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Do Automatic Reactions Elicited by Thoughts of Romantic Partner, Mother, and Self Relate to Adult Romantic Attachment?

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Three studies tested the expectation that automatic reactions elicited by the mental representation of one's current romantic partner, mother, and self relate to adult romantic attachment. Adult romantic attachment was assessed using multiple measures, and individual differences in automatic reactions were assessed by the Implicit Association Test (IAT). Studies 1 and 2 showed that automatic reactions elicited by thoughts of current romantic partner, but not by thoughts of self, were related to adult romantic attachment assessed at a specific (i.e., within one's current romantic relationship) and general level (i.e., across all romantic relationships). The pattern of results was stronger among individuals identified as attachment-schematic. Studies 2 and 3 showed that automatic reactions elicited by thoughts of one's mother were related to adult romantic attachment assessed at a general level. In all three studies, results did not differ depending on how adult romantic attachment was conceptualized (four styles vs. two dimensions).

Keywords: *automatic evaluations; automatic associations; implicit attitudes; adult attachment; romantic relationships; Implicit Association Test*

The present research examined the extent to which adult romantic attachment relates to individual differences in the automatic reactions elicited by mental representations of specific attachment figures, such as one's romantic partner and mother as well as self. Does a person characterized by a secure adult attachment style automatically evaluate his or her partner more positively than a person characterized by an insecure attachment style? Furthermore, does a person characterized by a secure attachment to one's romantic partner automatically evaluate his or her mother as more supportive than a person characterized by an insecure attachment?

Recent theory and research in the study of adult attachment has focused on understanding the automatic cognitive-affective processes that are associated with attachment-related behaviors (Shaver & Mikulincer, 2002). There are several reasons for focusing on automatic and implicit, rather than controlled and explicit, processes. First, automatic processes are assumed to be less susceptible to presentation biases and other distortions (Greenwald, & Banaji, 1995). Furthermore, given the highly affective nature of interpersonal interactions and the amount of time people spend with significant others, much of what happens within close relationships is likely to be occurring at an automatic level, and people may not necessarily be consciously aware of these automatic processes.

With the relatively recent development of techniques for assessing automatic processes, researchers have begun to more directly test hypotheses derived from adult attachment theory (e.g., Bartholomew & Horowitz, 1991; Hazan & Shaver, 1987) and from its predecessor,

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Bowlby's (1969) original conceptualization of attachment theory. This work has led to a greater understanding of the automatic cognitive-affective processing dynamics associated with individual differences in adult romantic attachment. For example, although not specifically focusing on automatic evaluative reactions, research has shown that aspects of the attachment system, such as reactions to psychological threat (Mikulincer, Birnbaum, Woddis, & Nachmias, 2000; Mikulincer, Gillath, & Shaver, 2002) and interpersonal expectancies (Baldwin, Fehr, Keedian, Seidel, & Thomson, 1993), in adulthood operate automatically. Furthermore, at least under certain conditions, some of these automatic processes have been shown to vary as a function of individual differences in adult attachment (Baldwin et al., 1993; Mikulincer et al., 2000, 2002).

Despite evidence showing relations between adult attachment and automatic cognitive-affective processes, there has not been direct and clear support for the hypothesis that individual differences in automatic reactions to specific attachment figures and self relate to adult romantic attachment.¹ The lack of correspondence is intriguing because evaluations of self and others assessed at an explicit level have been shown to relate to adult attachment. For example, Bartholomew and Horowitz (1991) showed that consistent with their four-category model of adult attachment styles, a secure or preoccupied attachment style is more strongly related to positive evaluations of others than is a dismissing or fearful attachment style, and that a secure or dismissing attachment style is more strongly related to positive evaluations of self than is a preoccupied or fearful attachment style. Because these findings were based on explicit peer and self-reports, they do not directly address the hypothesis that automatic evaluative reactions relate to adult attachment.

Banse (1999, 2001) directly assessed automatic reactions by using affective priming techniques to capture the evaluative reactions automatically elicited by significant persons. Names and photos of self (2001; Experiment 1) and significant persons (e.g., relationship partners and friends; 1999, 2001) automatically elicited positive reactions, providing partial support for Bowlby's (1969) hypothesis. However, with regard to individual differences, Banse found either no relation between adult attachment and automatic reactions (1999) or theoretically unexpected relations (2001; e.g., dismissing attachment style was related to stronger automatic positive reactions to one's romantic partner).

Although six of the seven studies reported by Mikulincer, Hirschberger, Nachmias, and Gillath (2001) assessed the automatic reactions elicited by generic attachment representations (e.g., a Picasso drawing of a mother and child, a picture of an old couple), one

(Experiment 4) was more directly relevant to the present studies. This study assessed the automatic reactions elicited by the mental representation of specific attachment figures and found that the name of a specific attachment figure elicited automatic positive reactions for the sample on the whole. However, individual differences in automatic reactions were not related to individual differences in adult attachment. Thus, to summarize, although specific attachment figures have been shown to automatically activate positive reactions, individual differences in such reactions have not been related to individual differences in adult attachment.

PRESENT STUDIES

The difficulty in finding the predicted relation between individual differences in automatic reactions and adult may be due to two reasons. First, as suggested by both Banse (1999, 2001) and Mikulincer et al. (2001), although affective priming techniques may be suitable for assessing typical reactions by people in general, their low reliability ($r = .02$ to $.26$) (Banse, 2001; Bosson, Swann, & Pennebaker, 2000; Kawakami & Dovidio, 2001) makes them less suitable for assessing individual differences in automatic reactions.

Second, for most individuals, attachment-related thoughts, affects, and behaviors are likely to differ depending on the specific relationship partner (e.g., Baldwin, Keelan, Fehr, Enns, & Koh-Rangarajoo, 1996; Collins & Read, 1994; Overall, Fletcher, & Friesen, 2003; Pierce & Lydon, 2001). Thus, a person's experiences with a specific romantic partner may differ from that person's experiences with a different partner. Moreover, how a person thinks about relationships at a general, abstract level may differ from how that person thinks about a relationship with a specific romantic partner. This distinction is important because individual differences in attachment assessed at a general and specific level may both contribute to aspects of relationship functioning (e.g., quality of interaction and intimacy) in a particular relationship (Pierce & Lydon, 2001). It is also possible that the predicted relation between automatic reactions and adult romantic attachment may depend in part on whether adult attachment is assessed at a general or specific level.

The present studies addressed both of these concerns. Specifically, automatic reactions elicited by the mental representation of one's romantic partner, mother, and self were assessed using the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998). In comparison to affective priming techniques, the IAT has been shown to have stronger test-retest reliabilities ($r = .65$ to $.69$) and larger effect sizes (Bosson et al., 2000; Greenwald et al., 1998). It, therefore, may be able to detect the hypothesized relation between automatic reactions and

adult romantic attachment. The present studies also assessed individual differences in adult romantic attachment at both a specific level (i.e., within one's current romantic relationship) and at a general level (i.e., across all romantic relationships).

STUDY 1

The main goal of Study 1 was to examine whether individual differences in automatic reactions to thoughts of one's current romantic partner and self relate to adult romantic attachment. To assess the automatic reactions elicited by, respectively, romantic partner and self, participants performed two IATs. Participants also completed five adult attachment measures. Although romantic partner and self were both expected to elicit positive reactions on average (e.g., Banse, 1999, 2001; Hazan & Shaver, 1987; Mikulincer et al., 2001), the degree to which individual differences in such automatic reactions relate to adult romantic attachment is still not known.

