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The Emotional Integration of Childhood Experience: Physiological, Facial Expressive, and Self-Reported Emotional Response During the Adult Attachment Interview

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Attachment researchers claim that individual differences in how adults talk about their early memories reflect qualitatively distinct organizations of emotion regarding childhood experiences with caregivers. Testing this assumption, the present study examined the relationship between attachment dimensions and physiological, facial expressive, as well as self-reported emotional responses during the Adult Attachment Interview (AAI). Consistent with theoretical predictions, more prototypically secure adults behaviorally expressed and reported experiencing emotion consistent with the valence of the childhood events they described. Insecure adults also showed distinctive and theoretically anticipated forms of emotional response: Dismissing participants evidenced increased electrodermal activity during the interview, a sign of emotional suppression, whereas preoccupied adults showed reliable discrepancies between the valence of their inferred childhood experiences and their facial expressive as well as reported emotion during the AAI. Results substantiate a case that the AAI reflects individual differences in emotion regulation that conceptually parallel observations of attachment relationships in infancy.

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According to attachment theory, confidence in primary caregivers serves two vital roles in human development: (a) the provision of a secure base from which to explore one's environment and (b) a safe haven in times of uncertainty (Waters & Cummings, 2000). In infancy, a secure attachment can be readily observed both in naturalistic settings, such as at home, as well as in moderately stressful laboratory paradigms, such as Ainsworth's Strange Situation, in a child's ability to flexibly use his or her primary caregiver as a base of operations for engaging the immediate environment and as a source of comfort when distressed (Ainsworth, Blehar, Waters, & Wall, 1978; Waters & Deane, 1985).

Interestingly, studies of infants suggest that heterogeneity exists in the inferred motivational profiles of young children who appear *unable* to use their primary caregivers as a secure base and/or safe haven. On the one hand, 1-year-old infants with anxious/*avoidant* attachments ignore their caregivers when reunited after separation, despite the fact that physiological evidence suggests that such separations are experienced as stressful (Sroufe & Waters, 1977). In contrast, infants with anxious/*resistant* attachments demonstrate marked poverty of exploration and continued distress upon being reunited with caregivers after a brief separation. Such observations of infants cumulatively suggest that individual differences in attachment may reflect qualitatively distinct patterns of emotion regulation. Whereas secure infants are able to flexibly explore their environments and use their caregivers as safe havens when distressed (e.g., their relationships allow them to regulate positive and negative affect), insecurity reflects either suppressed (avoidant) or exaggerated (resistant)

responses to separation and reunion, with implications for secure base behavior.

By adulthood, attachment experiences are theorized to become internalized in the form of representations that guide interpersonal behavior (Main, Kaplan, & Cassidy, 1985; Roisman, Madsen, Hennighausen, Sroufe, & Collins, 2001). Perhaps the most widely used and well-validated instrument in developmental research for identifying such adult attachment representations is the Adult Attachment Interview (AAI). In the AAI, adults are asked emotionally charged questions regarding their childhood experiences and must provide memories relevant to loss, separation, rejection, and trauma. Exclusively on the basis of their verbal responses, individuals can be classified by trained coders into one of three primary categories that reflect the quality of the discourse they produce and that conceptually parallel the infant attachment classifications already described: (a) *secure/autonomous*, for individuals who are able to flexibly and freely evaluate their childhood experiences, whether positive or negative in nature, (b) *dismissing*, for individuals who defensively distance themselves from the emotional content of the interview, either by normalizing harsh early memories or by idealizing their caregivers, and (c) *preoccupied*, for individuals caught up, often angrily, in their prior relationship experiences[1] (see Hesse, 1999, for more details).

Although accounts differ as to the exact nature and origin of these individual differences (see, e.g., Fox, 1995; van IJzendoorn, 1995b), evidence suggests that they reflect the cognitive and emotional residue of prior experience; that is, they appear to result from adults' actual experiences with malevolence and support in childhood and infancy (Allen & Hauser, 1996; Beckwith, Cohen, & Hamilton, 1999; Roisman, Padrón, Sroufe, & Egeland, 2002; Waters, Hamilton, & Weinfield, 2000). In addition, consistent with its designers' intent, AAI classifications have been shown to be robustly associated with infant security in the next generation, even when infants and caregivers are biologically unrelated (Dozier, Stovall, Albus, & Bates, 2001; van IJzendoorn, 1995a), which suggests that working models of childhood experiences are carried forward into the salient relationships of adulthood (Roisman et al., 2001).

Such studies testify to the AAI's retrodictive and predictive validity. Nonetheless, after nearly two decades of research, it remains unclear whether individuals' narratives accurately reflect their emotional states during the interview. Most important, surprisingly little empirical evidence bears directly on the questions of whether adults who are judged as dismissing are actually suppressing their emotional responses and whether preoccupied individuals are in fact overwhelmed (e.g., emotionally dysregulated) when recounting their early experiences during the interview, key assumptions of the literature on adult attachment (see Hesse, 1999).

In essence, attachment researchers have claimed that individual differences in how adults talk about their early memories reflect qualitatively distinct ways in which past experiences with caregivers have been organized intrapsychically (see, e.g., Kobak, Cole, Ferenz-Gillies, Fleming, & Gamble, 1993). More specifically, secure adults are presumed to be emotionally integrated (e.g., coherent), experiencing and perhaps expressing emotion consistent with the valence of their recalled childhood experiences. In contrast, insecurity is thought to reflect a disjunction or discrepancy between the way the past is portrayed and the emotion that is expressed regarding those experiences. Although dismissing adults (like avoidant infants) are thought to suppress negative emotions so as to minimize attention to unpleasant early experiences with caregivers, preoccupied individuals (paralleling resistant infants) have been described as becoming so emotionally entangled in the AAI that they become unable to provide an emotionally coherent account of the events of their childhood.

In order to directly test such assumptions regarding emotion regulation during the AAI, we administered the interview to 60 young adults, comprehensively assessing their physiological, behaviorally expressed, and self-reported emotional responses. Current emotion theory and research have converged on an understanding that the various systems of emotional response are most productively studied simultaneously, in part because aspects of emotion vary in a number of ways such as with respect to visibility and vulnerability to conscious control (Tsai & Levenson, 1997). Of paramount interest in the current study, individual differences in how adults represent childhood experiences might be expected to be differentially linked to systems of emotional response. For example, although there is evidence that dismissing adults manifest subtle forms of emotional reactivity during the AAI, as revealed in relatively covert physiological responses (Dozier & Kobak, 1992), attachment theory suggests that secure and preoccupied stances may be reflected more overtly in how consistent adults' reported and expressed emotional responses are with the content of their life narratives. In this article, we therefore extend prior relevant data by reporting the results of analyses of young adults' physiological responses to, facial expressive behavior during, as well as self-reported emotional reflections on the AAI within a gender-balanced sample that included both Chinese and European American college students.

Physiological Response During the AAI

On the basis of theories that increases in electrodermal activity signal the activation of the Behavioral Inhibition System, which is involved in passive responding to punishment (and therefore considered the "anxiety system"; Fowles, 1988), Dozier and Kobak (1992) predicted that deactivation (e.g., a dismissing orientation) would be associated with increases in electrodermal activity during the AAI. As predicted, they found that deactivating discourse was associated with increases in skin conductance from baseline levels, especially during AAI probes referencing separation, rejection, and other potentially threatening childhood experiences. Dozier and Kobak's (1992) findings were particularly compelling because the increases in electrodermal activity they observed were *discriminantly* associated with deactivation; that is, electrodermal activity was not related to other patterns of insecurity (e.g., preoccupation).

