$, did not differ as a function of securely versus insecurely primed attachment.

An interesting theoretical issue is the potential interaction between chronically and contextually activated attachment constructs. The fact that primed attachment style did not significantly influence self-reported chronic attachment allowed us to investigate the joint influence of chronic and temporary attachment activation on exploration. To this end, we performed hierarchical regressions predicting exploration from primed attachment (Step 1), avoidant and anxious attachment scores

(Step 2), and the two interaction terms (Step 3) (Aiken & West, 1991). For the composite exploration measure, the interaction between priming and anxiety was not significant ($\beta = 0.38, t = 1.35, p < .18$). The interaction between priming and avoidance was significant ($\beta = -0.82, t = -2.82, p < .005$). Inspection of the predicted values revealed that the effect of the attachment prime on exploration was stronger for chronically avoidant individuals relative to chronically secure individuals. Perhaps individuals high in security possess the inner resources that buffer potentially adverse priming effects. That is, secure individuals may have more stable self-concepts that enable them to withstand situational attachment threats. This interpretation is speculative, however, particularly because the interaction between chronic anxiety and primed attachment was not significant. Nevertheless, the interplay between chronic and primed attachment is an intriguing avenue for future research.

Alternative explanations. Potential weaknesses of our priming methodology should be noted. First, some of the sentences employed to prime avoidance might have primed a mixture of anxious-ambivalence and avoidance. For example, if after reading the sentence "Tom does not want to become too dependent on his girlfriend" the participant identified more with the girlfriend than with Tom, anxious-ambivalence could have been primed along with avoidance. However, such identification arguably was minimal because Tom was the subject of the sentence and because participants were focused simply on memorizing the sentences in a limited time period. Another potential concern is that one of the seven primed sentences in each condition referred to a mother-child relationship rather than an adult romantic relationship. Although we have discussed the linkage between the attachment and exploration systems in both childhood and adulthood, the specific patterns of emotional and cognitive reactions associated with attachment vary at different ages. It may have been preferable to have used exclusively adult-related sentences. In summary, our semantic attachment priming task may need to be refined to some degree. Nevertheless, although an item or two in each condition might possess some weaknesses, we believe that the group of sentences for each condition likely was successful in priming the intended attachment style.

Did individuals primed with insecurity manifest less interest in exploration because the relevant attachment schemas were activated or simply because they were sadder than were individuals primed with security? We feel that mood is unlikely to have accounted for the results because successful mood inductions, such as visualization techniques or exposure to affect-laden video clips, typically are rather heavy-handed. A pilot study involving

86 participants supported this view. After completing the attachment prime manipulation, participants rated how they felt for six positive affect adjectives (e.g., peaceful, enthusiastic) and six negative affect adjectives (e.g., dejected, irritated). Overall mood (i.e., positive affect minus negative affect) did not differ as a function of primed attachment, $F(1, 85) = .69, p < .41$. In addition, even if securely and insecurely primed individuals differed in mood, it is unclear which direction mood would influence exploration: Would sadness elicit reduced exploration as the individual turns inward or would sadness elicit heightened exploration as the individual seeks to repair the sad mood or otherwise redirect attention?

In a related vein, it is possible that the obtained results are partially due to the fact that priming a secure style activated positive constructs, whereas priming an insecure style activated negative constructs. There is some evidence that the activation of positive versus negative constructs has a general valence-congruent effect. For example, Bargh and Pietromonaco (1982) subliminally primed individuals with trait words associated with hostility and found that individuals primed with a greater percentage of hostile words formed a more negative impression of a stimulus person on both hostility-related and hostility-unrelated traits. However, it is not clear that undergraduate participants viewed our exploration items exclusively as positive in valence. Several of the behaviors could be perceived as foolhardy, uncomfortable, dull, or risky (e.g., going skydiving, not knowing people at a party, watching a science show on TV). In addition, the theoretically meaningful pattern of results on the exploration subscales (i.e., reduced environmental exploration for individuals primed with anxious-ambivalence relative to individuals primed with avoidance or security) suggests that more than simple positivity was primed. Finally, the results of Study 2 are conceptually similar to the results of Study 1, which investigated attachment from a chronic activation perspective. In conclusion, we argue that the pattern of results obtained in Study 2 is due primarily to the priming of distinct attachment schemas rather than to a general mood or primed positivity effect.