Method

PARTICIPANTS

Students enrolled in an introductory psychology course at the University of Washington completed three adult attachment measures and a short questionnaire about their relationship status as part of the psychology department's mass testing procedure. Individuals who were involved in a romantic relationship were preselected to take part in the experimental sessions. Because insecure attachment styles represent relatively small portions of the population (Hazan & Shaver, 1987), participants were also preselected based on the attachment style descriptor (Bartholomew & Horowitz, 1991) they had chosen as most applicable to themselves (see Procedures and Measures). Two experimental sessions were conducted. Of the individuals invited to participate, 74 (54 women and 20 men) completed the first session, and 58 (44 women and 14 men) returned for the second session. To ensure comparability across analyses, only the results for the 58 participants (15 dismissing, 12 fearful, 16 preoccupied, and 15 secure) who completed all measures in both sessions are reported. The median age of the 58-person sample was 18 years ($SD = 1.51$ years), and the median duration of participants' romantic relationship was 44 weeks ($M = 65.74$ weeks, $SD = 62.58$ weeks).

APPARATUS

The IATs in Studies 1 through 3 were all administered on IBM-compatible desktop computers with a Windows 95 operating system using the Farnham Implicit Association Test (FIAT) software (Farnham, 1997). Participants gave responses by pressing the A key with their left forefinger and the 5 key (on the right-side numeric keypad) with their right forefinger.

PROCEDURES AND MEASURES

Study 1 consisted of a prescreening session and two experimental sessions. Participants took part in the experimental sessions individually. At each experimental session, participants first performed one IAT and then completed self-report questionnaires. This study was part of a larger project (Zayas, 2003), and only the questionnaires relevant to this study are discussed here.

IAT. Because the procedures for the Partner-IAT and Self-IAT were highly similar, for brevity, the description that follows applies to both (unless otherwise noted). The phrase *target person* is used to refer to each participant's partner in the Partner-IAT and self in the Self-IAT.

The IAT method is a reaction-time measure that uses a series of discrimination tasks to assess the degree to which two concepts are differentially associated with two attributes. Before performing the standard 7-block IAT procedure (Greenwald et al., 1998), participants generated stimulus words for the target concept (described in the following). During the IAT, participants performed three types of discrimination tasks (i.e., target concept, attribute, and combined) in which they were presented with one word at a time in the middle of a computer screen and classified the presented word as quickly and as accurately as possible by pressing one of two computer keys (left or right). Because the critical components of the IAT method are the two combined discrimination tasks used for data collection (i.e., Blocks 4 and 7; Table 1), the following discussion focuses on these. Table 1 describes the discrimination tasks used to prepare participants for performing the combined discrimination tasks, as well as the order in which the blocks were performed, number of trials per block, and sample items.

The strength of association between target concept and attribute was assessed by examining differences in the ease, reflected by response latencies, with which individuals perform the two combined discrimination tasks. When a target concept and an attribute are strongly associated with each other and mapped onto the same response key (e.g., partner+positive), the categorization task should be relatively easy to perform (reflected by faster response latencies). In contrast, when a target concept and an attribute are not, or only weakly, associated with each other and mapped onto the same response key (e.g., partner+negative), the categorization task is performed with more difficulty (reflected by slower response latencies). The IAT effect is the difference between the average response latency for the two combined discrimination tasks (i.e., partner+negative – partner+positive). Larger IAT effects reflect stronger positive associations with the target person.

Generating stimuli idiographically. For the attribute terms, all participants were presented with the same set

TABLE 1: Example of 7-Block Implicit Association Test (IAT) Used to Assess Automatic Reactions Elicited by the Mental Representations of a Target Person (Partner, Mother, Self)

Block	Number of Trials	Discrimination Task	Task Description	Response Key Mapping for Target Concept and Attribute ^a		Example of Stimulus Words To Be Classified ^b
				LEFT	RIGHT	
1	20	Attribute	Classified attribute terms as either unpleasant or pleasant	Unpleasant	Pleasant	•Bomb Sunshine•
2	20	Target concept	Classified target concept terms as either descriptive or nondescriptive of target person	John	Not John	•Johnny Steve•
3 and 4 ^c	20 and 40	Combined	Attribute (Block 1) and target concept (Block 2) discrimination tasks combined	John or Unpleasant	Not John or Pleasant	•Johnny •Bomb Steve• Sunshine•
5	20	Target concept	Same as Block 2 but with response key assignments reversed	Not John	John	Johnny• •Steve
6 and 7 ^d	20 and 40	Combined	Attribute (Block 1) and target concept with key assignments reversed (Block 5) discrimination tasks combined	Not John or Unpleasant	John or Pleasant	Johnny• Bomb• •Steve •Sunshine

NOTE: In this example, the name of the target person is John. The discrimination tasks are listed from top to bottom in the order performed by participants. The IAT effect is computed by taking the mean difference in reaction time between the two combined tasks used for data collection. Specifically, IAT effect = mean reaction time for the target person+negative combined task (Block 7) – mean reaction time for the target person+positive combined task (Block 4).

a. These words also appeared on the upper left and right corners of the computer screen as labels to remind participants of the response key assignments. For the Mother-IAT, the attribute labels were *Supportive* and *Rejecting*.

b. Words to be classified are presented one at a time in the center of the computer screen. Dots placed to the left of the stimulus words listed here indicate that correct classification of the stimulus involves a left key press. Dots placed to the right of the stimulus word indicate that correct classification of the stimulus involves a right key press.

c. Block 3 consisted of 20 practice trials not used for data collection. Block 4 was identical to Block 3 except that it consisted of 40 trials used for data collection.

d. Block 6 consisted of 20 practice trials not used for data collection. Block 7 was identical to Block 6 except that it consisted of 40 trials used for data collection.

of pleasant (e.g., success, health, peace) and unpleasant words (e.g., bomb, rotten, disaster) whose valences have been validated (Bellezza, Greenwald, & Banaji, 1986). For the target concept terms, participants generated stimuli idiographically. Adapting Greenwald and Farnham's (2000) approach, before performing the actual IAT discrimination tasks, participants were prompted through a series of questions to generate a list of uniquely descriptive words (e.g., target person's first name, nickname, hair color, city of birth) and a second list of nondescriptive words (e.g., name, hair color not associated with the target person). For the Partner-IAT, the name that participants used to refer to their partner appeared on the computer screen as labels to remind participants of the concept associated with the response key. For example, if participants referred to their partner as John, then the target concept labels that appeared on the screen were *John* and *not John*. Following Greenwald and Farnham (2000), for the Self-IAT, *me* and *not me* were the generic labels used. The present study used *not target person* as the contrast category because it was expected

to be less likely to elicit affective reactions on its own, unlike concepts such as stranger and other (Fiske, 1981). Moreover, automatic reactions to stranger and others may be related to individual differences in adult romantic attachment (e.g., Berlin & Cassidy, 1999), making it difficult to interpret the meaning of the IAT effect.

Adult attachment measures. Adult romantic attachment was assessed using four different measures. For brevity, the measures are referred to as *Relationship Questionnaire (RQ)*–general, *RQ-%*, *RQ-specific*, and *Experiences in Close Relationships Questionnaire (ECR)*–general. The RQ-general, a modified version of the RQ (Bartholomew & Horowitz, 1991), assessed adult attachment style across all of the participants' romantic relationships. Participants ranked (from most to least descriptive) and rated (on an 8-point scale) how well each of the four attachment style descriptors (i.e., paragraphs describing thoughts and feelings typically experienced within relationships by individuals with one of the four adult attachment styles) characterized their experiences within romantic

relationships. Participants completed the RQ-general at the prescreening session and again at the first experimental session. The ranking version of the RQ-general was used to preselect participants. However, based on the recommendations of Fraley and Waller (1998), results for continuous measures are reported in the text and tables whenever possible. Because the attachment ratings of the two administrations of the RQ-general were related ($r_s = .50$ to $.65$), mean scores (i.e., one for each of the four attachment scales) were computed. If a participant was missing a response to one of the two measures, the composite score for the scale was based on the available response. Cronbach's alphas (α) for the four RQ-general composite variables were as follows: dismissing = $.78$, fearful = $.81$, preoccupied = $.72$, and secure = $.66$. Only the results for the composite variables are reported.