Moreover, Dozier and Kobak (1992) suggested that deactivation should be uniquely correlated with electrodermal activity. That is, on the basis of Fowles's (1988) argument that increases in heart rate signal the activation of the Behavioral Activation System, which is involved in reward seeking and active avoidance, Dozier

[1] Instead of using a categorical approach to the assessment of adult attachment in this study, we adopted Kobak's (1993) Q-sort system, which results in dimensional scores.

and Kobak (1992) predicted that deactivation would *not* be associated with heart rate. Unfortunately, no cardiovascular data were presented in Dozier and Kobak's (1992) seminal study to evaluate this hypothesis.[2] Thus, to examine the physiological specificity of the association between deactivation and electrodermal activity proposed by Dozier and Kobak (1992), we obtained continuous measures of participants' cardiovascular responses (cardiac interbeat interval, finger pulse transmission time to the finger, and finger pulse transmission time to the ear) as well as electrodermal activity during the AAI.

On a functional level, measuring electrodermal and cardiovascular activity also allowed us to assess activation of the sympathetic and parasympathetic nervous systems. Unlike cardiovascular response, electrodermal activity is a "direct and undiluted" measure of sympathetic activity (Dawson, Schell, & Filion, 2000, p. 210). As such, increases in electrodermal activity signal increases in individuals' preparation for action in response to a perceived threat. Heart rate, however, is influenced by both the sympathetic and parasympathetic systems, and therefore increases in heart rate (and other related measures) may signal increased preparation for action and/or decreased restoration and maintenance of bodily resources (Matsumoto, Walker, Walker, & Hughes, 1990). Thus, an association between deactivation and electrodermal activity in the absence of an association between deactivation and heart rate (and other cardiovascular responses) would suggest that this attachment dimension is specifically associated with the physiological preparation for action in response to anxiety or stress rather than other physiological changes.

Expressed and Self-Reported Emotion During the AAI

A frequently raised question is why adult attachment assessment using the AAI is based solely on individuals' verbal responses rather than observations of adults' expressive behavior or measures of their self-reported emotional experiences during the interview. The definitive response to this query was delivered by Hesse (1999), who argued that such cues may mislead AAI coders, a problem especially when identifying dismissing participants who are assumed to be (consciously or unconsciously) concealing the true nature of their early experiences.

As reasonable as Hesse's (1999) assertion may be, no laboratory has as yet attempted to directly test it empirically. After all, it is at least theoretically possible that expressive cues and self-reported emotion during the AAI might add highly valuable information to the assessment of adults' attachment representations. To our knowledge, only one study has used facial expressive coding in relation to the AAI, showing that secure adults are more likely than their insecure counterparts to emit facial expressions congruent with the affective valence of emotion-eliciting tapes (Spangler & Zimmermann, 1999). No prior study, however, has examined facial behavior *during* the AAI, in large part because of the time-consuming nature of coding these hour-long interviews second by second. A simultaneous focus on self-reported emotional experience during the AAI is likewise unprecedented in the literature.

A key question, of course, is what attachment theory suggests about the link between representations of childhood experience and emotional response. In general, developmental research on attachment has focused primarily on how emotion and cognition are organized (and reorganized) within the individual, wherein successful adaptation is defined by the effective recruitment of emotion, cognition, and behavior toward successfully negotiating salient developmental issues (Sroufe, 1979; Waters & Sroufe, 1983). From such an organizational perspective, the key feature of a well-adapted affective system is flexibility—to be able to experience emotions appropriate to a given context yet not be overwhelmed by any particular emotional state.

As such, an organizational perspective on attachment does not predict that secure adults should be unequivocally positive about their early experiences nor by extension manifest exclusively positive emotional responses to the questions of the AAI (see, e.g., Pearson, Cohn, Cowan, & Cowan, 1994; Roisman et al., 2002). Indeed, such inflexible patterns of emotion regulation may be much more descriptive of insecure states of mind regarding prior experiences. For instance, such emotional signatures may be present among preoccupied adults, who, being caught up in earlier negative experiences with parents, might emit pervasively negative emotional responses to and appraisals of the material explored in the AAI.

Guided by the principles of the organizational perspective on human development articulated above, we hypothesized that more prototypically secure participants (compared with their insecure counterparts) would show the closest *match* between the character of the caregiving experiences they described in their AAI narratives (whether supportive or malevolent) and their facial expressions and evaluations of their emotional experience during the interview. That is, we expected that individuals who coherently talked about their prior experiences would express and self-report emotion consistent with the valence of the events they discussed in the interview, whether positive or negative in nature. Evidence of this kind would suggest the utility of an organizational perspective on adult attachment-related individual differences as well as provide prima facie evidence that adult attachment stances are associated with distinctive and theoretically anticipated emotional responses to the material explored in the AAI. In addition, such data would speak to the methodological invariance of attachment assessments in infancy and adulthood. More specifically, although infant measures rely on direct observation of attachment relationships and adult measures such as the AAI instead use in-depth semistructured interviewing, individual differences derived from each may show parallel emotion regulation profiles.

Generalizability of Findings

In the current study, we administered the AAI to a gender-balanced sample of European American and Chinese American college students to determine whether the emotional correlates of

[2] Of note is that recent research (e.g., Gross & Levenson, 1997) suggests that some forms of emotional suppression may be revealed in parameters of cardiovascular as well as electrodermal response. Nonetheless, if Gray's (1975) psychophysiological heuristic is indeed accurate with respect to emotional suppression as identified in the AAI, one would expect a dismissing orientation to be *specifically* associated with electrodermal (but not cardiovascular) reactivity, as per Main's (1990) account of deactivating discourse as a means of "cutting off" or suppressing affect and cognition related to negative childhood experiences.

AAI dimensions could be observed in different ethnic groups.[3] On the basis of ethnographic accounts, Chinese and American cultures differ in a variety of ways. Whereas Chinese culture values interdependence, obedience to authority, filial piety, and emotional moderation and control, American culture values independence, equality, individuation, and emotional expression (Chan & Leong, 1994; Lee, 1988).

Given such documented mean-level cultural differences in emotion regulation, empirical demonstrations that Chinese Americans are influenced by both cultures (Tsai, Ying, & Lee, 2000), and recent concerns about whether attachment theory is an appropriate framework for exploring close relationships in Eastern cultural contexts (Rothbaum, Weisz, Pott, Miyake, & Morelli, 2000), we considered Chinese Americans to be sufficiently different from European Americans to serve as an appropriate ethnic group with which to test the generalizability of the findings of Dozier and Kobak (1992) as well as the additional analyses presented in this study. Because there is immense variability among Chinese Americans in how influenced they are by these cultural systems, we examined whether findings held across various levels of orientation to Chinese and American culture. Of note is the fact that we sampled both Chinese as well as Chinese Americans to increase variability in terms of orientation to Chinese and American cultures.

Although substantial evidence suggests that the primary hypotheses of attachment theory find support in diverse cultural contexts (for a review, see van IJzendoorn & Sagi, 1999), the systematic collection of data from two well-defined ethnic groups provides an opportunity to challenge our own and prior findings by examining potential cultural moderators of theoretically anticipated effects. Likewise, because in some cases research on adult attachment has undersampled men (see, e.g., Dozier & Kobak, 1992), we included roughly equal numbers of male and female participants in this study. Given that the literature on the AAI has provided little strong evidence for sex or cultural differences in correlates of attachment individual differences, however, we did not anticipate any cultural or sex differences a priori.