GENERAL DISCUSSION

As Bowlby (1969) stated, "During the past decade a view long held by Piaget has become widely accepted: exploration and investigation constitute a class of behavior that is as distinct and important as are such recognized classes as feeding and mating" (p. 237). However, research on adult exploration and attachment has been relatively neglected. Our studies were intended to be a step toward redressing this situation.

The present research investigated the influence of attachment on adult exploration from two perspectives.

We conceptualized attachment as both a chronically accessible individual difference construct and a contextually activated construct. Study 1 found an association between chronic attachment style and exploration. We measured willingness to explore the social, intellectual, and environmental realms with a newly developed exploration index. Both dimensions of insecurity were associated with less exploration. Individuals who reported greater anxiety on the 13-item attachment scale (Simpson et al., 1992) expressed less interest in exploratory activities, particularly environmental and intellectual exploration. Similarly, individuals who reported greater avoidance also expressed less interest in exploratory activities, particularly social exploration.

In Study 2, we primed the attachment styles by having participants memorize sentences that contained theoretically meaningful attachment concepts. That is, participants in the secure condition read sentences dealing with security and trust, participants in the anxious-ambivalent condition read sentences dealing with uncertainty and anxiety, and participants in the avoidant condition read sentences dealing with discomfort regarding closeness and trust. To our knowledge, a semantic priming procedure has not been employed previously to prime relational schemas. After reading and then recalling the attachment-related sentences, participants completed ostensibly unrelated items that assessed willingness to explore. Paralleling the results for Study 1 with chronically activated attachment styles, Study 2 found that participants primed with a secure attachment style expressed greater interest in exploratory activities than did participants primed with the insecure attachment styles. In addition, relative to participants in the insecure conditions, participants in the secure condition expressed moderately greater interest in novel stimuli (e.g., Escher prints). Ancillary analyses of the exploration subscales revealed that participants primed with anxious-ambivalence were less interested in environmental exploration, and participants primed with either anxious-ambivalence or avoidance were less interested in intellectual exploration. The converging results of Study 1 and Study 2, using both correlational and experimental methodologies, provide evidence that the attachment system and the exploration system are linked closely in adulthood.

Hazan and Shaver (1990) lamented that the link between attachment theory and adult exploration was not well understood, and they hoped that further research would "enable the formation of a more powerful and complete theory of adult attachment" (p. 278). They provided the first important piece of evidence by conceptualizing exploration as work and found that work-related attitudes varied by attachment style. We believe that the present research extends the current

knowledge. We demonstrated empirically a link between attachment style and social and leisure activities. Perhaps more important, we obtained similar findings by priming attachment styles, thus revisiting Bowlby's emphasis on working mental models as guides to relationship expectations and behavior. Approaching attachment theory from more than one perspective provides a more comprehensive picture of the link between attachment and exploration.

Future Research

Although the present research underscores the general association between attachment and exploration, future research may further illuminate more specific relationships between the two insecure styles and different types of exploration. For example, exploration by avoidant and anxious-ambivalent individuals might be relatively higher under limited conditions. Mikulincer (1997) found that avoidant and anxious-ambivalent individuals manifested different patterns of curiosity when they chose the amount of time to learn about new consumer products. Avoidant individuals spent less time reading about consumer products relative to secure individuals, but this difference disappeared when the information search competed with social interaction. Anxious-ambivalent participants displayed the opposite pattern, spending less time reading about consumer items when the time interfered with social interaction. These data suggest that avoidant individuals might engage in some forms of exploration (e.g., environmental or intellectual exploration) when it is seen as a means of escaping closeness to others. Anxious-ambivalent individuals, in contrast, might inhibit exploration when it interferes with relationships but might engage in greater exploration when it offers the possibility of developing relationships. For example, avoidant individuals might be more likely to engage in solitary hobbies, whereas anxious ambivalent individuals might be more likely to join social clubs or try shared activities in the service of developing close relationships. Future research that pitted directly one exploration option against another might further clarify their relation to attachment constructs.