RQ-% (Baldwin et al., 1996; administered at the prescreening session), also a modified version of the original RQ, requires participants to estimate the percentage of their past and current romantic relationships that corresponded to each attachment style descriptor (Bartholomew & Horowitz, 1991). Finally, at the experimental session in which the Self-IAT was performed, participants completed the RQ-specific, in which they ranked (but did not rate) the four attachment style descriptors based on how well it described their thoughts and feelings within their specific current romantic relationship.

ECR-general measure of adult romantic attachment (Brennan, Clark, & Shaver, 1998) consists of an 18-item avoidance scale that assesses discomfort with intimacy and dependency and an 18-item anxiety scale that corresponds to vigilance concerning rejection and abandonment (α s for avoidance and anxiety were $.90$ and $.92$, respectively). At the prescreening session, participants rated how well (on a 7-point scale) each statement characterized their feelings and thoughts across all of their past romantic relationships.

PROCEDURAL VARIABLES

All participants performed the Self-IAT in the first experimental session and the Partner-IAT in the second. For the Self-IAT and Partner-IAT, all participants also performed the target person+positive combined discrimination task first and the target person+negative combined discrimination task second. Because the main goal of the present study involved examining individual differences and because the order of the tasks has been shown to influence the overall IAT effects, only relative differences among individuals in their IAT effects will be interpreted substantively. (Studies 2 and 3, in which the task order was counterbalanced, confirmed that the results involving individual differences were not influenced by these procedural variables.)

Data Reduction

Response latencies (in ms) and accuracy were recorded for each trial. Standard statistical procedures for dealing with data resulting from timed tests were followed (Greenwald et al., 1998). Specifically, data from the first two trials of each combined discrimination block and response latencies outside the normal range of time needed to categorize a single trial (> 150 ms or $< 4,999$ ms) were excluded from further analysis. Response latencies less than 300 ms and greater than 3,000 ms were recoded to 300 ms and 3,000 ms, respectively. Latencies were then log-transformed. Finally, the IAT effect was computed by taking the difference in the average log-transformed latency for the two blocks used for data collection. All statistical significance tests and effect sizes were computed using the log-transformed latencies. The average log-transformed latencies for each block were transformed back to milliseconds and are reported in the text and tables for illustrative purposes. For all the IATs reported in Studies 1 through 3, the error rates were low (range = 3% to 11%) in the combined discrimination tasks used to compute the IAT effect. Furthermore, for all IATs, participants had more errors in the target person+negative combined discrimination task compared to the target person+positive combined discrimination task, indicating that faster response latencies were not caused by an increase in error rates.

Results

DESCRIPTIVE STATISTICS

Although the central aim of the present research was to examine individual differences, a brief summary of the main effects is provided for descriptive purposes. The top section of Table 2 reports the mean response latencies for the combined discrimination tasks and the computed IAT effects. As shown, participants found it more difficult to perform the combined discrimination task when the target person (partner, self) and negative were mapped onto the same response key (target person+negative) than when the target person and positive were mapped onto the same response key (target person+positive). When the target person was a participant's romantic partner, the difference between the two combined discrimination tasks (Partner-IAT effect) was $+322.27$ ms, $d = 2.36$, $t(57) = 15.11$, $p < 10^{-20}$.² When the target person was self, the difference (Self-IAT effect) was $+383.15$ ms, $d = 2.64$, $t(57) = 19.98$, $p < 10^{-26}$. The correlation between Partner-IAT and Self-IAT was $r(58) = .42$ ($p < .001$). There were no significant sex differences on any of the IATs, and relations between adult attachment and IATs reported did not depend on (i.e., interact with) participant's sex.

TABLE 2: Mean (and Standard Deviations) Response Latencies (in ms) for Combined Discrimination Tasks and Computed Implicit Association Test (IAT) Effects for IATs From Studies 1, 2, and 3

Target Person	Combined Discrimination Task					
	Target Person+Negative		Target Person+Positive		IAT Effect ^a	
	M	SD	M	SD	M	SD
Study 1 (<i>N</i> = 58)						
Partner	1023.77	207.14	701.50	114.90	322.27***	162.48
Self	1053.21	209.74	670.07	109.11	383.15***	174.07
Study 2 (<i>N</i> = 85)						
Partner	1075.96	226.01	705.84	109.17	370.12***	194.03
Self	980.79	194.90	640.84	86.95	339.96***	155.25
Mother ^b	953.71	197.05	679.28	109.11	274.43***	176.26
Study 3 (<i>N</i> = 104)						
Mother ^b	1201.03	228.12	783.80	134.39	417.22***	193.97

NOTE: Response latencies are reported in untransformed milliseconds (i.e., mean log-transformed latencies for each block of trials transformed back to milliseconds). All statistical tests and effect sizes however are computed using log-transformed latencies.

a. IAT effect = mean response latency for the target person+unpleasant combined task – mean response latency for the target person+pleasant combined task. Larger IAT effects reflect stronger positive associations with target person.

b. For the Mother-IAT, the words used as stimuli for the attribute were *supportive* and *rejecting*.

*** $p < .10^{-15}$.

RELATIONSHIP-RELEVANT VARIABLES AND AUTOMATIC REACTIONS

From the prescreening session to the time of the first experimental session, 13 of the 58 participants had broken up with their romantic partner. By the time of the second experimental session, 8 more participants had ended their relationship. The breakup rate was surprisingly high, which may reflect that most participants were in their first quarter in college and were involved in relationships that had probably formed before they came to college. This relatively large group made it possible to examine differences between automatic reactions elicited by current partners and expartners. Partner-IAT effects were larger for current partners than for expartners, $t(56) = 2.19$, $p < .05$, indicating that current partners elicited stronger automatic positive reactions than expartners. Because individuals performed the Partner-IAT after they had broken up with their partner, future research is needed to determine whether this difference in positive reactions preceded and may have contributed to the breakup or whether it resulted from the breakup. Nonetheless, the results support the construct validity of the Partner-IAT. Finally, the relations between adult romantic attachment and IATs reported next did not depend on (i.e., interact with) whether individuals remained involved in their current romantic relationship.

ADULT ROMANTIC ATTACHMENT AND AUTOMATIC REACTIONS

Relations among measures of adult romantic attachment. A person's experiences with a specific romantic partner

may differ from that person's experiences with romantic partners in general. Nonetheless, research has shown that adult romantic attachment assessed at a specific level does relate, to some degree, to adult romantic attachment assessed at a general level (Baldwin et al., 1996; Pierce & Lydon, 2001). To examine the relations between specific and general measures of adult attachment in the present sample, as well as relations between different measures of adult attachment (RQ vs. ECR), correlations among the different measures (available at http://shodalab.psych.washington.edu/Zayas&Shoda2005/attachment_study1.pdf) were examined.