Summary

The present study was designed to test important though untested assumptions regarding emotion regulation during the AAI. On the basis of prior research and theory, we expected that security would be associated with behaviorally expressed and self-reported emotional responses during the AAI that were consistent with the valence of secure participants' inferred experiences in childhood (e.g., *coherent* emotional responses). In contrast, we expected that insecure adults would show reliable discrepancies between the valence of their inferred childhood experiences and aspects of their emotional response during the interview. More specifically, in line with the notion that dismissing discourse represents a relatively covert form of emotional suppression, we hypothesized that dismissing adults would show electrodermal reactivity during the interview, indicative of a disjunction between these adults' idealized or normalized presentations of childhood experience and their physiological responses during the AAI (Dozier & Kobak, 1992). Although we could not make strong predictions about dismissing adults on the basis of the available literature, we expected that preoccupied individuals would show discrepancies between the emotional valence of their inferred childhood experiences and aspects of their expressed as well as reported emotion during the interview, discrepancies suggestive of a dysregulation of emotion related to the discussion of their early experiences with caregivers.

Method

Participants

Sixty young adults (30 European American and 30 Chinese American[4]; 28 men and 32 women) between 18 and 30 years of age were recruited for this study from the undergraduate and graduate student population of a large midwestern university. All participants completed a comprehensive assessment battery including (a) a mental health and cultural identity screener by phone, (b) a packet of self-report questionnaires before arriving at the lab, and (c) the AAI while being videotaped and physiologically monitored. Because of the moderately stressful nature of the laboratory interview, prospective participants were screened for signs of depression, anxiety, and psychotic thinking. Sixty-five of the first 69 potential participants who met the cultural criteria outlined below indicated no more than one major symptom of depression, anxiety, or psychotic thinking and subsequently completed the entire protocol described above, receiving $20.00 as compensation for their participation. Five participants were excluded from the current sample because of technical problems associated with the acquisition of their cardiac interbeat interval data.

To be included in the study, Chinese Americans were required to meet the following criteria: (a) Their maternal and paternal grandparents had to have been born in Mainland China, Taiwan, or Hong Kong, (b) their parents had to be Chinese or first-generation Americans of Chinese ancestry, (c) they had to have had Chinese and/or Chinese American friends in adolescence and/or childhood, (d) they had to speak a Chinese dialect (e.g., Mandarin, Cantonese, Taiwanese) and/or have grown up in a bilingual household, and (e) they had to identify themselves as Chinese or Chinese American. Similarly, European Americans were required to (a) have maternal and paternal grandparents from Europe or of European American ancestry, (b) have parents who were born in the United States, and (c) have been born themselves in the United States. In addition, all participants were required to be fluent in English.

Few significant demographic differences were observed between the two ethnic subsamples (see Table 1). As would be expected, however, the Chinese American group reported having spent less time in the United States. In addition, they reported a lower mean childhood socioeconomic status.

Apparatus

Audiovisual. Remotely controlled, high-resolution color video cameras recorded the participants' and interviewers' facial behavior during the study. Cameras were hidden from participants' view behind a darkened glass on a bookshelf. Lavaliere microphones clipped on participants' clothing were used to record their verbal responses to the AAI, which were subsequently transcribed verbatim.

Physiological. A system consisting of a Dell Pentium computer, HPVEE software, and Coulbourn Lab Link V bioamplifiers (Coulbourn Instruments, Allentown, PA) was used to obtain continuous recordings of participants' physiological responses.

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[3] Dozier and Kobak's (1992) sample was predominantly Caucasian and female.

[4] One third of the Chinese Americans in our sample were international students. We refer to them as Chinese American because they are of Chinese descent and living in the United States.

Table 1
Sample Descriptives by Ethnicity

Variable	European American		Chinese American	
	M	*SD*	*M*	*SD*
Age (in years)†	20.83	2.53	22.23	3.58
% female	53.3		53.3	
Years of postsecondary education	3.20	2.82	4.33	3.49
% employed	70		63	
SES of home environment**[a]	3.37	0.67	2.83	0.91
Years in United States**	20.45	3.26	10.61	8.74
English language proficiency†[b]	4.73	0.45	4.41	0.78
Orientation to American culture†[c]	3.95	0.56	3.71	0.56
Orientation to Chinese culture[c]	—		3.45	0.44

Note. SES = socioeconomic status.
[a] 1 = lower class, 5 = upper class. [b] 1 = not at all proficient, 5 = extremely proficient. [c] 1 = not at all oriented, 5 = extremely oriented.
† $p < .10$. ** $p < .01$ (two-tailed).

Procedure

A female interviewer greeted each participant upon arrival at the laboratory. Female interviewers were selected to help participants feel at ease during sensor attachment and administration of the AAI. In addition, participants were matched with interviewers of the same ethnicity to increase their level of comfort in the research setting (Bradley, Snyder, & Katahan, 1972). Interviewers underwent extensive training (supervised by Glenn I. Roisman, a certified AAI coder) and followed a standardized, semistructured interview script.

Surface sensors measuring skin conductance levels and cardiovascular activity were adhered to participants' lower ribs, ears, and fingers by the interviewer. Physiological recordings were subsequently monitored second by second from an adjoining room during the semistructured attachment interviews as well as throughout a 3-min rest period prior to the interview, which provided measures of baseline responding. Participants were instructed to be silent, to look at an X that was presented on a screen in front of them, and to empty their minds of all thoughts, feelings, and memories before the rest period commenced. The AAI was administered after the rest period.

The AAI is a semistructured interview used to characterize individuals' current state of mind with respect to past parent–child experiences (George, Kaplan, & Main, 1985). This protocol, approximately 1 hr in duration, requires participants to describe their early relationships with their parents, revisit salient separation episodes, explore instances of perceived childhood rejection, recall encounters with loss, describe aspects of their current relationship with their parents, and discuss salient changes that may have occurred from childhood to maturity (see Hesse, 1999). In accord with the established convention, AAIs were transcribed verbatim, and all personally identifying information was removed prior to coding. Nonetheless, it is important to point out that in some cases, AAI coders could not be considered completely unaware of ethnicity because of language use and content.

Measures

The Adult Attachment Interview Q-Set (Kobak, 1993). To assess individual differences in attachment, we used the Adult Attachment Interview Q-Set, which consists of 100 descriptive cards that are sorted into a forced normal distribution across nine piles from least to most characteristic (5, 8, 12, 16, 20, 16, 12, 8, and 5 cards per column, respectively). The Kobak (1993) Q-sort was used in this study instead of Mary Main's (Main & Goldwyn, 1998) classification approach to AAI coding for several reasons: (a) Dozier and Kobak (1992) used the Q-sort system. Doing so here allowed for a direct comparison of our results with their important findings, which after 10 years remain unreplicated. (b) Contrary to conventional wisdom, recent evidence suggests that attachment variables (at least in infancy) may be distributed dimensionally, not in terms of discrete taxa (Fraley & Spieker, 2003). (c) The use of dimensions rather than categories maximizes statistical power (MacCallum, Zhang, Preacher, & Rucker, 2002). This is particularly important given modest-sized samples that are typically recruited with time- and labor-intensive procedures such as the AAI. (d) Finally, all evidence available suggests that empirical convergence between the Kobak (1993) Q-sort and Main and Goldwyn's (1998) attachment classification system exceeds the minimum standard of reliability used to train coders in classifying AAI transcripts (see, e.g., Allen et al., 2003; Kobak et al., 1993). Data derived from independent scoring of transcripts using each method suggest measurement equivalence of the Kobak (1993) Q-sort and Main and Goldwyn's (1998) attachment classifications, at least up to the reliability of the classification system.[5] Nonetheless, it is important to point out that Kobak's (1993) Q-sort system does not identify adults who are *unresolved* with respect to loss or abuse.

To further ensure the validity of the attachment data in this study, we had each AAI transcript Q-sorted by at least one of three judges who were trained in the classification-based coding system of Mary Main and declared reliable by her laboratory. Specifically, all coders had achieved ≥ .80 reliability with a training set of 32 cases on both three-way (secure, dismissing, preoccupied) and four-way (secure, dismissing, preoccupied, unresolved) AAI classifications prior to coding for the present study. Although there is currently no equivalent training in the AAI Q-Set method, Glenn I. Roisman conferred with Roger Kobak throughout the course of this study.