The present line of investigation may benefit from other research methodologies as well. Longitudinal designs may illuminate more clearly the connection between childhood attachment style and exploration in adolescence or adulthood. Similarly, field studies may shed light on the specific exploratory preferences of individuals with different attachment styles. Finally, future research on construct activation with respect to attachment or other relationship domains might fruitfully employ a semantic priming procedure as a useful alternative to priming a specific relationship.

Concluding Remarks

Bowlby (1969) noted that caregivers who manifested a secure attachment style were more diligent in maintaining proximity to their child. Consequently, the child was able to "relax his own efforts" (p. 260) and pay more attention to novel environmental stimuli. The present research suggests that attachment relational schemas continue to be associated with exploration in adulthood. Whether chronically activated or contextually activated, secure attachment, relative to anxious-ambivalent or avoidant attachment, allows adults to relax and engage in greater social, intellectual, and environmental exploration.

APPENDIX Exploration Index

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- I would like to take a class that is unrelated to my major just because it interests me.
 - I would like to try bungee jumping, skydiving, or other adventurous activities.
 - If I had the time and money, I would like to travel overseas this summer.
 - I would like to explore someplace that I have never been before.
 - I would like to have several friends who are very different from each other.
 - I would like to spend a semester studying abroad.
 - I would like a job that was unusual and different.
 - I would like to have the chance to meet strangers.
 - If given the chance, I would enjoy exploring unusual ideas or theories.
 - I would like to explore the woods and interesting places near my town.
 - I would enjoy being introduced to new people.
 - I would pick up a book on an interesting topic and read some of it.
 - If I had time, I would enjoy watching TV shows on interesting topics such as science, history, art, or culture.
 - I would like to explore the ideas of foreign cultures.
 - I would enjoy joining a student group composed of a wide range of people I don't know.
 - I would like to go to a modern art museum.
 - I would strike up a conversation with a stranger on a bus or airplane and open up to the person.
 - I would like to go to a party if I didn't know very many of the people.
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NOTES

1. We examined the regression coefficients associated with avoidance and anxiety in the first step of the regression. For avoidance predicting overall exploration ($\beta = -.33$), $t(97) = -3.48$, $p < .001$. The results were similar for the exploration subscales: environmental exploration ($\beta = -.30$), $t(97) = -3.14$, $p < .002$, social exploration ($\beta = -.40$), $t(97) = -4.22$, $p < .001$, and intellectual exploration ($\beta = -.11$),

$t(97) = -1.02, p < .31$. For anxiety predicting overall exploration ($\beta = -.14$), $t(97) = -1.47, p < .14$. The results were generally similar for the subscales: environmental exploration ($\beta = -.16$), $t(97) = -1.48, p < .14$, social exploration ($\beta = -.01$), $t(97) = -.14, p < .89$, and intellectual exploration ($\beta = -.16$), $t(97) = -1.60, p < .11$. In sum, when avoidance is examined controlling for anxiety, it is generally a stronger predictor of exploration than is anxiety controlling for avoidance. This suggests that some of the association between anxiety and exploration may be due to the natural overlap of anxiety and avoidance. These results are consistent with the simple correlations between attachment and exploration, which generally were stronger for avoidance than for anxiety.

2. For participants who were either finished or close to finishing their experiment requirement, they were instructed to answer the last question as if they still needed several hours of experimental credit.

3. Initially, the two composite exploration indices were entered into a MANOVA in which the independent variables were secure versus insecure attachment prime and gender. Neither the main effect nor the interaction involving gender was significant; therefore, we performed a MANOVA with only attachment prime as the independent variable. Consistent with theory and past research, we expected both avoidance and anxious-ambivalence to be negatively associated with exploration. Therefore, for our principal analysis, we collapsed across these groups to form an insecure primed condition. The primed anxious-ambivalent and avoidant conditions did not differ significantly on the composite exploration index, $F(1, 158) = 0.89, p < .35$, or on the novel stimuli index, $F(1, 158) = 0.06, p < .80$.

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