First, the relations among the different RQ measures were examined. RQ-general and RQ-% showed the strongest correspondence (average correlation coefficient of the four attachment scales = .60), which was expected given that they both assess a person's adult attachment style at a general level. The RQ-specific showed less correspondence with the RQ-general (average coefficient = .43) and RQ-% (average coefficient = .35). These results were also expected given that RQ-specific assesses adult attachment style with regard to one's specific partner and RQ-general and RQ-% assess adult attachment style at a general level. Overall, the pattern of correlations is consistent with the expectation that adult attachment assessed at a general and specific level are moderately related but also differ within a person to some degree.

Next, the relations between the ECR-general and RQs were examined. According to Fraley and Shaver (2000), the RQ-general measures of security, fearful, preoccupied, and dismissing were expected to correlate with the

ECR-general scale of anxiety as follows: negatively, positively, positively, and negatively. The four scales were also expected to correlate with the ECR-general scale of avoidance as follows: negatively, positively, negatively, and positively. The correlations observed in this study were in the expected direction except that the avoidance dimension was not negatively correlated with the preoccupied attachment style ($r = -.16$, *ns*). The four attachment scales of the RQ-general are sometimes combined to form anxiety and avoidance indices (Fraley & Shaver, 2000). In the present study, the anxiety and avoidance indices derived by combining the four RQ-general attachment scales were less strongly and less clearly related to individual differences in Partner-IAT and Self-IAT than the individual RQ attachment scales. Thus, the analyses here report the results for the four RQ attachment scales separately.

The correlations between the ECR-general and RQ-specific and RQ-% were similar to those between ECR-general and RQ-general, except for the following: The avoidance dimension was not positively correlated with the fearful style ($r = .09$, *ns*) as assessed by the RQ-general. It was also not negatively correlated with the secure style ($r = -.03$, *ns*) as assessed by the RQ-specific.

Partner-IAT. Because the relations between adult romantic attachment and automatic reactions (IATs) may depend on the level (specific vs. general) at which adult attachment was assessed and/or the particular measure used (RQ vs. ECR), correlations between each of the four adult attachment measures and Partner-IAT and Self-IAT are reported separately in Table 3.³

When adult attachment style was assessed with one of three RQ attachment measures (RQ-general, RQ-%, or RQ-specific), Partner-IAT was positively and significantly correlated with the secure attachment scale (*rs* ranged from .28 to .34, $ps < .05$). In contrast, of the nine correlations involving an insecure attachment style (dismissing, fearful, or preoccupied) and Partner-IAT, seven were in a negative direction (although not all were statistically significant at $p < .05$).

The relation between adult attachment as assessed by the ECR-general and Partner-IAT was also examined. The avoidance dimension was negatively correlated ($r = -.33$, $p = .01$) with Partner-IAT. The anxiety dimension was not. Multiple regression analysis revealed no significant interaction between avoidance and anxiety.

Self-IAT. Adult romantic attachment showed no clear relations with automatic reactions to self (Table 3). The strongest relations were observed when adult attachment was assessed by the RQ-general. Here, Self-IAT was positively correlated with a secure style ($r = .21$, *ns*) and negatively correlated with a preoccupied style ($r = -.23$, $p < .10$). Neither, however, was statistically significant at $p < .05$.

TABLE 3: Correlations Between Implicit Association Test (IAT) Effects (Partner and Self) and Measures of Adult Romantic Attachment in Study 1 ($N = 58$)

	<i>Target Person</i>	
	<i>Partner-IAT</i>	<i>Self-IAT</i>
Adult attachment measure		
RQ-general attachment style		
Dismissing	-.14	.20
Fearful	-.11	-.01
Preoccupied	-.13	-.23†
Secure	.30*	.21
RQ-percentage of different attachment experiences		
Dismissing	-.11	-.02
Fearful	.00	.12
Preoccupied	-.27*	-.15
Secure	.34**	-.09
RQ-attachment style specific to partner		
Dismissing	-.21	-.14
Fearful	-.11	-.04
Preoccupied	.07	.00
Secure	.28*	.19
ECR-general attachment style		
Avoidance	-.33*	-.06
Anxiety	-.19	-.17

NOTE: RQ = Relationship Questionnaire; ECR = Experiences in Close Relationships Questionnaire. For the RQ-specific, participants ranked the four attachment paragraphs from most to least descriptive. These four ordinal attachment scales were recoded (e.g., a ranking of 4 identified the most descriptive paragraph, and a ranking of 1 identified the least descriptive paragraph) to make the interpretation of the correlation coefficients consistent with those obtained using the other attachment measures.

† $p < .10$. * $p < .05$. ** $p < .01$.

DISCUSSION

The results of Study 1 showed that adult romantic attachment was related to automatic positive reactions to one's partner as assessed by the IAT. Specifically, a secure adult attachment style, assessed at both specific and general levels, was reliably related to automatic positive reactions to one's partner. In contrast, the insecure adult attachment styles (i.e., fearful, dismissing, and preoccupied) were not related to stronger positive reactions to one's partner. Most important, the results did not depend on the specific measure used to assess adult romantic attachment. When adult attachment was assessed by the ECR, which differs considerably in format from the RQ, individuals low in avoidance showed stronger automatic positive reactions to one's partner. These results highlight the importance of individual differences in the automatic reactions elicited by thoughts of one's current romantic partner in adult romantic attachment.

Although automatic evaluative reactions to self are hypothesized to play a central role in internal working

models (Bartholomew & Horowitz, 1991; Bowlby, 1969), the present study did not show significant relations between automatic reactions to self and measures of the adult attachment. These null findings, however, may be a result of the small sample size ($N = 58$). To detect a correlation of .30 with $N = 58$, statistical power is .64. For this reason, the relation between adult romantic attachment and automatic reactions to self-relevant stimuli was reexamined using greater statistical power in Studies 2 and 3.

Might the relation between automatic reactions to thoughts of one's partner and adult romantic attachment be the result of a methodological artifact? For example, could there be individual differences in how people responded to the *not target person* contrast category? This possibility seems unlikely. Despite the fact that Self-IAT and Partner-IAT were identical, except for the words referring to the target person, only Partner-IAT was related to adult romantic attachment as well as continued involvement in one's current relationship. This pattern of correlations suggests that the results are specific to the Partner-IAT and related to individual differences in reactions to the partner descriptive words. Another alternative explanation for the results might be that performance in the IATs was affected by the fact that all participants completed the Self- and Partner-IAT in the first and second sessions, respectively. Although there is no *a priori* reason to believe that this was the case, this possibility is addressed in Study 2, which counterbalances the order in which the Self-IAT and Partner-IAT are performed.

STUDY 2

The results of Study 1 showed that adult romantic attachment was related to the extent to which the mental representation of one's romantic partner automatically elicited positive reactions but was not related to automatic reactions elicited by mental representation of self. Study 2 assessed the replicability of these findings.

Moreover, Study 2 addressed a new question. It examined the relation between adult romantic attachment and the degree to which the mental representation of one's mother is automatically associated with supportiveness as assessed by the IAT. According to Bowlby's (1969) conceptualization of attachment theory, attachment representations formed in early life as a result of repeated interactions with one's primary caregiver, particularly one's mother (Main, Kaplan, & Cassidy, 1985), influence the attachment representations that develop in later life within adult close relationships. Moreover, Bowlby stressed the importance of automatic evaluative reactions in such representations. The more recent conceptualization of adult attachment theory also proposes that patterns of adult romantic attachment develop in part from infant-caregiver interactions (Bartholomew &

Horowitz, 1991; Hazan & Shaver, 1987) and emphasizes the importance of automatic processes (Shaver & Mikulincer, 2002). Although past research has found moderate concurrent associations between representations of early life relationships and adult romantic relationships using a variety of methodologies (for a review, see Crowell, Fraley, & Shaver, 1999; Fraley & Shaver, 2000), no study has examined the degree to which individual differences in adult romantic attachment are related to automatic associations with one's mother as supportively assessed by measures of automatic cognition such as the IAT.