To estimate interrater reliability, we double-sorted 66% (40/60) of the AAI transcripts from this study, and a reliability of .6 or greater (Spearman-Brown prophecy formula) was achieved for 80% of these transcripts. A third coder rated transcripts on which the initial coders were discrepant, and sorts that were most highly correlated were ultimately averaged (reliabilities of composited sorts ranged from .73 to .93; $M = .82$). To our knowledge, this is the first time that Kobak's (1993) Q-sort has been applied with raters who had all been trained and certified as reliable by Mary Main in AAI classification-based coding prior to data reduction. As such, not all transcripts were sorted twice, as has become typical out of necessity in laboratories applying the AAI Q-sort that have been limited to one (e.g., Kobak et al., 1993) or no (Lewis, Feiring, & Rosenthal, 2000) trained AAI coders. Establishing sample-specific interrater reliability on a subsample of AAI Q-sorts is not without precedent, however, as Mary Dozier and her colleagues have made use of this approach as well (see, e.g., Dozier, Cue, & Barnett, 1994; Dozier & Lee, 1995). Moreover, this is standard practice in virtually all AAI studies that use Main and Goldwyn's (1998) attachment classification system.

In the final step of data reduction, Pearson correlations were computed between each of the composited sorts and both a prototypic "secure/insecure" sort and a "deactivation/hyperactivation" sort developed by Roger Kobak and his colleagues (see Kobak et al., 1993, for details). Prototypically secure (in contrast to insecure) cards include "responds in a clear, well-organized fashion" and "is credible and easy to believe." Prototypically deactivating cards (in contrast to hyperactivating/preoccupied cards) include "subject persistently does not remember" and "provides only minimal responses." On the basis of this analysis, partici-

[5] As a check, participants were categorized into attachment classifications using the security/insecurity and deactivation/hyperactivation dimensions. In no case did this process result in a classification that differed from the expectations of the coders, all of whom were trained and reliable in Main's (Main & Goldwyn, 1998) classification-based coding system for the AAI.

pants were assigned continuous scores ranging from −1.00 to 1.00 on each construct, with higher scores indicating greater resemblance to the prototypically secure and prototypically deactivating individuals. By definition, the deactivation/hyperactivation dimension is the variable of choice if one is attempting to demonstrate that an outcome is *specifically* associated with a dismissing as opposed to a preoccupied state of mind (or vice versa), as was the case with the analyses focused on associations between deactivation and electrodermal response.

Since the publication of Dozier and Kobak's (1992) work, a second set of prototypes has been developed and validated, allowing for separate continuous ratings of the dismissing and preoccupied dimensions (for details see Spangler & Zimmermann, 1999). For these variables, highlighted in the facial expressive and self-reported emotion analyses, negative scores indicate less prototypically dismissing/preoccupied transcripts, and positive scores indicate more prototypically dismissing/preoccupied transcripts. Prototypically dismissing cards include "responses are superficial and require further probes" and "parental descriptions are stereotyped." Prototypically preoccupied cards include "is confused or overwhelmed with information about parents" and "loses topic during interview, failing to complete thoughts." Importantly, these dimensions are not redundant with the deactivation/hyperactivation dimension described above. Instead, the preoccupied and dismissing dimensions are meant to be used instead of the deactivation/hyperactivation dimension in the absence of a strong a priori claim that a given outcome is uniquely associated with dismissing but not preoccupied attachment states of mind (or vice versa). Note finally that all attachment scores were transformed (log base 10) to correct for skew and were standardized (raw descriptive data, however, are presented in Table 2 and were used in the *t* tests presented in Table 4).

Self-reported valence of childhood experiences. In addition to using Kobak's (1993) Attachment Q-Set to derive attachment dimensions, individual cards (e.g., descriptors) can be averaged to create "mega-items" (see, e.g., Spangler & Zimmermann, 1999). In the current study, we were interested in the match between emotion (self-reported and behaviorally expressed) and the valence of life experiences that participants discussed during the interview. As such, we averaged the ratings given on a 9-point scale to all cards describing the quality of participants' early experiences (setting aside "state of mind" cards focused on the coherence of their discourse) to create an inferred childhood experience variable, with low scores indicative of negative parenting experiences and high scores indicative of positive parenting experiences ($\alpha = .93$). For greater ease of interpretation, this variable was reversed in some analyses described later, as indicated, so that higher scores referenced more negatively valenced inferred childhood experiences.

Although there are no doubt cultural differences in terms of what might be viewed as optimal parental behaviors, it is important to point out that the inferred childhood experience cards were designed to be sufficiently global to be applicable to positive and negative parenting experiences within both Eastern and Western cultural contexts. Examples of cards indicating positive childhood experiences include "mother was generally forgiving of mistakes and limitations" and "father actively encouraged subject in developing his or her abilities." Examples of cards indicating negative childhood experiences include "father was psychologically unavailable" and "mother was too busy or preoccupied to pay attention to subject." Although inferred experience cards can be factored into four early experience components (R. R. Kobak, personal communication, no date available), the higher order aggregate was used here to maximize reliability and comprehensiveness.

Physiology. Second-by-second measures of physiological responding were sampled from participants' electrodermal and cardiovascular systems during the baseline period and AAI administration. Electrodermal response was measured by *skin conductance level* (SCL). A constant-voltage device was used to pass a small voltage between electrodes attached to the palmar surface of the middle phalanxes of the first and third fingers of the nondominant hand. SCL was measured in micromhos. The specific cardiovascular measures obtained were as follows: (a) *cardiac interbeat interval* (IBI; electrodes with Redux paste were placed in a bipolar configuration on opposite sides of each participant's chest, and IBI was measured as time in milliseconds between successive R waves of the electrocardiogram [EKG]), (b) *pulse transmission time to the finger* (FPT; calculated by measuring time in milliseconds between the EKG R wave and the arrival of the pulse pressure at the finger), and (c) *pulse transmission time to the ear* (EPT; a photoplethysmograph was attached to the ear lobe on the participant's nondominant side to measure the volume of blood in the ear, and EPT was calculated in milliseconds by measuring time between the EKG R wave and the arrival of the pulse pressure at the ear). Mean levels of physiological responding were calculated during the baseline period and for each question during the AAI. Change in physiological responding was calculated by subtracting mean levels of physiological responding during baseline from mean levels during each interview question, a practice commonly used in physiological research that has been defended conceptually and statistically by Rogosa (1995) and was used by Dozier and Kobak (1992).

Expressive behavior. Research assistants coded every facial event that occurred during the AAI, starting when the participants began to respond to the interview questions and ending when they were finished, using the Facial Action Coding System (FACS; Ekman & Friesen, 1978). The FACS

Table 2
Descriptive Statistics

Measure	Minimum	Maximum	*M*	*SD*
Attachment dimensions				
Security	−.59	.86	.29	.50
Dismissing	−.71	.71	−.17	.46
Preoccupation	−.53	.59	−.20	.28
Deactivation/hyperactivation	−.43	.63	.02	.28
Inferred childhood experiences[a]				
Negative	2.83	7.31	4.22	1.14
Positive	2.69	7.17	5.78	1.14
Observed emotion				
Negative (frequency)	5.00	288.00	98.38	71.11
Positive (frequency)	6.00	225.00	100.75	57.85
Self-reported emotion				
Negative emotion	0.00	5.00	0.47	0.87
Positive emotion	0.29	5.86	2.78	1.58

[a] To facilitate interpretation of analyses, positive and negative inferred childhood experience constructs represent the same variable reversed.

is a comprehensive, anatomically based system for measuring all visually discernible facial movement that describes all facial activity on the basis of 44 unique action units (AUs) as well as several categories of head and eye positions and movements. Scoring involves decomposing a facial movement into the particular AUs that produce it, either singly or in combination with other units. Note that FACS scoring is completed without audio, thus keeping coders unaware of the content of individuals' narratives.

Two coders, both of whom had completed a FACS training and certification program prior to scoring, independently performed the FACS coding. During the process of coder certification, the reliability of each coder was established against a criterion developed by Paul Ekman. In order to establish sample-specific interrater reliability in the present study, both coders scored the facial expressions of 8 participants in common, including both Chinese American as well as European American participants. Interrater reliability was estimated according to Ekman and Friesen's (1978) method of calculating the ratio of the number of agreements in emotional expressions to the total number of agreements and disagreements, yielding for this study a mean agreement ratio of .85.

To reduce FACS data further for analysis, we grouped combinations of AUs into specific emotion categories on the basis of an empirically and theoretically derived database of expression patterns (Alvarado & Jameson, 1996; Dimberg & Lindquist, 1988; Ekman & Friesen, 1978; Rosenberg, Ekman, & Blumenthal, 1998; Rozin, Lowery, & Ebert, 1994; Sayette & Hufford, 1995; Specific Affect Coding System [SPAFF] manual, as cited in Gottman & Levenson, 1992; Wiggers, 1982). This study focuses on two such behavioral aggregates: (a) indicators of general positive expressions (involving AU 12 [both lip corners pulling up] either singly or in combination)[6] and (b) indicators of general negative expressions. Two kinds of negative affect indicators were aggregated: (a) those involving AU 4 (lowering and pulling brows together) either singly or in combination and (b) contempt and disgust expressions involving unilateral movement of the lip corners (unilateral AU 12 or AU 14) and/or wrinkling of the nose (AU 9) and/or raising of the upper lip (AU 10). We examined the frequency of these behaviors according to the criteria given in the FACS manual.

Reports of emotional experience. A self-report inventory consisting of 25 emotion terms was administered after the AAI was completed. We were interested in 16 of the 25 terms; the remaining terms were fillers. For each of the emotion terms, participants rated how they felt during the interview using an anchored 9-point Likert-type scale (0 = *no emotion*, 4 = *moderate emotion*, and 8 = *the most emotion you have felt in your life*). Principal-components analyses revealed that these emotion terms comprised two reliable factors (a third, unreliable, low-intensity negative affect aggregate, including sadness, was discarded): Positive Emotion (contentment, love, happiness, satisfaction, pride, calm, and interest) and Negative Emotion (anger, contempt, disgust, and fear). Cronbach's alphas for the aggregates were .88 and .77, respectively. The self-reported emotion variables were standardized and transformed (log base 10) for correlational and regression analyses.

Cultural orientation. Before arriving at the laboratory, Chinese Americans completed the Chinese and American versions of the General Ethnicity Questionnaire (GEQC and GEQA; Tsai et al., 2000) to indicate how oriented they were to Chinese and American cultures, respectively. The General Ethnicity Questionnaire allows independent assessment of orientation to Chinese and American cultures and has been shown to differentiate among various Chinese American groups. Participants use a 5-point Likert-type scale ranging from *strongly disagree* (1) to *strongly agree* (5) to rate 25 items pertaining to their social affiliation, activities, attitudes, exposure, and food. Participants use a 5-point scale ranging from *very much* (1) to *not at all* (5) to rate 13 items pertaining to their language use and proficiency. In the current study, Cronbach's standardized item-alphas for the GEQC and GEQA were .70 and .84, respectively, for the Chinese American group.

To assess the concurrent validity of the GEQC and the GEQA for our Chinese American sample, we examined the relationship between years in the United States and average cultural orientation scores. As found by Tsai et al. (2000), the longer Chinese Americans had lived in the United States, the more oriented they were to American culture ($r = .67$, $p < .01$) and the less oriented they were to Chinese culture ($r = -.76$, $p < .01$). European Americans completed the GEQA only. Cronbach's alpha for the European American sample was .78. As expected, European Americans were more oriented to American culture than were the Chinese Americans in the sample (see Table 1).

Results

Analytic Plan

Data for this study were analyzed by channel of emotional response. First we focus on results related to participants' physiological reactivity during the AAI. Next, we present the facial expressive and self-reported emotion data. Finally, all significant findings are probed for potential moderating effects of sex and ethnicity (post hoc analyses of null findings revealed no significant sex or ethnicity interactions). Prior to testing substantive hypotheses, however, we present descriptive data for the primary variables of the study and examine potential mean-level sex and cultural differences on attachment variables.

Descriptive Data

Table 2 provides descriptive data on the principal variables used in this analysis. Importantly, means and standard deviations of the attachment dimensions are consistent with results of previous studies using Kobak's (1993) Q-set (e.g., Dozier & Kobak, 1992). Sixty-four physiological change variables (4 channels of response $\times$ 16 AAI questions) were also used in the analyses presented in this article. For descriptive purposes, mean physiological change during each question of the interview was averaged for each physiological channel across all of the questions of the interview. These data demonstrate that, on average, participants showed modest increases in physiological activation during the AAI relative to baseline conditions (SCL = +.18 micromhos, $SD = .38$; cardiac IBI = −29.46 ms, $SD = 62.31$; FPT = −10.61 ms, $SD = 14.49$; EPT = −7.95 ms, $SD = 20.23$). Raw descriptive data on physiological response at baseline and during the AAI are presented in Table 3. Results of paired comparison *t* tests revealed that, with the exception of IBI and EPT during Question 8 (which focused on experiences of rejection), all other SCL, IBI, FPT, and EPT mean values during the interview differed significantly from baseline levels ($p < .05$, two-tailed).

Cultural and Sex Differences on Attachment Variables

Independent-samples *t* tests were run to determine if there were mean-level cultural or sex differences on the adult attachment dimensions (security, preoccupied, dismissing, and deactivation/

[6] Although a distinction between felt (Duchenne) versus unfelt (non-Duchenne) forms of positive emotion has been proposed (Ekman, Friesen, & O'Sullivan, 1988; Duchenne smiles include orbicularis oculi movement in addition to the lip corners moving upward), the pattern of results reported in this study was consistent whether we focused on Duchenne or non-Duchenne smiles.

Table 3
Mean Physiological Response (and Standard Deviations) at Baseline and During the Adult Attachment Interview

Interview question	SCL	IBI	FPT	EPT
Baseline	.00 (.19)	791.04 (123.30)	263.51 (20.74)	232.79 (24.65)
Q1: Background	.17 (.24)	737.36 (109.93)	253.33 (19.35)	226.18 (23.48)
Q2: Describe relationships	.15 (.28)	730.54 (107.88)	250.32 (20.64)	224.91 (24.08)
Q3: Adjectives for mother	.15 (.35)	746.90 (109.05)	251.73 (20.59)	224.41 (24.52)
Q4: Adjectives for father	.17 (.40)	756.23 (109.41)	252.50 (20.71)	224.43 (25.71)
Q5: Which parent feel closest to	.19 (.36)	761.30 (115.46)	252.36 (20.92)	227.05 (27.03)
Q6: Upset	.20 (.38)	765.58 (107.28)	253.86 (20.21)	225.62 (26.21)
Q7: Separated	.18 (.41)	768.83 (107.95)	253.89 (19.04)	225.96 (26.30)
Q8: Rejected	.18 (.42)	777.34 (114.16)	256.46 (22.10)	228.72 (27.80)
Q9: Threatened	.20 (.41)	761.79 (107.95)	254.43 (19.82)	224.50 (25.35)
Q10: Experience affect personality	.20 (.40)	762.24 (109.93)	253.64 (20.12)	225.31 (25.30)
Q11: Why parents behaved	.20 (.41)	761.79 (107.95)	251.77 (21.26)	222.22 (23.55)
Q12: Close to other adults	.18 (.43)	774.11 (118.45)	255.16 (20.74)	224.95 (25.69)
Q13: Loss	.18 (.45)	767.01 (127.95)	252.58 (20.79)	224.33 (25.82)
Q14: Trauma	.18 (.45)	772.31 (110.28)	252.16 (20.79)	225.06 (32.46)
Q15: Changes in relationship	.18 (.43)	760.06 (110.61)	250.93 (20.21)	221.86 (26.66)
Q16: Current relationship with parents	.16 (.42)	768.28 (126.51)	250.19 (23.19)	221.51 (28.43)