Method

PARTICIPANTS

Using the psychology department's mass testing procedure, participants were selected to take part in the experimental sessions based on the preselection criteria described in Study 1. Three experimental sessions were conducted. Of the individuals invited to participate, 139 completed the first session, 126 returned for the second session, and 85 participants (63 women and 22 men) completed all three sessions. To ensure comparability across analyses, the results presented here are based only on the 85 participants (23 dismissing, 16 fearful, 19 preoccupied, and 27 secure) who completed all measures. The median age of the sample was 19 years ($SD = 3.53$ years), and the median duration of participants' romantic relationship was 38 weeks ($M = 62.1$ weeks, $SD = 73.3$ weeks).

PROCEDURES AND MEASURES

Participants completed procedures similar to those administered in Study 1 (Partner-IAT, Self-IAT, and adult attachment measures; α s for avoidance and anxiety scales of the ECR-general were .92 and .91, respectively). As in Study 1, the RQ-general administered at prescreening was related to the RQ-general administered at the experimental session (r s = .46 to .69). Thus, mean scores (i.e., one for each of the four attachment scales) were computed (α s were as follows: dismissing = .76, fearful = .74, preoccupied = .81, secure = .63). In addition to the procedures described in Study 1, participants in Study 2 took part in a third session in which they completed the Mother-IAT and additional self-report measures.

Mother-IAT. The procedures used to assess the extent to which Mother is automatically associated with supportiveness were similar to those used for the Partner-IAT and Self-IAT (see Study 1: Procedures and Measures and Table 1). The key difference in design between the Mother-IAT and Partner- and Self-IATs was the nature of the attribute discrimination task. For the Mother-IAT, the attribute discrimination task involved classifying stimulus words that were supportive (e.g., caring, giving,

loving) and rejecting (e.g., cold, distant, critical). For the Partner-IAT and Self-IAT, to replicate the results of Study 1, the attribute discrimination task remained classifying stimulus words that were pleasant and unpleasant. The supportive and rejecting words used as stimuli were validated in an independent sample (Zayas & Shoda, 2004). *Supportive* and *Rejecting* were the labels that appeared on the computer screen as a reminder of the attribute associated with each response key. In a separate study, the test-retest reliability of Mother-IAT using supportive versus rejecting as the attribute discrimination task was $r(26) = .68, p < .001$ (Zayas & Shoda, 2004).

Additional self-report measures. RQ-specific (Bartholomew & Horowitz, 1991) was administered at the experimental session in which the Self-IAT was performed. Participants rated, as well as ranked, how well each descriptor characterized their thoughts, feelings, and behaviors within their current romantic relationship on a scale from 1 (*not at all*) to 8 (*extremely well*). Participants also answered (at the prescreening sessions) relationship-relevant questions (Kasian & Painter, 1992; Spanier, 1976) that assessed length of relationship, level of emotional commitment, expectations that the relationship would last 1 year and that it would last 5 years, and feelings about the future of the relationship. Finally, participants completed the social desirability responding (Paulhus, 1991) questionnaire, which consists of a 20-item scale designed to assess self-deception (i.e., the tendency to give favorably biased but honestly held self-descriptions) and another 20-item scale designed to assess impression management (i.e., the tendency to give favorably self-descriptions to others).

PROCEDURAL VARIABLES

From the samples of participants representing each attachment style (based on RQ-general administered for prescreening), an approximately equal number were randomly selected and assigned to one of four experimental conditions that controlled for the following two procedural variables: order in which the combined discrimination tasks were performed within each IAT and order in which the Partner- and Self-IATs were performed (all participants performed the Mother-IAT in the last session). There was no significant main effect for order of combined discrimination task on any of the IATs, and neither did it interact with any of the relevant variables. Order of experimental session also had no significant main effect on Partner-IAT or Mother-IAT and did not interact with other relevant variables. Order of experimental session did have a significant effect on Self-IAT, $d = .93, t(83) = 4.30, p < .001$; Self-IAT effects were larger when performed in the first session ($M = 408.94$ ms) than in the second session ($M = 332.20$ ms). However, because relations between adult attachment and

IATs did not depend (i.e., interact with) order of experimental session, the results are reported for the combined sample.

Results

DESCRIPTIVE STATISTICS

Replicating the findings of Study 1, Partner-IAT effects and Self-IAT effects were large ($d = 1.91$ and $d = 2.68$, respectively) and in a positive direction (middle section of Table 2). In the Mother-IAT, participants found it more difficult to perform the combined discrimination task when Mother and Rejecting were mapped onto the same response key ($M = 953.71$ ms) than when Mother and Supportive were mapped onto the same response key ($M = 679.28$ ms). The difference between these two combined discrimination tasks (Mother-IAT effect) was $+274.43$ ms, $d = 1.77, t(84) = 16.28, p < 10^{-26}$.

In the Partner-IAT, men had significantly greater IAT effects than women, $d = .58, t(83) = 2.32, p < .05$, but there was no significant sex difference in either the Self-IAT or Mother-IAT. Moreover, there were no significant interactions involving sex on any of the IATs. The relations among the IATs were as follows: Partner-IAT was strongly correlated with Mother-IAT ($r = .45, p < .0001$), Mother-IAT was moderately correlated with Self-IAT ($r = .26, p < .05$), and Self-IAT was moderately correlated with Partner-IAT ($r = .23, p < .05$).

RELATIONSHIP-RELEVANT VARIABLES AND AUTOMATIC REACTIONS

In contrast to Study 1, only 4 participants had broken up with their romantic partner by the third experimental session. Thus, it was not possible to reliably evaluate whether IAT effects were related to whether participants remained involved with their romantic partner. Partner-IAT however was correlated with length of relationship ($r = .34, p < .001$), level of emotional commitment ($r = .25, p < .05$), and expectations about the future of the relationship ($r = .36, p < .001$). Self-IAT was also correlated with length of the relationship ($r = .22, p < .05$) and marginally correlated with level of emotional commitment ($r = .20, p < .10$) but not correlated with expectations about the future of the relationship ($r = .13, ns$). Mother-IAT was not significantly related to relationship length ($r = .18, ns$), emotional commitment ($r = .02, ns$), or expectations about the future of the relationship ($r = .14, ns$).

ADULT ROMANTIC ATTACHMENT AND AUTOMATIC REACTIONS

Relations among measures of adult romantic attachment. The correlations among the measures of adult romantic attachment (available at <http://shodalab.psych>).

washington.edu/Zayas&Shoda2005/attachment_study2.pdf) were highly similar to those observed in Study 1.

Partner-IAT and Self-IAT. Table 4 reports the correlations between each of the four adult attachment measures and Partner-IAT, Self-IAT, and Mother-IAT. Replicating the findings of Study 1, adult romantic attachment was related to automatic positive reactions to thoughts of one's romantic partner but did not show a clear relation to automatic reactions to self-relevant thoughts. Because none of the correlations involving Self-IAT were statistically significant, results involving Self-IAT are discussed in more detail in the Results section of Study 3 and in the General Discussion.