Note. SCL = skin conductance levels (in micromhos); IBI = cardiac interbeat interval (in milliseconds); FPT = pulse transmission time to the finger (in milliseconds); EPT = pulse transmission time to the ear (in milliseconds); Q = question. For cardiovascular indicators (IBI, FPT, and EPT), lower values indicate greater activation. Note that with the exception of IBI and EPT during Question 8, all other SCL, IBI, FPT, and EPT mean values during the interview differed from baseline levels at $p < .05$ (two-tailed).

hyperactivation).[7] The main effect of sex was not significant for any attachment dimension; however, there was a significant main effect of ethnic group for security and preoccupation (but not for the dismissing or deactivation dimensions). More specifically, Chinese Americans had lower mean security scores and higher preoccupation scores than did European Americans (see Table 4). When placed in the context of findings from prior studies, however, it appears that the Chinese American sample's security and preoccupation scores were consistent with previously published results from primarily Caucasian samples (e.g., Dozier & Kobak, 1992), which suggests that security may have been overrepresented in our European American sample. Although ethnicity was not covaried in the primary analyses presented below, findings were consistent when ethnicity was controlled in the follow-up moderator analyses.

AAI Dimensions and Physiological Response

The principal analyses relevant to the physiological data were focused on whether deactivating discourse was discriminantly and uniquely associated with electrodermal response in the AAI. In these analyses, we used Kobak's (1993) original two-prototype system (security/insecurity, deactivation/hyperactivation) to attempt direct replication of Dozier and Kobak's (1992) findings. This is appropriate theoretically, as research questions related to the physiological data focused exclusively on the specificity of the expected linkage between deactivation and electrodermal response.

Because electrodermal measures violated parametric assumptions, we conducted nonparametric Spearman correlational analyses to examine the associations between deactivation and change in electrodermal activity from baseline to each question of the AAI. These analyses revealed striking consistency with Dozier and Kobak's (1992) original findings, with coefficients ranging from .27 ($p < .05$) to .47 ($p < .01$; $M = .38$); by comparison, significant effects ranged from .29 to .43 in Dozier and Kobak's (1992) study. More specifically, deactivation was robustly linked to rises in skin conductance from baseline to each question of the AAI.[8] Moreover, as in Dozier and Kobak's (1992) analysis, skin conductance was found to be *discriminantly* related to deactivation, as rises in skin conductance from baseline were not significantly associated with security/insecurity (effects ranged from $-.18$ to .05, $M = -.10$; *p*s ranged from .18 to .72). As a check, the same pattern of results described above was replicated when the newer preoccupied and dismissing dimensions were used (the preoccupied dimension showed no significant correlations with electrodermal response, whereas the dismissing dimension showed modest positive associations with electrodermal change from baseline).

To determine whether deactivation was uniquely associated with electrodermal (as opposed to cardiovascular) response, we next correlated security and deactivation attachment scores with three measures of change in cardiovascular activity during the AAI

[7] We used *t* tests because they allow for an extremely liberal test of whether there were any sex or ethnic differences on the attachment variables.

[8] Results of supplementary growth curve modeling were consistent with change score analyses: Deactivation was associated with rises in skin conductance across the AAI. Importantly, these analyses did not use baseline scores but rather modeled within-individual growth in electrodermal activity. As such, the findings cannot simply be attributed to differences in basal physiological activity that may not have been adequately accounted for by subtracting mean levels during the 3-min baseline from physiological activity during each question of the AAI.

Table 4
Cultural and Sex Differences on Attachment Dimensions

	Chinese American		European American				
Attachment dimension	*M*	*SD*	*M*	*SD*	*t*	*df*	*p*
Security	.17	.49	.42	.48	2.02	(1, 58)	.05
Preoccupied	−.08	.34	−.31	.12	3.41	(1, 36)	.002[a]
Dismissing	−.09	.41	−.25	.50	1.33	(1, 58)	.19
Deactivation	.02	.25	.03	.31	0.23	(1, 58)	.82
	Female		Male				
	M	*SD*	*M*	*SD*			
Security	.30	.53	.27	.47	0.27	(1, 58)	.79
Preoccupied	−.15	.29	−.25	.26	1.32	(1, 58)	.19
Dismissing	−.22	.46	−.11	.45	0.92	(1, 58)	.36
Deactivation	−.03	.25	.09	.30	1.60	(1, 58)	.12

Note. Chinese Americans, $n = 30$; European Americans, $n = 30$; women, $n = 32$; men, $n = 28$.
[a] As Levene's test of homogeneity of variances was significant for this analysis, the statistics reported do not assume homogeneity.

(cardiac IBI, FPT, and EPT). Neither deactivation nor security was significantly associated with any measure of cardiovascular activation measured in this study during any question of the interview, which suggests that deactivating discourse shared a specific association with electrodermal activity (range of effects for deactivation = −.15 to .17, $M = .00$; *p*s ranged from .21 to .94; range of effects for security = −.19 to .08, $M = -.08$; *p*s ranged from .14 to .95). No significant correlations were observed between the newer dismissing and preoccupied dimensions and any measure of cardiovascular change from baseline.

In order to directly examine whether there were statistically significant differences in the effects of (e.g., correlations between) deactivation and electrodermal versus cardiovascular response, we computed a series of Fisher's *r* to *z* transformations and comparisons by AAI question. Adopting a one-tailed criterion in light of the fact that a directional prediction was articulated a priori, we found that 77% (37/48) of these contrasts proved to be statistically significant ($p < .05$; for an additional 21%, $p < .10$). Even with a stricter two-tailed test, 63% (30/48) of the contrasts were significant ($p < .05$; for an additional 17%, $p < .10$).

AAI Dimensions and Expressed/Self-Reported Emotion

Analyses for the facial expressive and self-reported emotion data follow in three sections. First, we describe associations between attachment dimensions and the facial expressive data. Second, we present correlations between attachment dimensions and self-reported emotion. Finally, regression analyses are described that were used to determine whether AAI dimensions were associated with the relative match between the valence of inferred early experiences described during the AAI and emotional expression as well as self-reports of emotional experience. For all expressive behavior and self-reported emotion analyses, Kobak's (1993) newer three-prototype Q-sort system (security, preoccupied, dismissing) was highlighted, as we were interested in the differential facial expressive and self-reported emotional correlates of each attachment dimension. The deactivation/hyperactivation dimension was not used initially in these analyses because we did not have a strong a priori expectation that preoccupied (but not dismissing) participants would show discrepancies between expressed/reported emotion and self-reported experience.

Table 5 summarizes associations observed between aggregate measures of the total number of general positive and negative emotions expressed behaviorally during the AAI and each attachment dimension. Consistent with the theoretical treatment outlined in the introduction, security was not associated with the frequency of either positive or negative emotions expressed during the interview. Also in accord with the hypotheses, preoccupation was significantly correlated with the frequency of negative (but not positive) expressions. Dismissing discourse was not significantly associated with positive or negative expressive behavior.

Table 5 also describes associations between attachment dimensions and positive as well as negative self-reported emotional experience during the AAI. Only preoccupation was marginally associated (negatively) with self-reported positive emotion. Security was associated with marginally less, and preoccupation with significantly more, negative emotional engagement. Dismissing orientations were not significantly associated with either self-reported positive or self-reported negative emotion.

In order to determine whether secure participants were more likely than insecure participants to express and self-report emotion congruent with the valence of their inferred early experiences described during the AAI, we subtracted the mega-item described earlier representing positive (or negative) childhood parenting experiences from standardized behavioral frequency and self-report measures of positive and negative emotion, as appropriate (positive expressed/reported emotion – positive experiences; negative expressed/reported emotion – negative experiences). Next, each attachment dimension (security, preoccupied, and dismissing) was in turn regressed on these discrepancy scores and their second-degree power polynomial (quadratic term) simultaneously. The quadratic term was chosen in line with our hypothesis that secure individuals should show more highly correspondent emotion and

Table 5
Correlations Between Attachment Dimensions and Observed as well as Self-Reported Emotion During the Adult Attachment Interview

	Attachment dimensions		
Emotion	Secure	Dismissing	Preoccupied
Observed			
Negative emotion	−.11	−.02	.38**
Positive emotion	.08	−.17	.15
Self-reported			
Negative emotion	−.21†	.18	.31*
Positive emotion	.11	−.12	−.24†

† $p \leq .10$. * $p < .05$. ** $p < .01$ (two-tailed).

inferred childhood experiences than should insecure participants (for a similar analytic approach, see Kobak et al., 1993).

Simultaneous regressions were used because they allow for a conservative test of the predictive power of second-order power polynomials to account for incremental variance in each attachment dimension after controlling for the linear discrepancies (Cohen & Cohen, 1983). Note that significant negative beta weights associated with quadratic terms indicate that the regression line is moving toward an inverted-U shape, implying that the attachment dimension is associated with matches between emotion and inferred early experiences (e.g., discrepancy scores close to 0, the midpoint). In contrast, positive beta weights indicate that the regression line is moving toward a U shape, suggesting that the attachment dimension is associated with discrepancies between emotion and the inferred valence of early experiences (e.g., more negative emotion than negative experiences; less negative emotion than negative experiences). Importantly, the linear discrepancy terms cannot be unambiguously interpreted (as they are partially redundant with the criterion) and should be viewed simply as linear controls for the squared terms.

Tables 6 and 7 summarize the relevant regressions. First, as predicted, security was associated with matches in behaviorally expressed positive emotion and positive childhood experiences as well as congruence between negative expressive behavior and negative inferred childhood experience. Similarly, security predicted convergence between self-reported negative emotion during the AAI and negative childhood experiences. In contrast, in all but one regression (frequency of negative facial expressions − negative inferred childhood experiences), preoccupation was associated with *discrepancies* between emotion and inferred experiences. Dismissing styles, however, were less consistently associated with either matches or discrepancies between emotion and inferred childhood experience. In only one of four regressions was a marginal (positive) beta weight observed, implying that more prototypically dismissing participants may be more likely to manifest discrepancies between self-reported negative emotion during the interview and their inferred negative caregiving experiences. Post hoc analyses using the deactivation/hyperactivation dimension revealed that hyperactivated (preoccupied) states of mind were uniquely associated with discrepancies between reported positive emotion and positive inferred childhood experiences. All other analyses with this variable failed to reach statistical significance.

Generalizability of Findings

Follow-up regressions using Ethnicity × Deactivation and Sex × Deactivation interaction terms were used to test for moderating effects of ethnicity and sex on the associations observed between deactivation and electrodermal response. In short, these analyses provided no evidence that ethnicity or sex conditioned the deactivation–electrodermal linkage (all p values were nonsignificant, suggesting that effects were similar by ethnicity and sex). Furthermore, the findings were replicated within ethnic and sex groupings using split samples.

As we anticipated that cultural orientation (rather than ethnicity per se) might be a more relevant moderator of the physiological

Table 6
Simultaneous Regression Models Examining Whether Attachment Dimensions Are Associated With Convergence or Divergence Between Frequency of Expressed Emotion and Valence of Inferred Early Experiences During the Adult Attachment Interview

	Attachment dimensions		
Model	Secure	Dismissing	Preoccupied
Neg. Expression − Neg. Experience Squared			
β weight	−.30**	.15	.18
Total R^2	.41	.31	.17
$F(2, 59)$	20.00**	12.60**	6.28**
Pos. Expression − Pos. Experience Squared			
β weight	−.30*	.21	.21*
Total R^2	.30	.14	.48
$F(2, 59)$	12.11**	4.57*	26.43**

Note. Positive beta weights indicate that the attachment dimension is associated with discrepancies between the emotional valence of participants' inferred experiences and their facial expressions during the Adult Attachment Interview (AAI). Negative beta weights indicate that the attachment dimension is associated with convergence between the emotional valence of participants' inferred experiences and their facial expressions during the AAI. Note that linear discrepancy terms are controlled in each regression model. Pos. = positive; Neg. = negative. * $p \leq .05$. ** $p < .01$ (two-tailed).

Table 7
Simultaneous Regression Models Examining Whether Attachment Dimensions Are Associated With Convergence or Divergence Between Self-Reported Emotion and Valence of Inferred Early Experiences During the Adult Attachment Interview

Model	Attachment dimensions		
	Secure	Dismissing	Preoccupied
Neg. SR Emotion − Neg. Experience Squared			
β weight	−.37**	.23†	.50**
Total R^2	.36	.21	.43
$F(2, 59)$	16.06**	7.35**	21.13**
Pos. SR Emotion − Pos. Experience Squared			
β weight	−.11	−.11	.26**
Total R^2	.24	.15	.30
$F(2, 59)$	8.86**	5.10**	10.06**

Note. Positive beta weights indicate that the attachment dimension is associated with discrepancies between the emotional valence of participants' inferred experiences and their self-reports of emotion during the Adult Attachment Interview (AAI). Negative beta weights indicate that the attachment dimension is associated with convergence between the emotional valence of participants' inferred experiences and their self-reports of emotion during the AAI. Note that linear discrepancy terms are controlled in each regression model. SR = self-reported; Pos. = positive; Neg. = negative.
† $p < .10$. * $p < .05$. ** $p < .01$ (two-tailed).

effects observed, we examined participants' self-reported cultural orientations to American and Chinese cultures using Tsai et al.'s (2000) GEQA and GEQC. Neither orientation to American values nor orientation to Chinese values moderated the associations observed between deactivation and electrodermal response.

Regarding the linkages between AAI dimensions and emotional behavior, inspection of coefficients by ethnicity revealed that the associations between preoccupation and negative emotion obtained only for Chinese Americans (see Table 4 for sample-wide effects).[9] More definitive statistical tests of the difference of these effects using interactions were nonsignificant, however; this may have been due to relatively low statistical power. All other effects related to the behavioral data appeared similar by ethnicity and sex and were not conditioned by cultural orientation.

As with the analyses of emotional behavior, inspection of coefficients by ethnicity revealed that significant associations between preoccupation and self-reported negative emotion obtained only for Chinese Americans (see Footnote 9). Nonetheless, more definitive regressions using Ethnicity/Cultural Orientation × Preoccupation interactions were again nonsignificant, as was a regression analysis using a Sex × Preoccupation interaction.

Although no definitive ethnicity/cultural orientation moderator analyses could be conducted for the emotional coherence analyses given the limited size of each cultural sample, no Culture/Cultural Orientation × Attachment Dimension interactions proved significant in follow-up regressions. Moreover, inspection of effects within ethnicity and sex revealed that beta weights appeared similar for European Americans and Chinese Americans.