As was the case in Study 1, when adult romantic attachment was assessed with the RQ-general and RQ-%, a secure attachment style was positively correlated with Partner-IAT ($r = .27, p < .05$ and $r = .23, p < .05$, respectively). A secure attachment style as assessed by the RQ-specific was also positively correlated (although not statistically significant) with Partner-IAT ($r = .13, ns$). In contrast, correlations involving the three insecure attachment styles (i.e., dismissing, fearful, and preoccupied) and Partner-IAT were often negatively, and never significantly positively, correlated (r s ranged from $-.28, p < .05$ to $.15, ns$).

The relation between adult romantic attachment as assessed by the ECR-general and Partner-IAT was also examined. As was the case in Study 1, the avoidance dimension of the ECR-general was negatively correlated ($r = -.31, p < .01$) with Partner-IAT. The anxiety dimension was not. Multiple regression analysis revealed no significant interaction between avoidance and anxiety.

Mother-IAT. As shown in Table 4, when adult attachment was assessed by the RQ-general, a secure attachment style was positively correlated ($r = .23, p < .05$) with Mother-IAT. Correlations involving the dismissing, fearful, and preoccupied adult attachment styles were not. In addition, the avoidance dimension of the ECR-general was significantly and negatively related to Mother-IAT ($r = -.21, p < .05$). When adult attachment was assessed using the RQ-% or RQ-specific, none of the correlations between adult attachment styles and Mother-IAT were significant.

RELATIONS AMONG SOCIAL DESIRABILITY RESPONDING, AUTOMATIC REACTIONS, AND ADULT ROMANTIC ATTACHMENT

The IAT is assumed to be relatively immune to tendencies for self-deception and impression management (Greenwald et al., 1998). Consistent with this expectation, the three IATs were only weakly and nonsignificantly correlated with the self-deception and impression management scales (r s = $-.08$ to $.10$). In contrast, adult

TABLE 4: Correlations Between Implicit Association Test (IAT) Effects (Partner, Self, and Mother) and Measures of Adult Romantic Attachment in Study 2 ($N = 85$)

	Target Person		
	Partner-IAT	Self-IAT	Mother-IAT
Adult attachment measure			
RQ-general attachment style			
Dismissing	-.20†	.08	-.07
Fearful	-.18	-.17	-.09
Preoccupied	.10	-.02	.07
Secure	.27*	-.02	.23*
RQ-percentage of relationships			
Dismissing	-.13	.15	-.11
Fearful	-.01	-.12	-.09
Preoccupied	.04	-.07	.05
Secure	.23*	.14	.11
RQ-attachment style specific to partner			
Dismissing	-.16	.11	-.05
Fearful	-.28*	-.11	-.12
Preoccupied	.15	.01	-.03
Secure	.13	-.10	.08
ECR-general attachment style			
Avoidance	-.31***	-.03	-.21*
Anxiety	.00	-.10	.03

NOTE: RQ = Relationship Questionnaire; ECR = Experiences in Close Relationships Questionnaire.

† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .005$.

attachment measures were moderately correlated with the self-deception and impression management scales (r s = $-.36$ to $.35$). Results controlling for self-deception and impression management were highly consistent with those reported here.

Discussion

The results of Study 2 replicated the main findings of Study 1. A secure adult attachment style assessed at a general level was associated with stronger automatic positive reactions to one's romantic partner.

A main goal of Study 2 was to examine the relation between adult romantic attachment and the extent to which the mental representation of one's mother is automatically associated with supportiveness. Adult romantic attachment assessed at a general level was related to automatic associations with one's mother as supportive. Moreover, the results did not depend on the specific measure (i.e., RQ vs. ECR) used to assess adult romantic attachment. Specifically, when adult attachment was assessed by the RQ-general, a secure attachment style was associated with stronger automatic supportive associations with one's mother. Similarly, when adult attachment was assessed by the ECR-general, individuals low in avoidance showed stronger automatic supportive associations with one's mother.

Why might adult attachment assessed at a general level, but not at a specific level, be related to automatic associations with one's mother as was observed in Study 2? These findings may be understood within Collins and Read's (1994) notion of an attachment network hierarchy. Within this framework, thoughts and affects of one's mother are the basis from which generalized representations of others and self form and are expected to be central in a person's mental network. As a result, such cognitions and affects are highly accessible and readily applied to a majority of a person's relationships. With the increased applicability however comes a loss of specificity. That is, although such thoughts and feelings may apply to many relationships, they are less likely to accurately reflect or "fit" specific relationships. That the present study found the relation between adult romantic attachment and automatic associations with one's mother only when adult attachment was assessed at a general level (i.e., across all romantic relationships) and not when adult attachment was assessed in relation to one's specific romantic partner or based on the percentage of different attachment experiences is highly consistent with this framework.

STUDY 3

The results of Study 2 showed that adult romantic attachment was related to individual differences in the degree to which the mental representation of one's mother was automatically associated with supportiveness. In Study 3, the replicability of this finding was examined by administering the Mother-IAT to a group of men.

A second goal of Study 3 was to obtain stable estimates of the magnitude of the relations between adult attachment and automatic reactions elicited by the mental representation of one's partner, mother, and self. Study 3 reports the results of meta-analyses performed on the data from Studies 1 through 3. Combining the three samples through meta-analyses also made it possible to examine the relations between adult romantic attachment and automatic reactions for attachment-schematic individuals. Extending the idea of cognitive schemas (Markus, 1977) to attachment and experiences within relationships (Baldwin et al., 1993), it was reasoned that adult attachment should be a more meaningful indicator of one's experiences within close relationships if a person indicates the same attachment style at different levels of specificity (Bem & Allen, 1974). Participants were classified as attachment-schematic if they showed agreement between their specific and general adult attachment styles, and the meta-analytic procedures were performed a second time using data from only attachment-schematic individuals.

Method

PARTICIPANTS

Participants were 112 male students attending the University of Washington who were participating in a separate study in exchange for extra credit toward their introductory psychology class. Five participants had average response latencies of over 2,000 ms (greater than the average response latencies expected on IAT tasks; Greenwald et al., 1998) and/or had incorrectly classified more than 25% of the trials, so they were excluded from analyses. Three other men did not complete the self-report measures and were also excluded from analyses. Of the remaining 104 participants, 59 were and 45 were not involved in a romantic relationship at the time of the first experimental session. There was no main effect for involvement in a current relationship or significant interactions with the relevant variables. The median age of participants was 19 years ($SD = 1.23$).

PROCEDURES AND MEASURES

Because participants were taking part in a separate study that was designed to develop men's descriptions of themselves in the form of personal ads (Zayas, 2003), only the questionnaires and procedures relevant to the present study are reported here. Participants took part in the university's mass testing procedure in which they completed the categorical version of the RQ-general (17 dismissing, 15 fearful, 22 preoccupied, 47 secure, and 3 unspecified). Participants returned for two experimental sessions in which they performed the Mother-IAT and another RQ-general (categorical and continuous versions; see Study 1: Procedures and Measures). The experimental sessions were held in rooms equipped with 24 to 26 IBM-compatible computers.

PROCEDURAL VARIABLES

For each attachment style (based on RQ-general at pre-screening), an approximately equal number of participants were randomly assigned to one of the two conditions that controlled for the order in which the combined discrimination tasks were performed within the Mother-IAT. The Mother-IAT effect was larger, $t(102) = 2.59$, $p < .05$, when the mother+supportive task was performed first ($M = 479.08$ ms) than when the mother+rejecting task was performed first ($M = 363.60$ ms). However, because the relations between Mother-IAT and adult romantic attachment, which was the main focus of this study, were highly similar in both conditions, the results for the entire sample combined are reported here.