Discussion

The most commonly espoused theoretical account given for individual differences in adult attachment is that they represent qualitatively distinct emotional and cognitive organizations of prior experience. Specifically, secure adults are presumed to be able to freely examine childhood memories, whether malevolent or supportive in nature, whereas individuals with insecure working models are viewed as either having distanced themselves emotionally from the events of childhood (dismissing) or having become caught up and ultimately enmeshed in prior experience (preoccupied). This study was designed to provide one of the first thoroughgoing empirical examinations of these foundational assumptions about emotion regulation during the AAI (but see also Spangler & Zimmermann, 1999; Zimmermann, 1999).

The results of the present study support the view that attachment dimensions in adulthood are indeed associated with theoretically anticipated and qualitatively distinct organizations of emotional response during the AAI that conceptually parallel observations of attachment relationships in infancy. More specifically, the analyses presented in this article demonstrated that secure participants express and report emotion consistent with their inferred childhood experiences. Patterns of insecurity were likewise associated with distinctive organizations of emotional response: Prototypically dismissing participants showed subtle signs of covert emotional suppression as evidenced by robust electrodermal reactivity during the interview. In contrast, preoccupied adults showed reliable discrepancies between the valence of their inferred early experiences and their expressed as well as self-reported emotion during the AAI. We now elaborate on these findings by focusing on results by channel of emotional response.

Physiological Findings

This study replicated the results of Dozier and Kobak's (1992) important study, which provided psychophysiological support for the validity of the assessment of defensive processes in the AAI.

[9] Although it is unclear why these effects may have been stronger for Chinese Americans, one possible reason is psychometric in nature: There was significantly more variability in preoccupation for Chinese Americans than for their European American counterparts.

As in this earlier report, we found that young adults who appeared more prototypically dismissing when asked about their early attachment experiences showed increases in electrodermal activity, a physiological marker of the effortful inhibition of behavior. Moreover, this study expanded on the results of Dozier and Kobak (1992) by demonstrating that (a) deactivation was linked to electrodermal but not cardiovascular reactivity in the AAI, (b) security was not related to either electrodermal or cardiovascular response during the interview, and (c) these associations held for men and women and within two ethnic groups.

We caution readers, however, that because this analysis was guided by Fowles's (1980) ideas regarding the unique physiological correlates of the Behavioral Inhibition System (electrodermal activity) versus the Behavioral Activation System (cardiovascular activation), other potentially important parasympathetic physiological parameters related to emotion regulation, such as vagal tone (e.g., heart rate variability), were not examined. Within the developing framework of Beauchaine (2001), which extends Gray's (1975) motivational theory, we are currently exploring linkages between attachment dimensions and parasympathetic tone in challenging situations (e.g., attempting to resolve areas of disagreement in one's marital relationship). We expect that such data will yield important insights regarding the role that attachment narratives play in organizing physiological (and behavioral) regulation in the salient life contexts of adulthood, insights that may extend the findings presented in this study.

Expressive Behavior and Self-Reported Emotion

Our analyses focusing on expressive behavior and self-reported emotion also expand our insight into the emotional organization of adult attachment. Interestingly, however, these results were not entirely consistent with any previous theoretical treatment regarding the role that facial expressions and self-reported emotion may play in providing a window on emotional responding during the AAI (see, e.g., Hesse, 1999). On the one hand, results did not indicate that secure or dismissing orientations are strongly (or necessarily directly) associated with behavioral or self-reported emotional indicators. Still, measures of facial and self-reported emotion did provide useful information about emotional regulation, especially when we considered whether adults' emotional responses during the AAI were consistent with the valence of their inferred early experiences with caregivers.

Such behavioral and self-report data provide support for the notion that security and insecurity are reflected in the emotional organization of experience, that is, in the way in which emotion and the quality of one's recalled experiences are integrated in adult personality. For secure adults, emotion seems coherently tied to their descriptions of childhood experiences with caregivers. In the current study, for example, secure adults behaviorally expressed and self-reported emotion consistent with the nature of their childhood memories, whether they were speaking about more positive or negative early events. In contrast, preoccupied adults showed marked *discrepancies* between the inferred quality of their childhood experiences and behavioral/self-reported emotion during the AAI, a finding suggesting that, when called upon to talk about their early experiences, preoccupied adults become emotionally dysregulated. In contrast, dismissing adults could not be reliably discriminated from others in terms of the match between what they said about their childhood and their emotional behavior and self-reports. Still, consistent with the notion that dismissing discourse reflects a covert form of emotional suppression, such adults became electrodermally reactive during the interview.

Limitations

It should be emphasized that the results of this study are not definitive with respect to the issue of the cross-cultural consistency of the linkages observed between AAI dimensions and elements of expressed as well as self-reported emotional response. Clearly, a modest sample size in the present study precluded strong empirical tests of the potential moderating role of ethnicity for analyses focused on expressive behavior and self-reported emotion. Of note, however, is the fact that when cultural differences emerged, hypothesized results appeared strongest for the Chinese Americans in this sample, an ethnic group outside of the cultural contexts within which attachment theory was developed. Moreover, all physiological findings were replicated within both the Chinese American and European American subsamples examined in this study.

Nonetheless, the findings of the present study are limited by the nature of the sample, and stronger tests of attachment theory's core propositions will necessarily involve developing and validating adult attachment measures in other countries and ethnic contexts (see, e.g., Kazui, Endo, Tanaka, Sakagami, & Suganuma, 2000). Moreover, the use of clinical cutoffs for inclusion in this study may have resulted in a somewhat supernormal European American subsample, a definite trade-off in terms of protecting potentially vulnerable research participants and in ruling out psychopathology as a confound in these analyses.

Conclusion

Taken together, the scientific yield of research findings on adult attachment using the AAI is substantial, providing evidence that (a) relationship experiences with primary caregivers in childhood are internalized and carried forward into adulthood (Roisman et al., 2001), (b) adults' discourse can provide researchers with leverage in terms of understanding childhood experiences with malevolence and support (Allen & Hauser, 1996; Roisman et al., 2002; Waters et al., 2000), and (c) the way parents talk about their early experiences with caregivers reliably predicts the quality of their adult relationships (Cohn, Silver, Cowan, Cowan, & Pearson, 1992; van IJzendoorn, 1995a). Unfortunately, however, only a handful of these studies of adult attachment have turned a critical eye toward elucidating the deep structure of the individual differences inferred from the AAI. Such work provides a critical foundation for understanding the mechanisms by which prior relationship experiences may be carried forward into adulthood and offers more specific predictions about the developmental origins and consequences of each of these adult orientations toward childhood experiences (see, e.g., Dozier & Kobak, 1992; Spangler & Zimmermann, 1999; Zimmermann, 1999).

The present study adds to this body of research by providing a more complete picture of the three emotionally distinctive organizations of represented experience that can be inferred from the Adult Attachment Interview. Paralleling findings from classic research on individual differences in infant attachment (see, e.g.,

Sroufe & Waters, 1977), our data suggest that a key variable that makes secure, preoccupied, and dismissing adults different is the way that their emotional responses are tied to the valence of their memories regarding childhood experiences. Whereas secure adults appear to be "in sync" with their recalled pasts, dismissing and preoccupied individuals do not present as emotionally integrated, but in qualitatively distinct ways. Further extensions of the linkages described in this article to the developmental-adaptational domains of adulthood, including parenting and romantic relationships, represent exciting avenues for future research on adult attachment (see, e.g., Crowell, Treboux, & Waters, 2002; Roisman et al., 2002). The results of this study emphasize strongly that such work must include multiple levels of analysis and methods in order to fully explicate the social and emotional legacy of childhood experiences in the developmentally salient contexts of adulthood.

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