META-ANALYTIC TECHNIQUES

To obtain more stable estimates of the magnitude of the relations between adult romantic attachment and Partner-IAT (obtained in Studies 1 and 2) and Mother-

TABLE 5: Correlations Between Mother-IAT Effects and Measures of Adult Romantic Attachment in Study 3 ($N = 104$)

	<i>Mother-IAT</i>
Adult attachment measure	
RQ-general attachment style	
Dismissing	-.10
Fearful	-.08
Preoccupied	-.10
Secure	.24*

NOTE: IAT = Implicit Association Test; RQ = Relationship Questionnaire.

* $p < .05$.

IAT (obtained in Studies 2 and 3), meta-analyses were used to combine the data from the individual studies (Field, 2001; Hedges & Olkin, 1985). Correlations (a measure of effect size) within each study were converted to z scores using Fisher's r to z transformation. Transformed correlations were then weighted as a function of the accuracy of the effect size (i.e., based on the sample size) and averaged across relevant studies. The significance value for this average effect size was computed by dividing it by the standard error, based on Hedges and Vevea's (1998) formula.

In addition, the extent to which correlations involving the secure attachment style were greater than correlations involving each of the insecure attachment styles were examined specifically. The t test value obtained from McNemar's test of two correlations and the degrees of freedom ($N - 3$) were used to compute the effect size within each study for the *difference between two correlations*. Using the meta-analytic procedures described earlier, the average effect sizes across studies, representing the average difference between correlations, were obtained.⁴ Differences between two correlations at conventional $p < .05$ levels are indicated by different subscripts.

Results and Discussion

MOTHER-IAT

Replicating the results of Study 2, the Mother-IAT effect was large and in a positive direction, $M = 419.03$ ms, $d = 2.52$, $t(103) = 25.74$, $p < 10^{-17}$ (bottom section of Table 2). More central to Study 3's aims, the relation between Mother-IAT and adult romantic attachment using the all-male sample replicated the results of Study 2. A secure adult attachment style assessed at a general level was more positively correlated with stronger automatic supportive associations with one's mother than were any of the three insecure adult attachment styles (i.e., fearful, dismissing, and preoccupied; Table 5).

META-ANALYSES

The results of the meta-analyses are reported in Table 6. As will be discussed in the General Discussion section,

TABLE 6: Average Correlation Coefficients Between Implicit Association Test (IAT) Effects and Measures of Adult Romantic Attachment From Meta-Analyses of Studies 1, 2, and 3

	<i>Target Person</i>		
	<i>Partner-IAT</i> ($N = 143$)	<i>Self-IAT</i> ($N = 143$)	<i>Mother-IAT</i> ($N = 189$)
Adult attachment measure			
RQ-general attachment style			
Dismissing	-.18* _a	.13 _a	-.09 _a
Fearful	-.15† _a	-.11 _a	-.09 _a
Preoccupied	.01 _a	-.11 _a	-.03 _a
Secure	.29**** _b	.07 _a	.24**** _b
RQ-percentage of relationships			
Dismissing	-.12 _a	.08 _a	-.11 _a
Fearful	-.01 _a	-.02 _a	-.09 _a
Preoccupied	-.09 _a	-.10 _a	.05 _a
Secure	.28**** _b	.05 _a	.11 _a
RQ-attachment style specific to partner			
Dismissing	-.18* _a	.01 _a	-.05 _a
Fearful	-.22* _a	-.08 _a	-.12 _a
Preoccupied	.12† _b	.01 _a	-.03 _a
Secure	.20* _b	.02 _a	.08 _a
ECR-general attachment style			
Avoidance	-.33**** _a	-.04 _a	-.21* _a
Anxiety	-.08 _b	-.13 _a	.03 _a

NOTE: RQ = Relationship Questionnaire; ECR = Experiences in Close Relationships Questionnaire. Within each column and for each adult attachment measure, correlations with different subscripts differ significantly at $p < .05$. Columns 1 and 2 are based on data from Studies 1 and 2. Column 3 is based on data from Studies 2 and 3. Study 3 assessed adult attachment using only the RQ-general. Thus, the correlations involving Mother-IAT and RQ-general are based on the adult attachment measures that were administered in both Studies 2 and 3 ($N = 189$), and the correlations involving Mother-IAT and RQ-%, RQ-specific, and ECR-general are based on Study 2 data ($N = 85$).

† $p < .10$. * $p < .05$. ** $p < .01$. **** $p < .001$.

the findings were consistent with the results of the individual studies and our interpretation of the results so far.

The meta-analysis was repeated using only the data from individuals who showed agreement between their specific and general attachment styles in Studies 1 and 2 (because Study 3 assessed adult romantic attachment only at a general level, data from Study 3 were not included in this analyses). Using the categorical versions of the RQ-specific and RQ-general administered, respectively, at the experimental and prescreening sessions, 63 participants (7 dismissing, 9 fearful, 11 preoccupied, and 36 secure) who indicated the same attachment style on both measures were classified as attachment-schematic.

As shown in Table 7, the relations between adult romantic attachment and Partner-IAT were stronger for the attachment-schematic individuals than those observed for the entire sample. Self-IAT, on the other hand, continued to be unrelated to measures of adult romantic attachment. Finally, the correlation coefficients between Mother-IAT and measures of adult

TABLE 7: Average Correlation Coefficients Between Implicit Association Tests (IATs) and Measures of Adult Romantic Attachment From Meta-Analyses of Studies 1, 2, and 3 for Attachment-Schematic Participants Only

	<i>Target Person</i>		
	<i>Partner-IAT</i> (<i>n</i> = 63)	<i>Self-IAT</i> (<i>n</i> = 63)	<i>Mother-IAT</i> (<i>n</i> = 38)
<i>Adult attachment measure</i>			
RQ-general attachment style			
Dismissing	-.48*** _a	-.20 _a	-.15 _a
Fearful	-.34** _a	-.12 _a	-.20 _a
Preoccupied	.02 _b	.03 _a	-.07 _a
Secure	.38*** _b	.15 _a	.26 _a
RQ-percentage of relationships			
Dismissing	-.29* _{a,b}	-.20 _a	-.30† _a
Fearful	-.17 _a	-.18 _a	-.29† _a
Preoccupied	-.04 _{b,c}	-.13 _a	-.05 _a
Secure	.34** _c	.14 _a	.07 _a
RQ-attachment style specific to partner			
Dismissing	-.40*** _a	-.12 _a	-.25 _a
Fearful	-.40*** _a	.05 _a	-.27† _a
Preoccupied	-.03 _b	-.13 _a	-.19 _a
Secure	.22† _b	-.08 _a	.15 _a
ECR-general attachment style			
Avoidance	-.49*** _a	-.20 _a	-.29† _a
Anxiety	-.06 _b	-.15 _a	-.04 _a

NOTE: RQ = Relationship Questionnaire; ECR = Experiences in Close Relationships Questionnaire. Attachment-specific individuals were those who indicated the same general and specific adult attachment style. Within each column and for each adult attachment measure, correlations with different subscripts differ significantly at $p < .05$. Columns 1 and 2 are based on data from Studies 1 and 2. Column 3 is based on data from Study 2 only (i.e., only Study 2 had Mother-IAT and specific and general measures of adult romantic attachment).

† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .005$. **** $p < .001$.

romantic attachment did not increase when the analysis was limited to attachment-schematic individuals. However, these coefficients were based on the data from one sample (i.e., only Study 2 had Mother-IAT and specific and general measures of adult romantic attachment).

GENERAL DISCUSSION

Bowlby (1969) was among the first to discuss the importance of internal working models and their effect on attachment-related behaviors. Since his initial theorizing, adult attachment theorists have built and elaborated on his theory and conducted extensive studies examining the role of automatic processes in attachment-related dynamics. The present studies contribute to this literature by showing that automatic reactions elicited by the mental representation of romantic partners and mothers, but not self, are related to attachment-related thoughts and feelings in adult romantic relationships.

The present studies showed that adult romantic attachment was related to the extent to which one's

romantic partner automatically elicited positive reactions. As shown in Table 6, across two studies, a secure attachment style was positively correlated with Partner-IAT. In contrast, the insecure attachment styles (i.e., dismissing, fearful, and preoccupied) were, for the most part, either not correlated or negatively correlated with Partner-IAT (although not all correlations were statistically significant at $p < .05$). Furthermore, of the nine tests comparing the magnitude of the correlations involving the secure style to those involving one of the insecure styles, eight were statistically significant ($p < .05$). The three insecure attachment styles (dismissing, fearful, and preoccupied) did not differ significantly from one another.

In addition to providing empirical evidence that adult romantic attachment was related to the extent that the mental representation of one's partner elicited automatic positive reactions, the present studies also showed that adult romantic attachment assessed at a general level was positively related to automatic supportive associations with one's mother (Table 6). Specifically, the correlation between a secure adult attachment style and automatic associations with one's mother was significantly more positive than those found for each of the three insecure adult attachment styles.

It is worth highlighting that the present results did not depend on the specific measure (RQ vs. ECR) used to assess adult romantic attachment. Specifically, when adult romantic attachment was assessed by the RQ-general (Bartholomew & Horowitz, 1991), a secure adult attachment style was more strongly related to automatic positive reactions to partner, as well as stronger supportive associations with mother, than each of the three insecure adult attachment styles (i.e., dismissing, fearful, and preoccupied; Table 6). When adult romantic attachment was assessed by the ECR-general measure (Brennan et al., 1998), individuals low in avoidance showed stronger automatic positive reactions to thoughts of their partner and stronger supportive associations with their mother. The fact that the findings do not depend on the particular measure used to assess adult romantic attachment adds confidence that the pattern of results obtained are not due to the format or specific wording of the attachment measure. In a similar vein, that Partner-IAT and Mother-IAT used different word lists also suggests that the results are not due to the specific words used in the tasks.

Could Partner-IAT and Mother-IAT be assessing the extent to which people in general (rather than partner and mother specifically) elicit positive reactions? If this were entirely the case, then Partner-IAT and Mother-IAT should have correlated with the same measures to similar degrees. Evidence suggesting that this may not be the case comes from Study 2. Specifically, automatic positive

reactions to one's current romantic partner were strongly correlated with characteristics of individuals' current romantic relationships (e.g., emotional commitment), but automatic associations with mother were not. In addition, Partner-IAT was associated with adult attachment assessed at a specific level as well as at a general level, whereas Mother-IAT was only associated with adult attachment assessed at a general level. Taken together, these results suggest that the IAT is assessing, at least in part, automatic reactions to specific persons rather than simply assessing automatic reactions to all people. However, a word of caution is urged in drawing conclusions about these results because differences in correlations might have been due to the different word lists used in the attribute discrimination task.

Because of the concurrent assessment of automatic associations with mother and measures of adult romantic attachment, the results do not address whether automatic associations with one's mother were formed in early life and shaped adult attachment styles or whether experiences in adult romantic relationships shaped aspects of representations formed earlier (e.g., Pierce & Lydon, 2001). Future research using longitudinal designs may help to distinguish between these two possibilities. Nonetheless, it suggests a concurrent link between mental representations of primary caregivers and mental representations of adult romantic partners. Moreover, because the IAT and measures of adult attachment are distinct with regard to format, the relation between adult romantic attachment and automatic supportive associations with one's mother is less likely to be the result of self-reporting tendencies or a shared method factor.

The present studies have at least two observations relevant for the conceptualization of adult romantic attachment. The first involves the cognitive-affective processes associated with a preoccupied adult attachment style as conceptualized by Bartholomew and Horowitz (1991). Within their four-category framework, adult attachment is conceptualized in terms of explicit evaluations of others and self, and specifically, a preoccupied attachment style is associated with a positive view of others and negative view of self. The present studies however showed that when adult attachment style was assessed at a general level or based on the percentage of relationships measure (RQ-%), the evaluative reactions associated with a preoccupied attachment style were more similar to a fearful and dismissing adult attachment style than to a secure style (Tables 6 and 7). These findings are consistent with the speculation in the field that a preoccupied attachment style may correspond with a less positive view of others when the latter is assessed at an automatic, implicit level. Consequently, because preoccupied individuals may not hold positive evaluations of others, some

researchers have raised concerns about the four-category model and have proposed instead conceptualizing adult romantic attachment in terms of avoidance and anxiety dimensions (e.g., Brennan et al., 1998; Fraley & Shaver, 2000).

A second observation involves the results of Studies 1 and 2 and the meta-analyses that show that automatic reactions of self as assessed by IAT were not related to adult romantic attachment (Table 6) even among attachment-schematic individuals, who were expected to show the strongest relations (Table 7). The power for detecting even a small effect should have been adequate considering the combined sample size of 143. This lack of a clear correspondence is intriguing because evaluations to self, both explicit and automatic, have been assumed to underlie differences in adult romantic attachment (Bartholomew & Horowitz, 1991). One possibility is that individual differences in automatic evaluative reactions of self, as assessed in relatively neutral and stress-free contexts, are not predictive of individual differences in adult romantic attachment. Automatic self-relevant reactions may be more affective and variable in nature compared to automatic reactions to other people, such as partners and parents. This is consistent with Fraley and Waller's (1998) conceptualization of adult romantic attachment. They wrote, "The dimension of Anxiety captures variation in physiological and emotional parameters rather than cognitive knowledge structures, whereas Avoidance captures variation in the organization of knowledge structures rather than emotional thresholds" (p. 107). If the anxiety dimension underlying adult romantic attachment corresponds to anxiety and vigilance concerning rejection and abandonment (Brennan et al., 1998), perhaps cues that activate thoughts of rejection or abandonment are needed to elicit anxiety and to observe the expected individual differences in automatic evaluative reactions of self. This possibility seems reasonable given that the Self-IAT is predictive of reactions to stressor events such as success and failure (Greenwald & Farnham, 2000).

NOTES

1. In the present research, automatic positive reactions elicited by significant persons refer to the positive thoughts and affects assumed to be automatically associated with, elicited by, the mental representation of the significant person. Although it is possible that such positive reactions to specific significant persons generalize and are applied to neutral stimuli (see Mikulincer, Hirschberger, Nachmias, & Gillath, 2001), the IAT does not examine this question. Rather, the IAT assesses the degree to which such positive thoughts and affects are automatically associated with a specific significant person.

2. All statistical tests and effect sizes are computed using log-transformed latencies. Response latencies are reported in untransformed milliseconds (i.e., mean log-transformed latencies for each block of trials transformed back to milliseconds).

3. In Studies 1 and 2, controlling for length of romantic relationship produced results that were highly consistent with those reported

in the text and tables. In addition, because the four attachment scales of the Relationship Questionnaire are correlated with one another, multiple regression analysis was used to compute partial correlations between Implicit Association Tests and each of the attachment scales controlling for the effect of the three other attachment scales. Results from these analyses were highly similar to those reported here (available at <http://shodalab.psych.washington/Zayas&Shoda2004/partialcorrelations.pdf>)

4. To the extent that characteristics of the present samples differ from those of the population, the magnitude of the effect size estimates may not be representative of the population values.

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